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Games and Game Jams: An Employability-First Approach to Educating Programmers

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Acknowledgements

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Games and Game Jams: Employability-First

CONTEXT



The Games Academy

- Launched new BSc in 'Computing for Games' in 2015
- Complement existing BA courses:
 - Animation
 - Art
 - Audio
 - Design
 - Programming
 - Writing
- Stimulate the local game development industry
- Nurture entrepreneurship



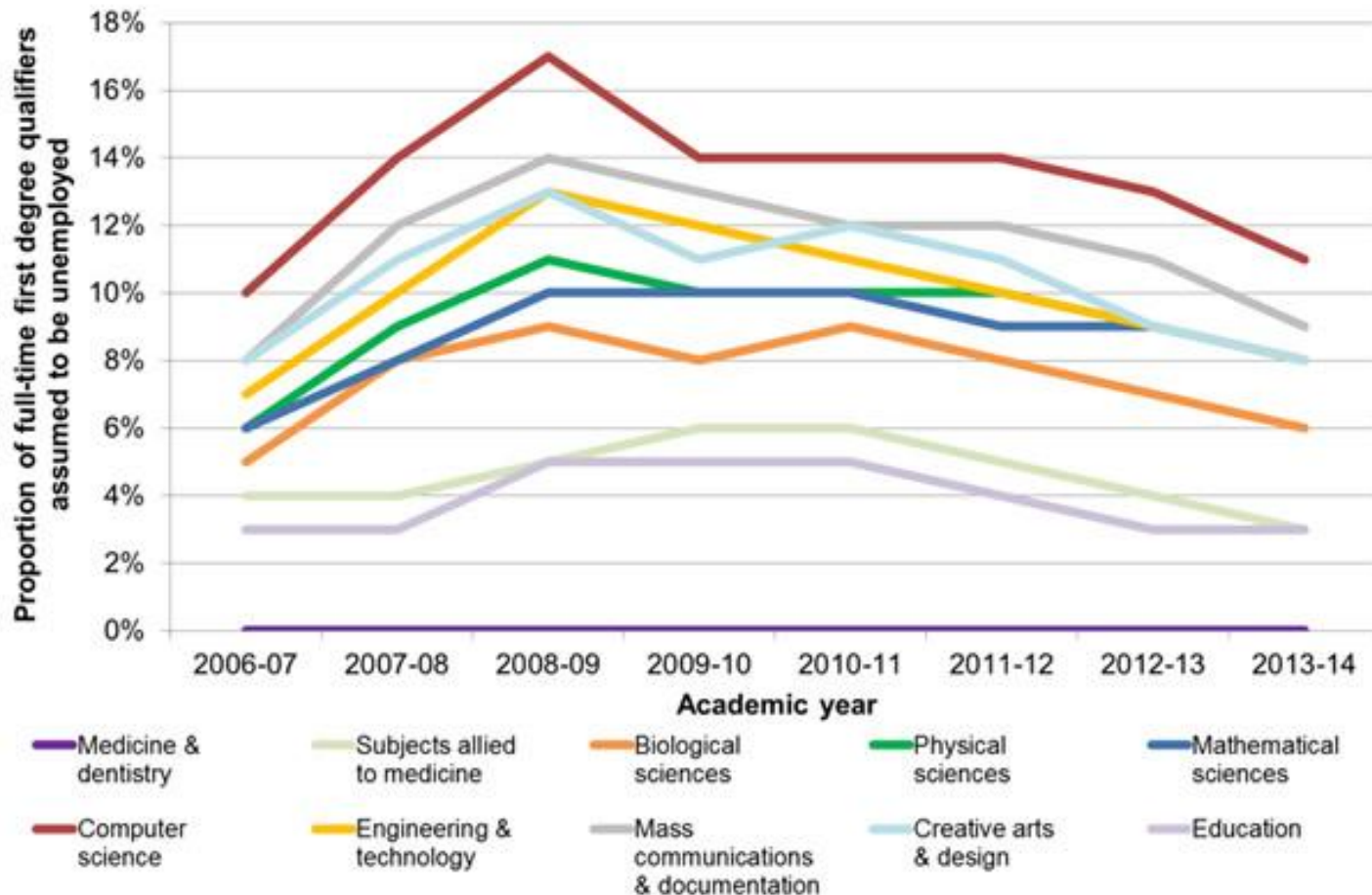


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Employability

- Employability skills are a central driver for the course.
- Widely Reported Skills Shortages in Computing
 - Livingstone & Hope Report (2011)
 - Code.org (2013)
- Mismatches between games industry and academia (McGill, 2009)
- *Higher* unemployment figures than comparable STEM subjects
 - Shadbolt Review(forthcoming)

STEM Graduate Unemployment



Further Challenges

- Employers in the games industry want [highly technical graduates] who can hit the ground running.
(Creative Skillset, 2014)

- **Problem Solving** and **Teamwork** skills endorsed across sectors.
(CBI-Pearson Report, 2012)

Further Challenges

- Wide range of backgrounds of incoming students, often without much experience on collaborative projects
- Few beginners seem to find writing code easy and enjoyable when they first set out. (Jenkins, 2001; Jenkins, 2002)

Further Challenges

- Historically, many do not perform well on “basic” programming tasks after instruction. (Soloway, Bondor & Ehrlich, 1983; McCracken et al, 2001; Tew & Guzdial, 2011; Fisler, 2014; Seppälä et al, 2015)
- Many HE institutional contexts do not readily offer opportunities for the type of interdisciplinary collaboration that employers are now demanding.

Moving Forward

Research Question

How can a computing course enhance the employability of its graduates?

Hypotheses

- H1 A programming game can be used to enhance problem-solving in the introductory programming context.

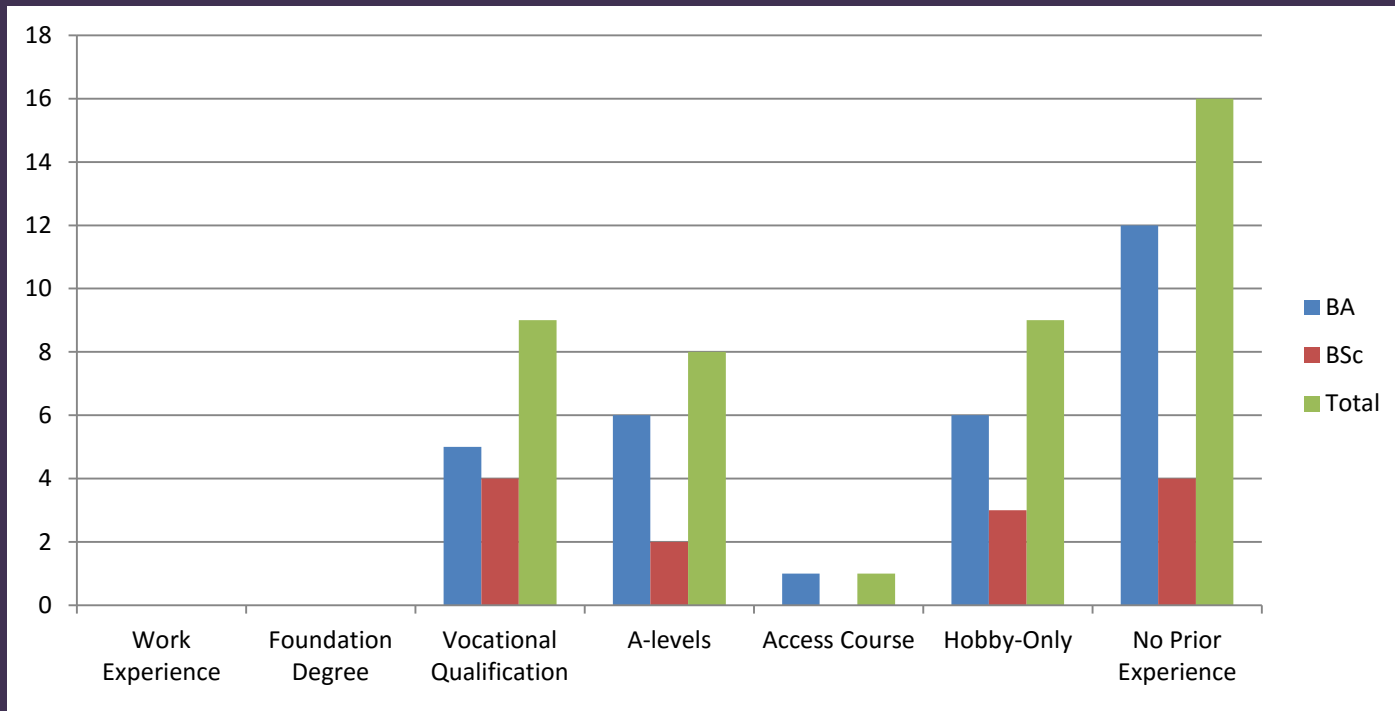
- H2 A games jam can be used to enhance teamwork in an interdisciplinary software development context.

Moving Forward

Sample – 2015/16 Intake

13 BSc Computing for Games

32 BA Games Development (Programming)



Moving Forward

Pilot Study Methodologies

The two case studies are observational in nature, involving the BSc students playing SpaceChem and the BA students engaging in game jams.

- BSc Students assigned SpaceChem to improve problem solving. Assessed *pre-* and *post-* via in-class Socratic activities in Weeks 1, 2, and Week 4.
- BA students were assigned two game jam projects to improve teamwork. Assessed via questionnaires and direct observation.

Games and Game Jams: Employability-First

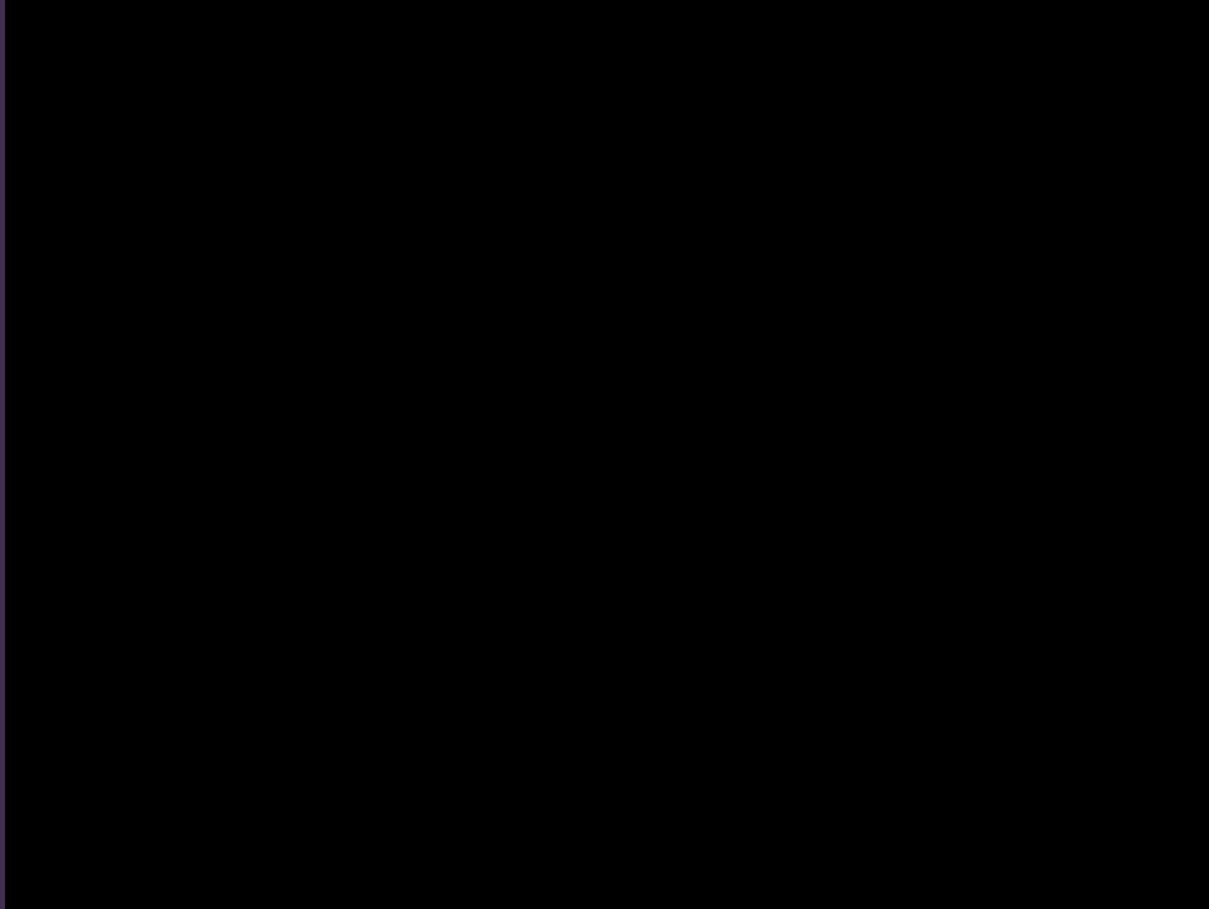
GAMES



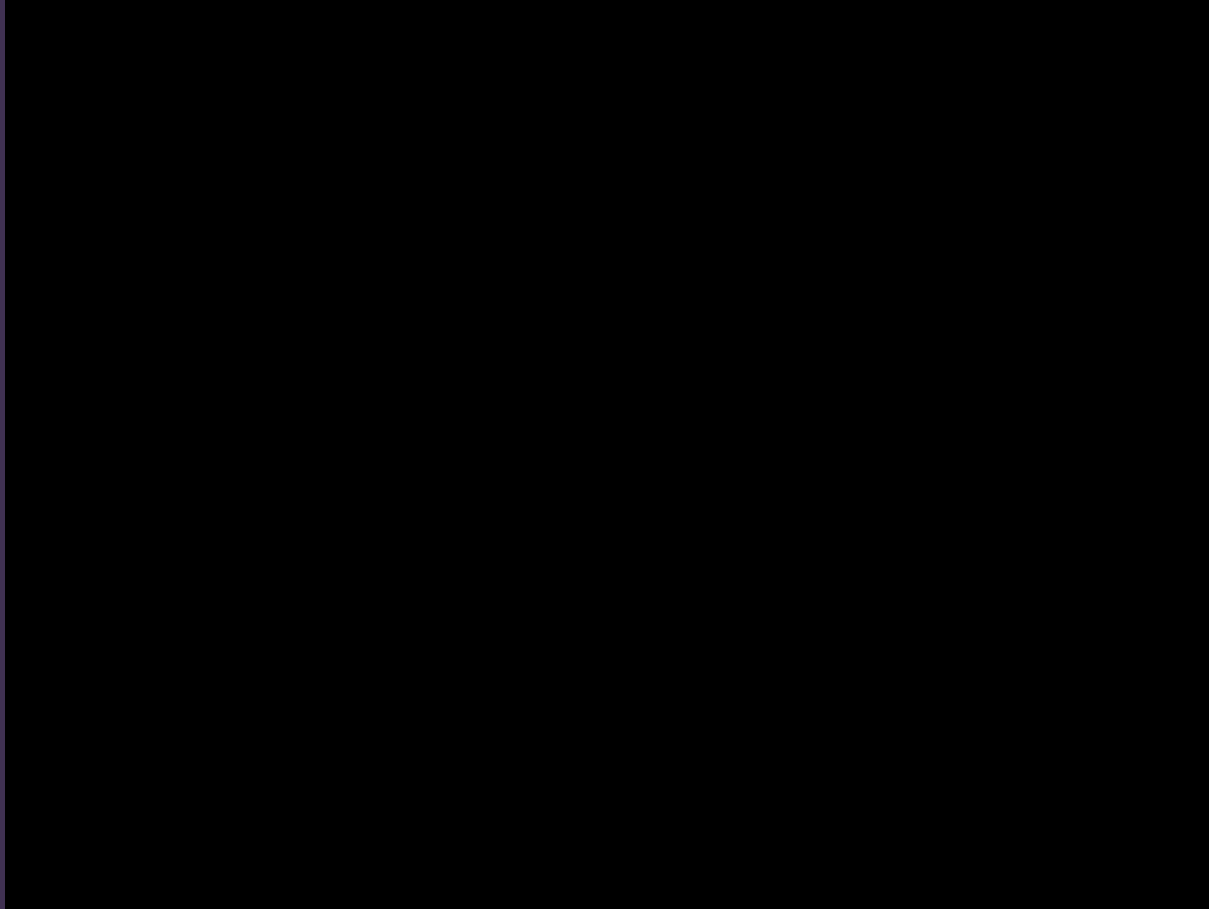
SpaceChem

- Free educational license for HEIs to install in laboratories
- Students can purchase directly on Steam for £6.99
- Runs on most hardware that students and institutions have access to

Circuits Submitted



Circuits Submitted

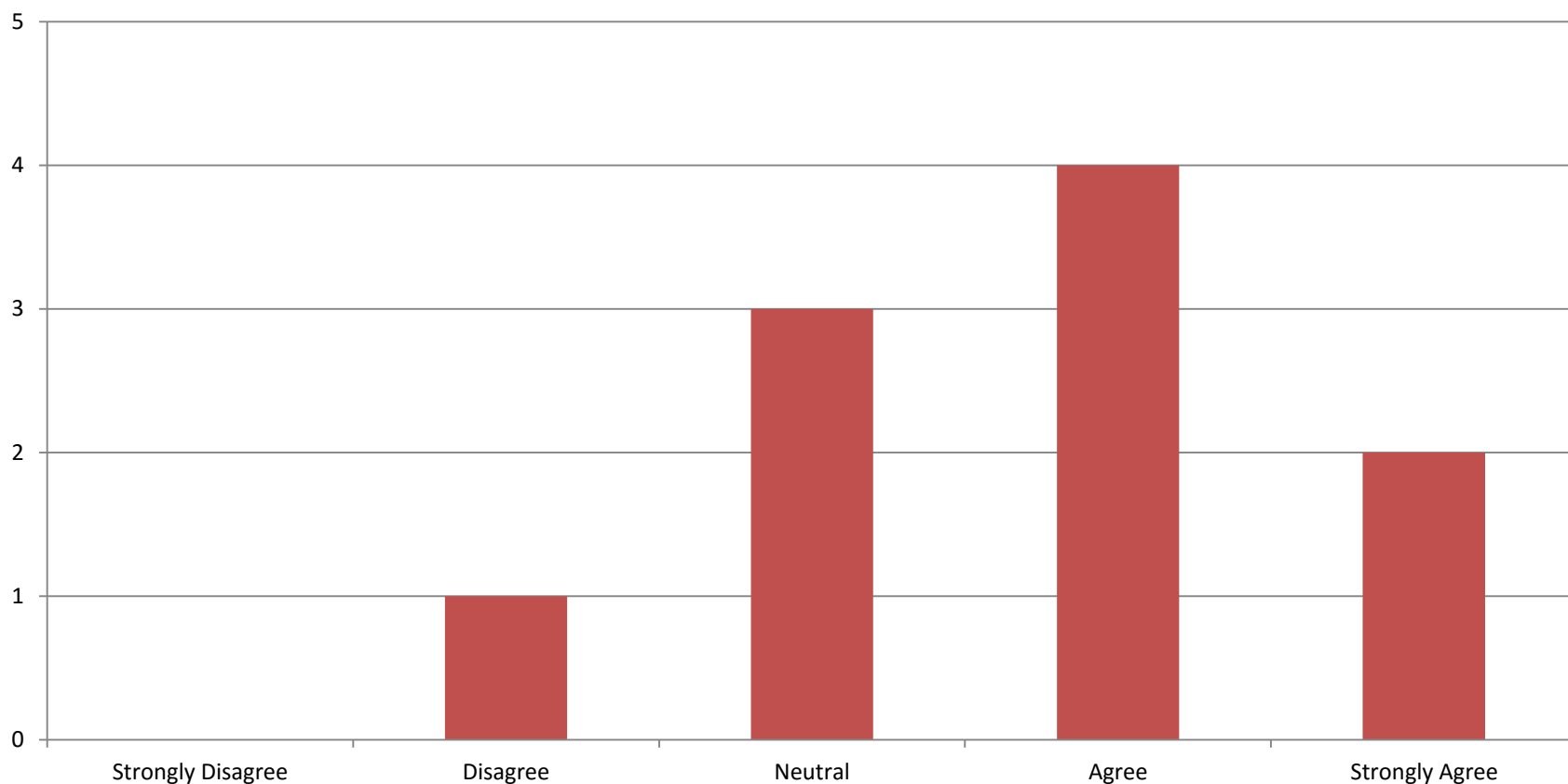


Results

t-Test: Paired Two Sample for Means		
	<i>Week 1</i>	<i>Week 3</i>
Mean	3.8	4.4
Variance	2.622222	1.6
Observations	10	10
Pearson Correlation	0.802832	
Hypothesized Mean Difference	0	
df	9	
t Stat	-1.96396	
P(T<=t) one-tail	0.040563	
t Critical one-tail	1.833113	

Results

I Enjoyed the SpaceChem Assignment



Results

“SpaceChem was an enjoyable assignment, it was a fun way to learn about the concepts of programming. I can't think about anything negative about it.”

Results

“The SpaceChem was tough at first but once completed I felt a sense of satisfaction for solving the puzzle.”

“It was an interesting start to the course and the comparison of symbols to functions was useful.”

Results

“It was a nice ice breaker
for the course.”

Results

“I'm on the last planet on Donopth
and I can feel my brain trying to
leak from my eyes.”

Games and Game Jams: Employability-First

GAME JAMS



Game Jams

- "Jam" is a reference to musician jam sessions (GGJ, 2015)
- Students get into teams and use the studio to make a game in a short period of time
- Nordic Game Jam and Global Game Jam have grown significantly in popularity since 2008
 - GGJ 2015 was hosted at 518 sites across 78 countries
 - 28,800 participants uploaded 5438 games over the 48 hrs of the jam

Game Jams

In our HEI context:

- 2 week project (10 working days)
- 9am – 5pm studio booking
- Studio practice supervised by full-time technician/demonstrator
- 32 programmers were divided up randomly into 10 teams to encourage pair-programming and to address attrition
- Total cohort of ~100 students drawn from all BA disciplines, resulting in teams of ~10 people
- Out-of-lab activities (e.g. Lectures) as normal

Game Jams



Game Jams



Game Jams



Game Jams



For educational use only

Game Jam Games

BA Level 1 Games – November 2015
Unity Projects

Available to Download

http://falmouthgamesacademy.com/l1s1_2015.html

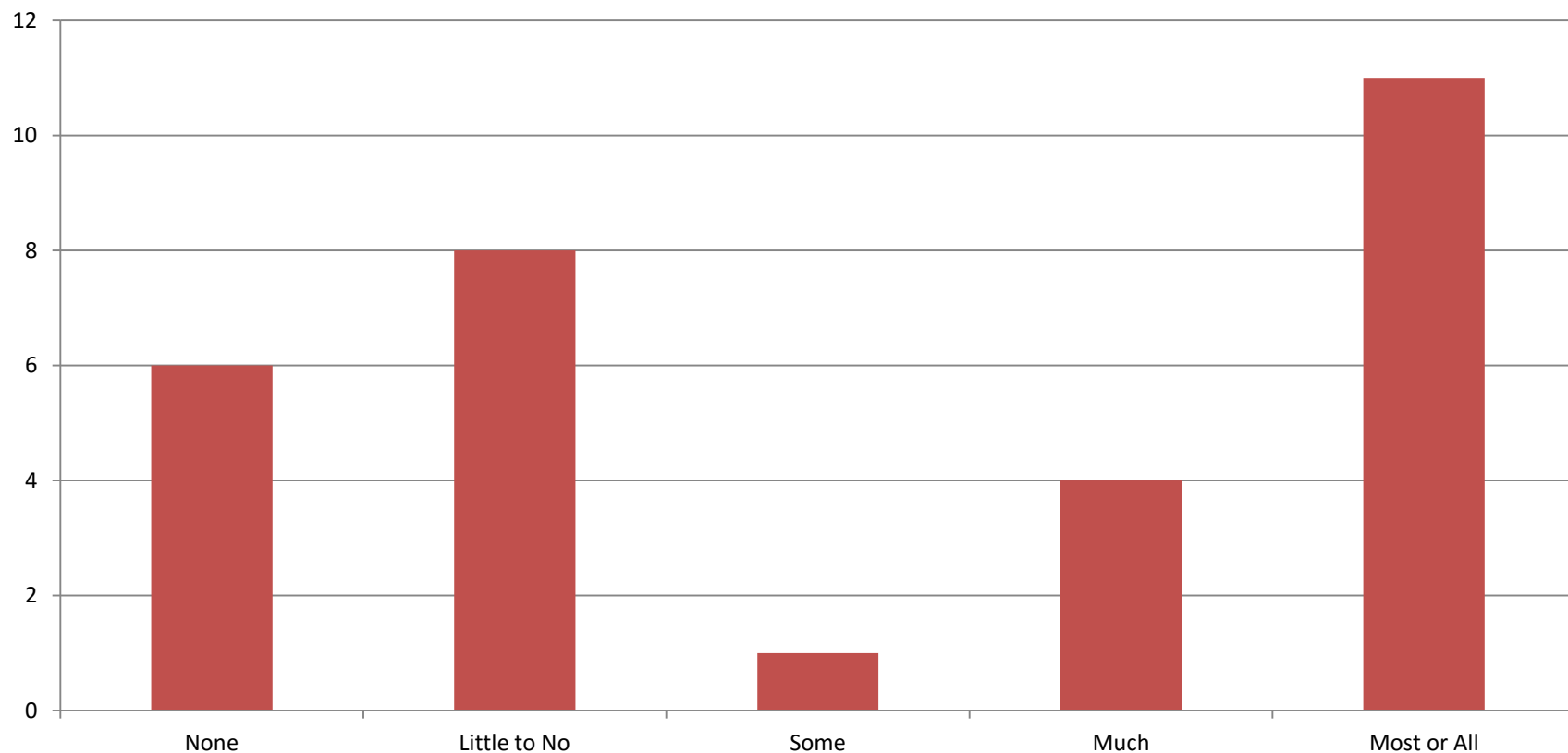
Results

t-Test: Two-Sample Assuming Unequal Variances

	<i>End of Project 1</i>	<i>End of Project 2</i>
Mean	4	3.5
Variance	0.666666667	1.166666667
Observations	10	10
Hypothesized Mean Difference	0	
df	17	
t Stat	1.167748416	
P(T<=t) one-tail	0.129512946	
t Critical one-tail	1.739606716	

Results

To what extent did you feel able to contribute to the programming-aspects of the project?



Results

“I found it a brilliant experience as I had never done anything like it before because of the team aspects and how everyone got to contribute to the game with their special role.”

Results

“Fun. Learned very quickly how to implement code in a gaming environment. Enjoyed working as a team.”

“Loved working in the team, everyone was nice and seemed to enjoy the project as much as I did.”

Results

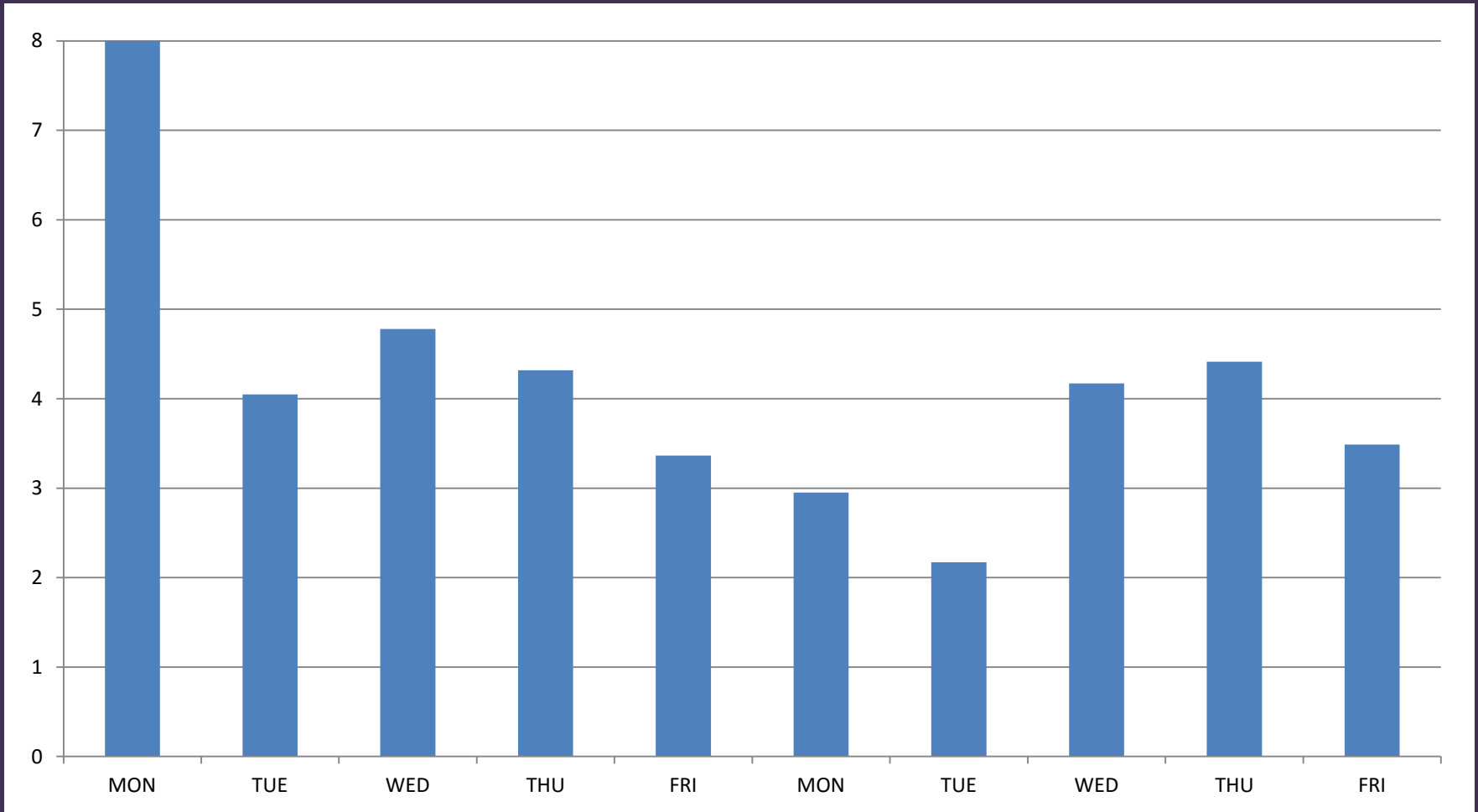
“I liked programming the game and also being part of the concept process.”

Results

“I do not feel I was able to try my hand at programming nearly as much as I would have liked, due to all the programming being carried out by [another programmer].”

“Most of our group members didn't contribute whatsoever despite constant attempts to involve them”

Game Jam Studio Attendance (Second Year BA)



Additional Challenges

- Intensive lab usage during the 2-weeks of the 'game jam' (fully blocked out)
- Inconsistent attendance
- Imbalanced teams

Games and Game Jams: Employability-First

FINAL REMARKS



Findings

- SpaceChem was an enjoyable activity that exercised students' problem solving skills
- There was a measurable increase in achievement on an in-class problem solving task after having played SpaceChem for 2 weeks as part of a course of study

Findings

- Game Jams were a well-received activity that exposed students' to interdisciplinary team work
- The decrease in team dissonance by the end of the first and second game jams was not statistically significant, but with only 10 groups, insufficient power to determine if a smaller than expected effect size is present

Limitations

- **Experimental data needed** --- case studies are observational in nature
- **Broader sample needed** --- students are self-selected game enthusiasts having enrolled on a 'games course' and may differ from the population of computing students
- **Larger sample needed** --- insufficient data to determine statistical significance in some cases
- **Rigorous measurement needed** --- used proxy measures that could be readily deployed in class without causing undue discomfort

Thank you for listening

Any Questions?

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