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Investigating student experiences of a Block Teaching Model in STEM courses

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Overview

Background to the study

Changes

Comparison

Overall comparison

By Discipline

By Course Type

Comment Analysis

Focus Group Planning

Further work needed

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Block Models

- Contrast with traditional ‘broadcast’ model of course delivery (Tapscott 2016)
- In 1960s, some courses designed as intensives (Davies 2006)
- More recently, intensives or block models have gained favour with changing demands by students (Coaldrake & Stedman, 2013; Marginson, 2016)
- Drivers are attrition rates, teaching capabilities, low student engagement, increased student/staff ratios, reduced student support mechanisms, financial factors (Dept of Education and Training, 2018)
- Most common reasons for moving to block model:
  - Better work-life balance (30%)
  - Increase engagement (25%)
  - Focus students on fewer subjects (10%)
  - Accommodate geographic distance (9%)
  - (Male et. Al. 2016).

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Background of University

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- Regional Australian University
- Several campuses
  - 3 regional campuses
  - partner campuses in metropolitan areas
  - some overseas partnerships
  - also offer courses fully online
- High proportion of
  - Online students
  - Mature-age students

The Southern Cross Model

- SCM introduced as an initiative to combat high withdrawal and failure rates
- SCM is a modified 'block' model
  - fewer courses studied at one time
  - intensive study
  - changes in delivery
- SCM Pilot in 2021 – selected courses across University
- Faculty of Science and Engineering (STEM)
  - Some pilot courses 2021
  - All other courses in 2022

SCM - Changes made

OLD (2021):
3 Trimesters of 13 weeks
Up to 4 courses at one time

SCM (2022):
6 Terms of 6 weeks
Up to 2 courses at one time

OLD (2021):
1 hr Lecture - all students
2 hrs tutorial - on-campus

SCM (2022):
2 hrs tutorials - all students
1 hr workshop - all students

OLD (2021):
PDF material, lecture notes, textbook, sometimes videos

SCM (2022):
OER Texts (if any), interactive H5P content, videos, active learning

Comparison

Courses chosen to compare:

- STEM courses in Faculty of Science and Engineering (includes computing and math)
- Criteria
  - course offered in 2021 in old model
  - Same course offered in 2022 in Southern Cross Model
- A total of 100 courses (250+ offerings)

Numbers of Units	U/Grad	P/Grad	Total
Engineering	18	5	23
Computing	22	18	40
Science	34	3	37
TOTAL			100

Comparison

What to compare?

- Success rate (what percentage of students passed)
- Grade Point Average (actual grades)

- Student satisfaction with the course as a calculated number out of 5

- Student sentiment (from text responses)
- Student feedback themes (from text responses)

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Analysis of data

Quantitative data was analysed by a number of statistical tests including:

- Wilcoxon-Signed Rank test (non-parametric equivalent to t-test)
- Kruskal-Wallis test (non-parametric equivalent to ANOVA)
- Bonferroni correction was used when groups were divided.

Qualitative data (primarily feedback comments on end-of-term surveys) was analysed using:

- Nvivo for word frequency – full analysis not completed yet
- BlueML for sentiment analysis – full analysis not completed yet
- Nvivo thematic analysis for focus groups – analysis not started yet

Comparison – all included courses 2021 to 2022

Success

80% -> 87%

p < 0.001
z = 3.18
W = 1850

GPA

4.4 –> 4.6
(out of 7)

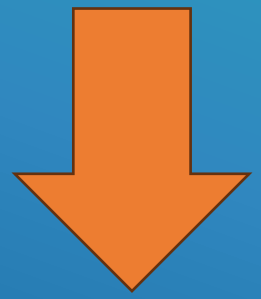
p = 0.012
z = 2.26
W = 194

Satisfaction

4.2 -> 4.0
(out of 5)

p = 0.0027
z = -2.78
W = -1568

Sentiment



40% pos -> 30% pos
[2040 comments]

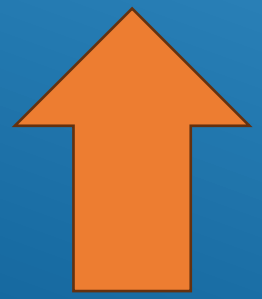
p <0.0001
phi = -0.12
Yates = 28.16

Comparison – undergraduate and postgraduate

Success

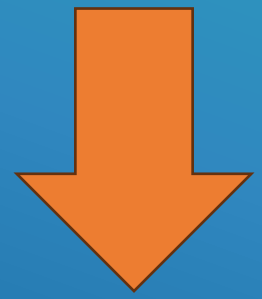
UG: 76% -> 85% **
PG: 89% -> 93% *

GPA



UG: 4.21 -> 4.46 *
PG: 4.83 -> 4.87
(out of 7)

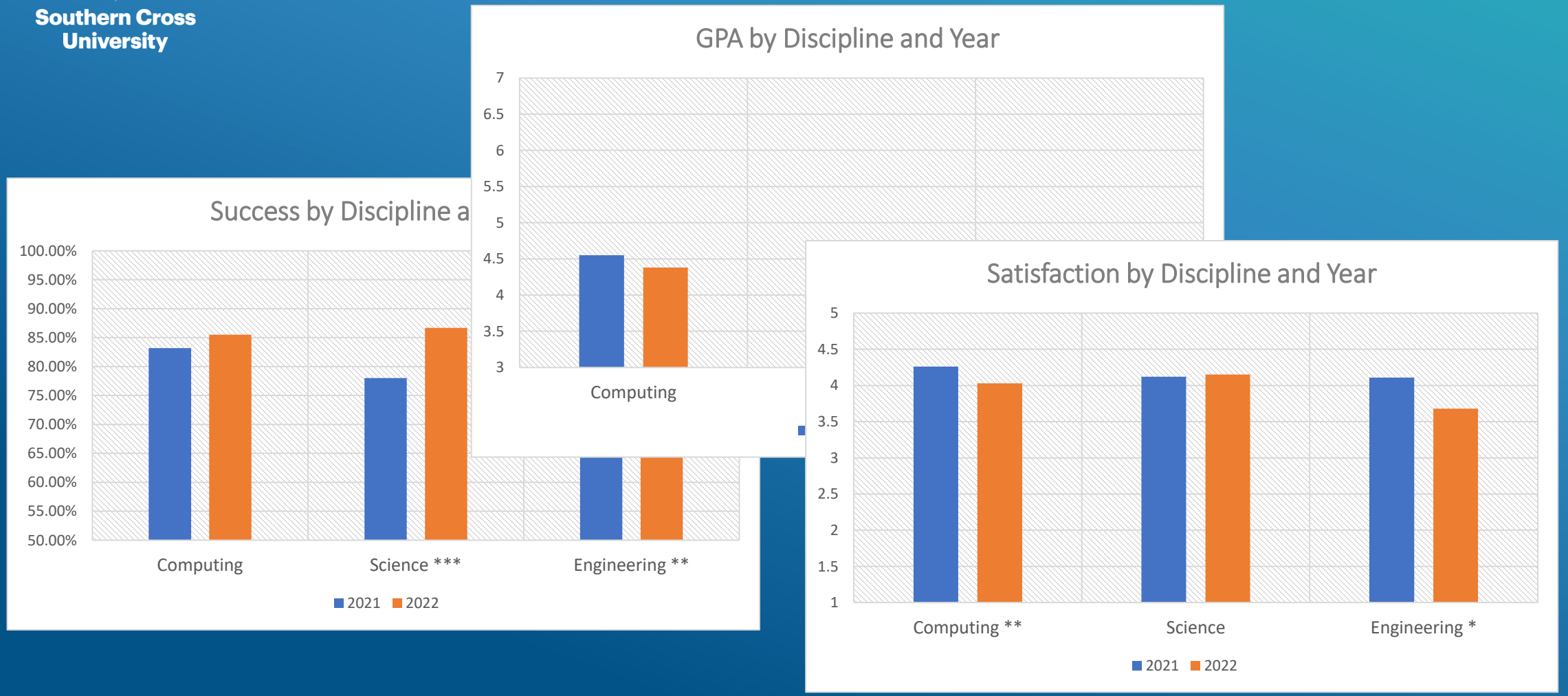
Satisfaction



UG: 4.08 -> 3.97
PG: 4.45 -> 4.08 **
(out of 5)

Statistical significance: * - $p < 0.05$ ** - $p < 0.01$ *** - $p < 0.001$
(Bonferroni correction equiv)

By Discipline – Science, Engineering and Computing



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By course type

Looking for explanation for results per discipline.

- Discussions
- Anecdotal evidence

- Five types of courses:
  - **Fieldwork**
  - **Maths**
  - **Programming and technical**
  - **New to software**
  - **Theory**

- Classification process
  - individual coding (by discipline staff)
  - discipline workshops

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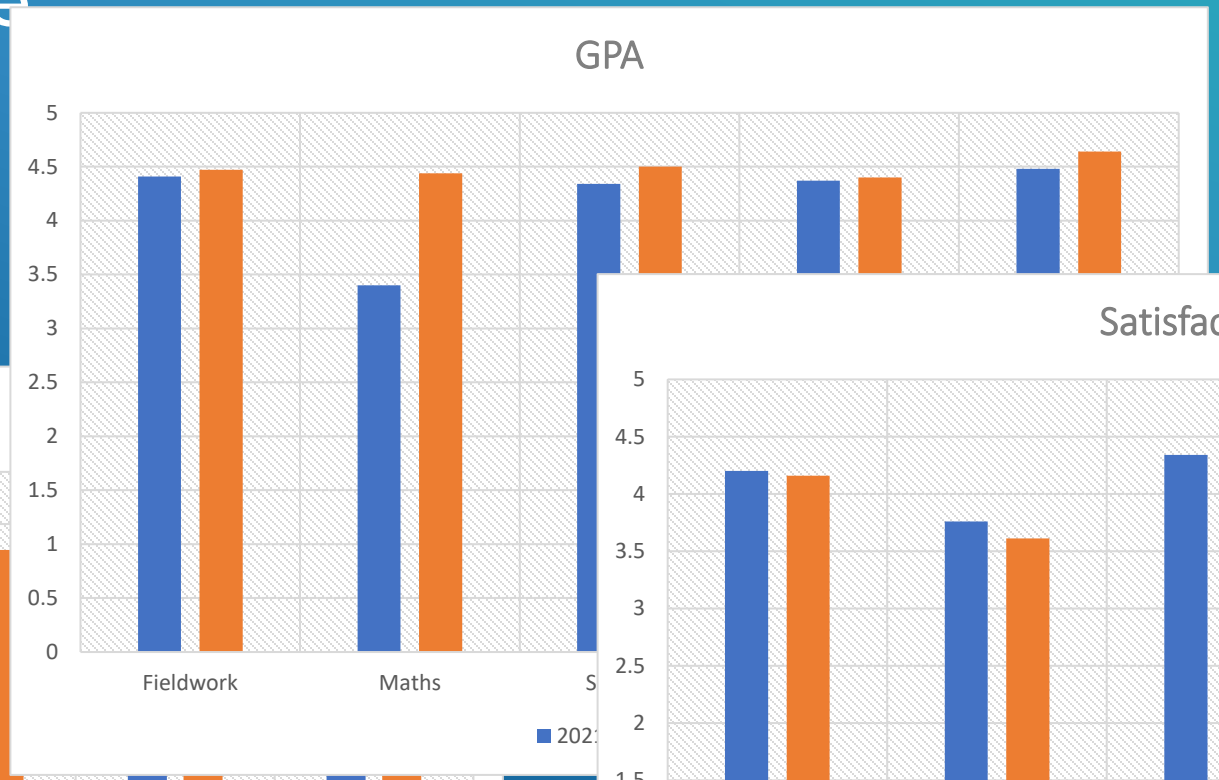
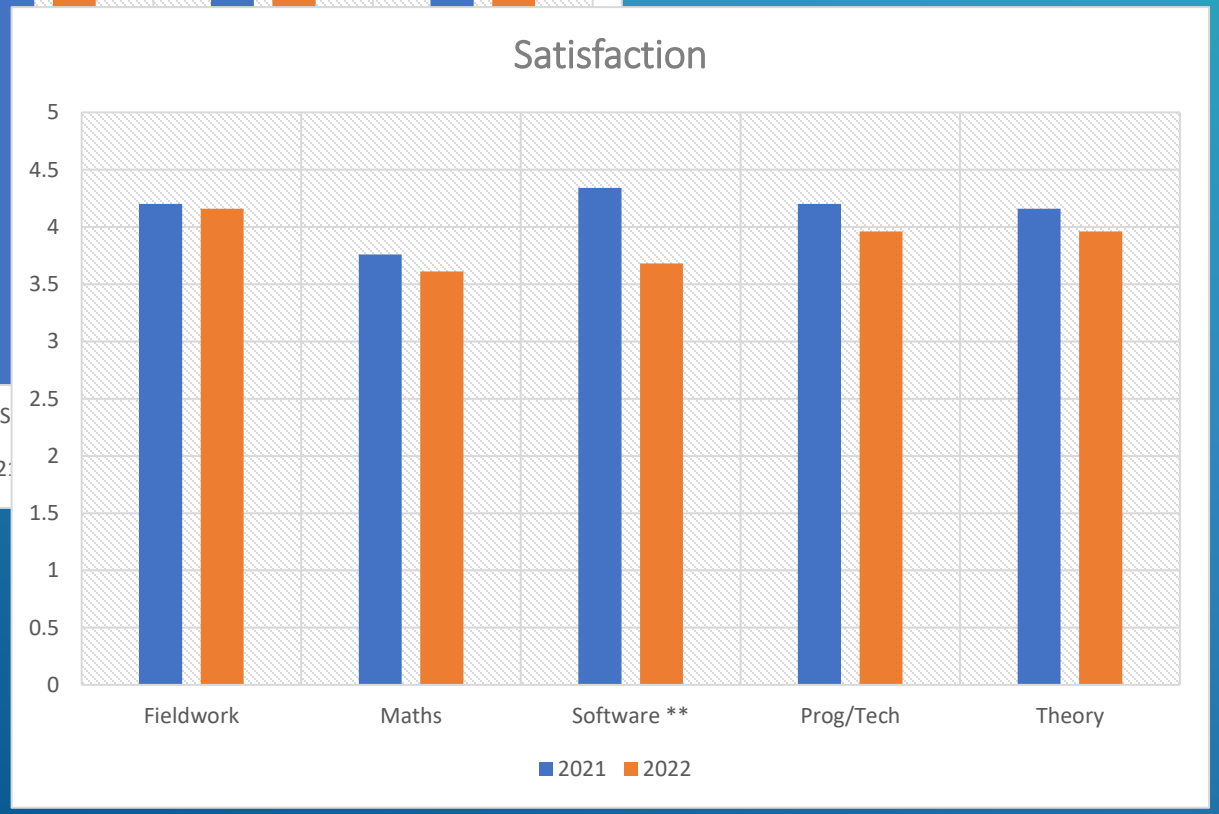
By Course Type

- Number of courses
- Note: not all courses in Faculty
- Only repeated courses (2021 and 2022)

Number of units	Science	Engineering	Computing
Fieldwork	22	0	0
Mathematics-based	1	4	0
New to software	1	3	4
Programming/Technical	2	1	27
Theory	11	15	10

By Type





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Summary

	Success	GPA	Satisfaction
Overall	Up	Up	Down
Undergraduates	Up	Up	-
Graduate Study	Up	-	Down
Computing	-	-	Down
Science	Up	-	-
Engineering	Up	-	Down
Fieldwork	Up	-	-
Maths	Up	-	-
Technical	Up	-	-
New to Software	-	-	Down
Theory	Up	-	-

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Some thoughts

From previous summary

- Undergraduates and graduate students
- Computing.
- Engineering and Science
- Suited to theory and fieldwork courses.
  Problematic for “New to Software” students.
- Some Thoughts
- What do students say?

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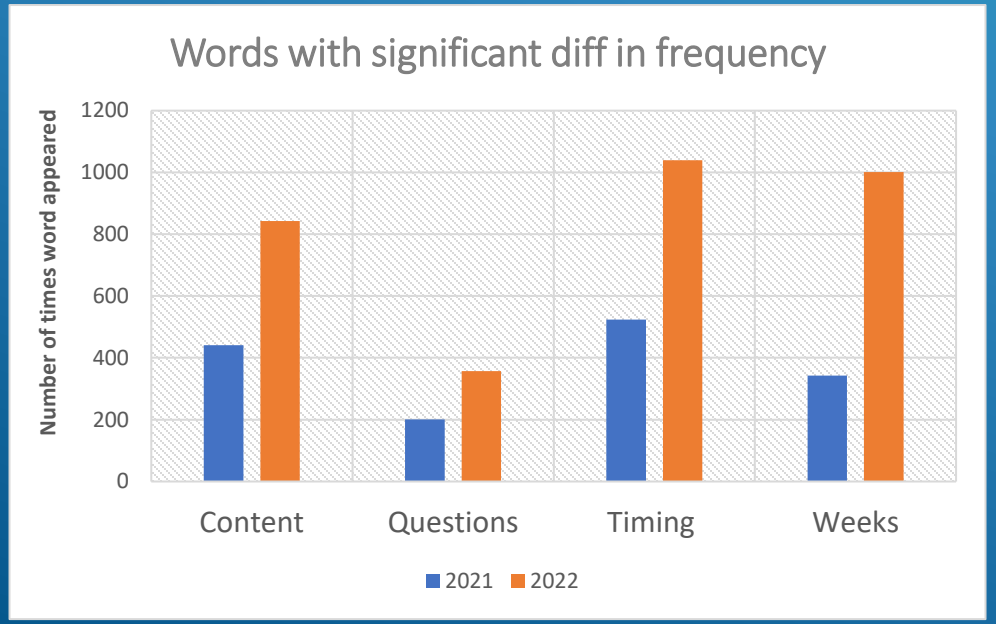
Analysis of feedback comments

- Work in progress

- NVivo12 was used to determine the priority use of words in student feedback across the 5 categories and between the two years – 2021 and 2022.
- The following four words had a change in use that was significant between 2021 and 2022 when controlled for number of comments - Content, Questions, Timing, and Weeks.

	2021	2022	p-value <0.05
Content	441	843	0.0327
Questions	201	357	0.0328
Timing	524	1039	0.0318
Weeks	342	1001	0.0163



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Analysis of feedback comments

- The change of use of the four words (content, questions, timing and weeks) from 2021 to 2022 was also significant with a p-value of 0.0221
- The context around the words is listed on the right and separated into negative and positive columns
- The themes were used to create questions for the focus groups.

Negative	Positive
too much content	Like videos, helps with understanding content
quality of unit content poor	good content
too much time is spent working through content	assessment aligned with content
length of unit too long for time	fast answers to questions
contact time is not enough	good experience in 6-week model
Too much time spent on extras outside of unit	
assessment don't match content	
video doesn't help with content	
6-weeks too short for content	
not enough feedback on questions	
not enough time to ask questions	
assessments need to work with 6-week delivery	

Focus Group Themes

These groups are currently being conducted.

- Groups from Science, Engineering and Computing
- Questions on content, time spent, length of course and contact time (themes from feedback)

- Course Experience (sub-themes of skill acquisition, overload, rushing, time spent on looking externally, making sense of content/assessment, and figuring out alignment between assignment and content.
- Content (amount, use of software, quality, delivery of content, videos)
- Contact Time (student support, answering questions, clarification of assessments)
- Overall sentiment towards the Southern Cross Model
- How could your experience be improved?

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Limitations

- Local large flood, effects of the pandemic.
- Engineering pilot;
- Limitations on use of student comments;
- Non-compulsory feedback;
- Background of researchers;

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Future work needed

- Complete feedback comment analysis;
- Complete focus group analysis;
- Publish results.

- Performance of programming or other technical courses that introduce software
- Compare STEM results with other faculties
- Compare Nvivo and BlueML results and processes

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Thank You

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Questions?

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