University of Manchester

An Investigation of the Attitudes of Instructors and Students to On-line Assessment in Mathematical Subjects

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Introduction

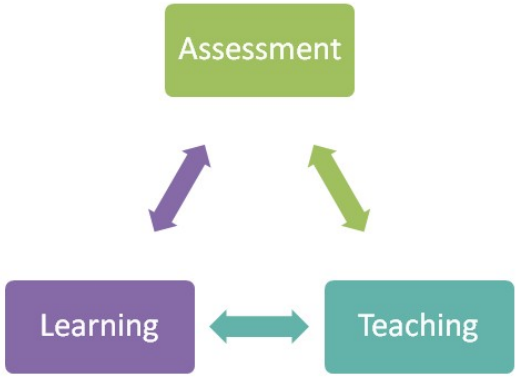
The influence of Information and Communication Technologies (ICT) on the educational processes have been significant.

It is increasingly seen as a way to fulfil the requirements for learning in our modern society.

However, it seems less research has been conducted concentrating on the assessment process.

Introduction

- The assessment process is a core component for effective learning.



The specific process of assessment using ICT has come to be known as e-assessment.

It includes the entire assessment process from designing assignments to storing the results using ICT.

Our Aim

- We study factors that facilitate or hinder the adoption and use of ICT in the assessment process in STEM subjects involving mathematics. We investigate both the behavioural intentions of instructors and the attitudes of students.
- Students' attitude: they are very familiar with the use of ICT, they are still worried about the security of testing, the fairness of the question banks, etc.
- The role that instructors play appears to be the most important.

Research Models

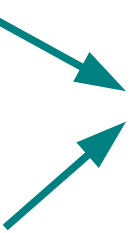
- Technology Acceptance Model (TAM)
- Theory of Planned Behaviour (TPB)
- Social Cognitive Theory (SCT)

Technology Acceptance Model

- PU : “the degree to which a person believes that using a particular system would enhance his/her job performance”.
- PEU : “the degree to which a person believes that using a particular system would be free of physical and mental effort”.

Technology Acceptance Model

- “Perceived Usefulness”
- “Perceived Ease of Use”



users' behavioural intention

- Previous studies found that there are attitudinal and technical factors that also impact the intention to use ICT.
  - Several studies have extended TAM by adding other variables.

Technology Acceptance Model

- “Perceived Usefulness to Students” (PUS):
  - “The degree to which instructors believes that students can enhance their learning by using technology”.
- We hypothesise that PUS will have a positive effect on instructors' behavioural intentions in the context of web based-assessment.

Theory of Planned Behaviour

Attitude (AT) and Social Influence (SI) are direct determinants of intentions that influence behaviour.

- AT: ‘‘The degree of a person’s favourable or unfavourable evaluation or appraisal of the behaviour in question’’ (Ajzen 1991).
- SI: “The perceived social pressure to perform or not to perform the behaviour” (Ajzen 1991).

Social Cognitive Theory

- Is a model for understanding and predicting human behaviour and identifying ways in which behaviour can be changed.

- SCT proposes “Self-Efficacy” (SE) as a cognitive factor that influence individual behaviour.

- SE: “as one’s judgements and beliefs of his/her confidence and capability to perform a specific behaviour”.

Extending TAM

- Not all of these factors are relevant for the student model. In this case we extended the TAM by including:

- Perceived Suitability (PS)
- Perceived Reliability (PR)
- Feedback (FE)

Extending TAM

- PS is “the students' belief that the technology used is **appropriate** to evaluate understanding of a specific topic”.
- PR is considered as “the students' belief that the technology assesses their work **fairly** and **accurately**”.
- FE is “the students' belief that the **support** and feedback they receive from instructors and the software will **improve** their learning”.

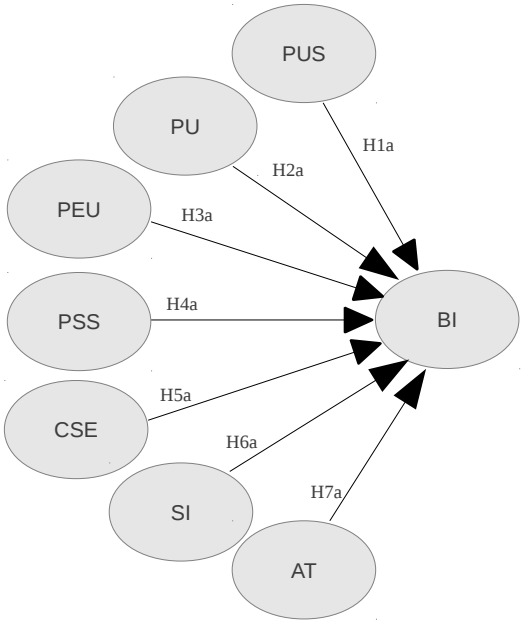
Research Models and Hypotheses Proposed

The instructor model:

- Attitude (AT)
- Perceived Usefulness (PU)
- Perceived Usefulness to the Student (PUS)
- Perceived Ease of Use (PEU)
- Behavioural Intention (BI)
- Perceived System Satisfaction (PSS)
- Computer Self-Efficacy (CSE)
- Social Influence (SI)

The instructor model

BI is the dependent variable, the other ellipses represent the independent variables. The labelled arrows are the hypotheses



- *PUS, PU, PEU, PSS, CSE, SI, AT will positively influence instructors' behavioural intention to use web-based assessment.*

Research Models and Hypotheses Proposed

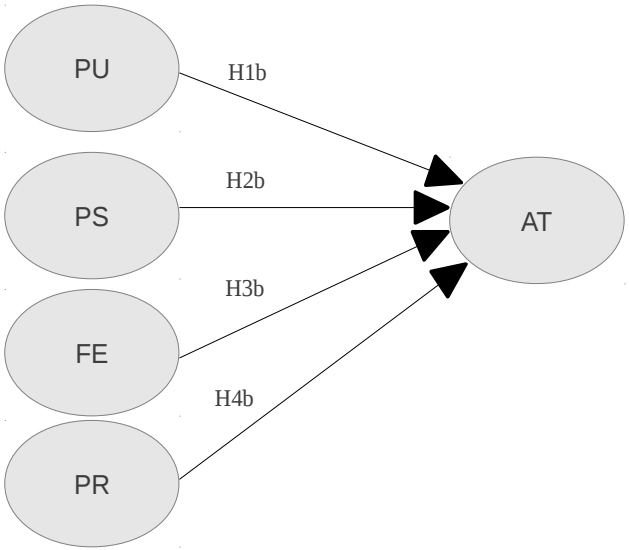
The student model:

- Perceived Usefulness (PU)
- Perceived Suitability (PS)
- Perceived Reliability (PR)
- Feedback (FE)
- Attitude (AT)

The student model

- *H1b. PU will positively influence students' attitude towards using web-based assessment.*
- *H2b. PS will positively influence students' attitude towards using web-based assessment.*
- *H3b. FE received will positively influence students' attitude towards using web-based assessment.*
- *H4b. PS will positively influence students' attitude towards using web-based assessment.*

AT is the dependent variable, the other ellipses represent the independent variables. The labelled arrows are the hypotheses



Research Methodology

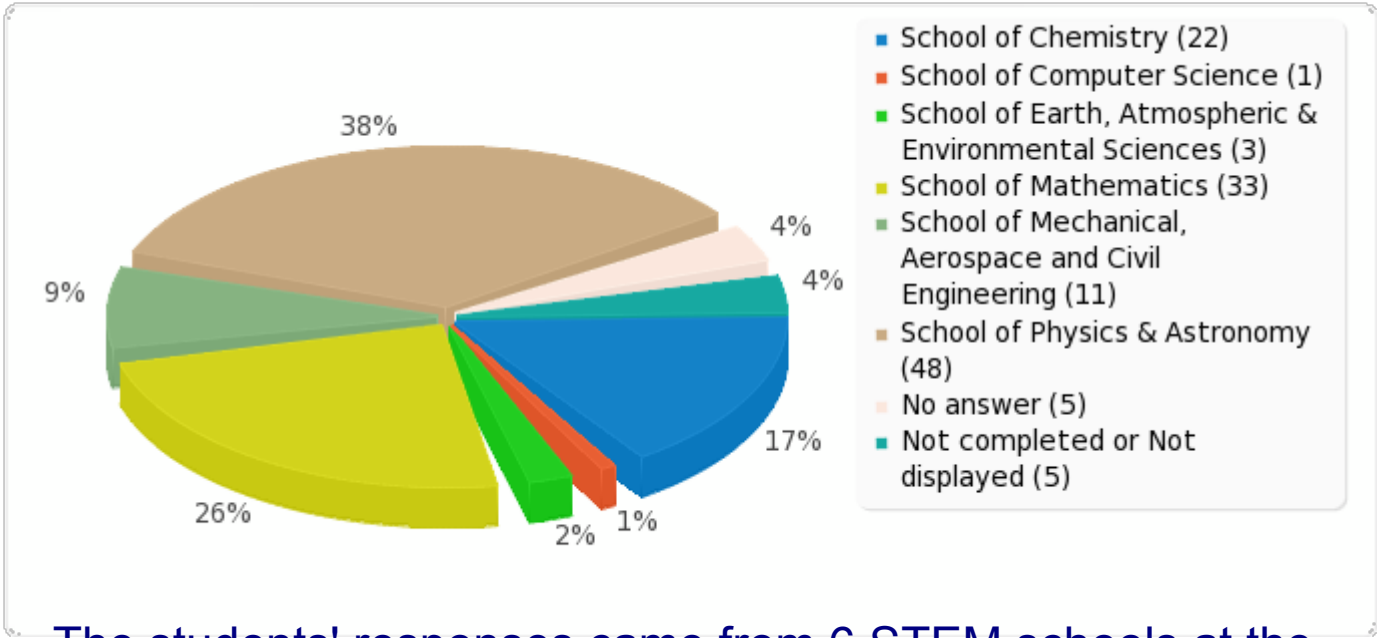
- On-line questionnaires to obtain data to test the empirical models for two groups.
- These questionnaires were applied during the same semester.

- Students' questionnaire consists of 15 items.
- Instructors' questionnaire consists of 32 items.

(each item was measured using a five-point Likert scale).

Data Collection and Instruments

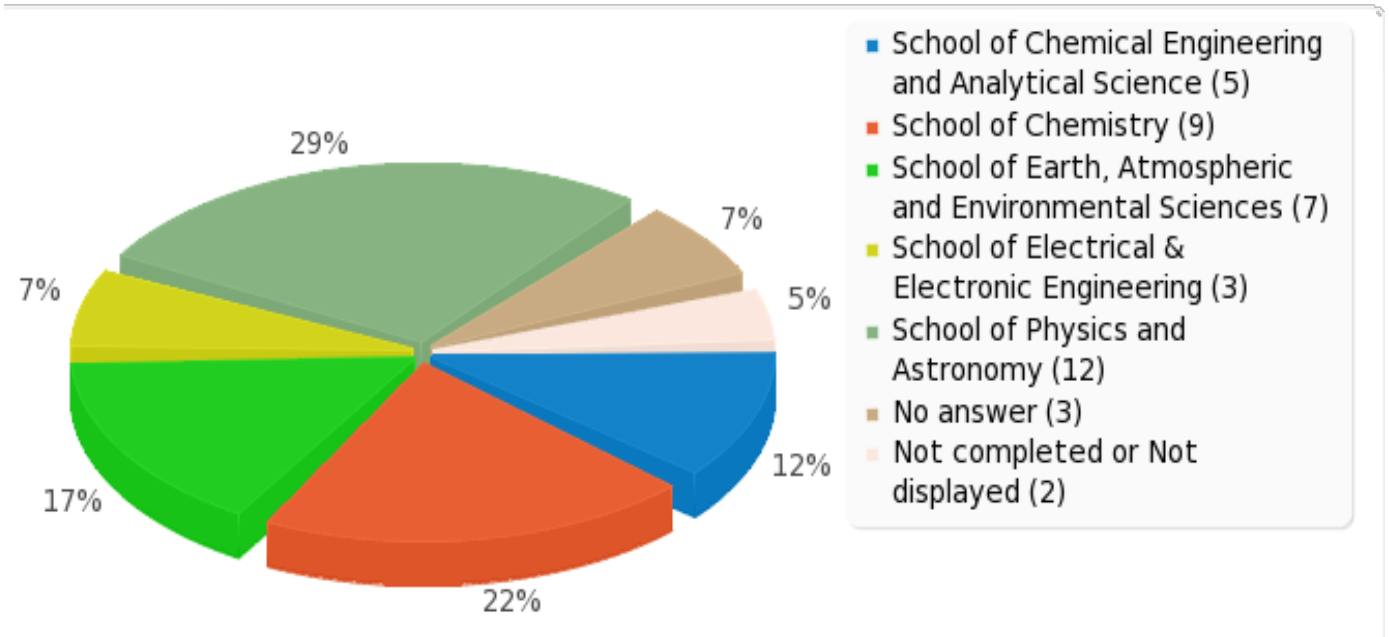
A sample of 121 students (71 male and 50 female).



The students' responses came from 6 STEM schools at the Manchester University.

Data Collection and Instruments

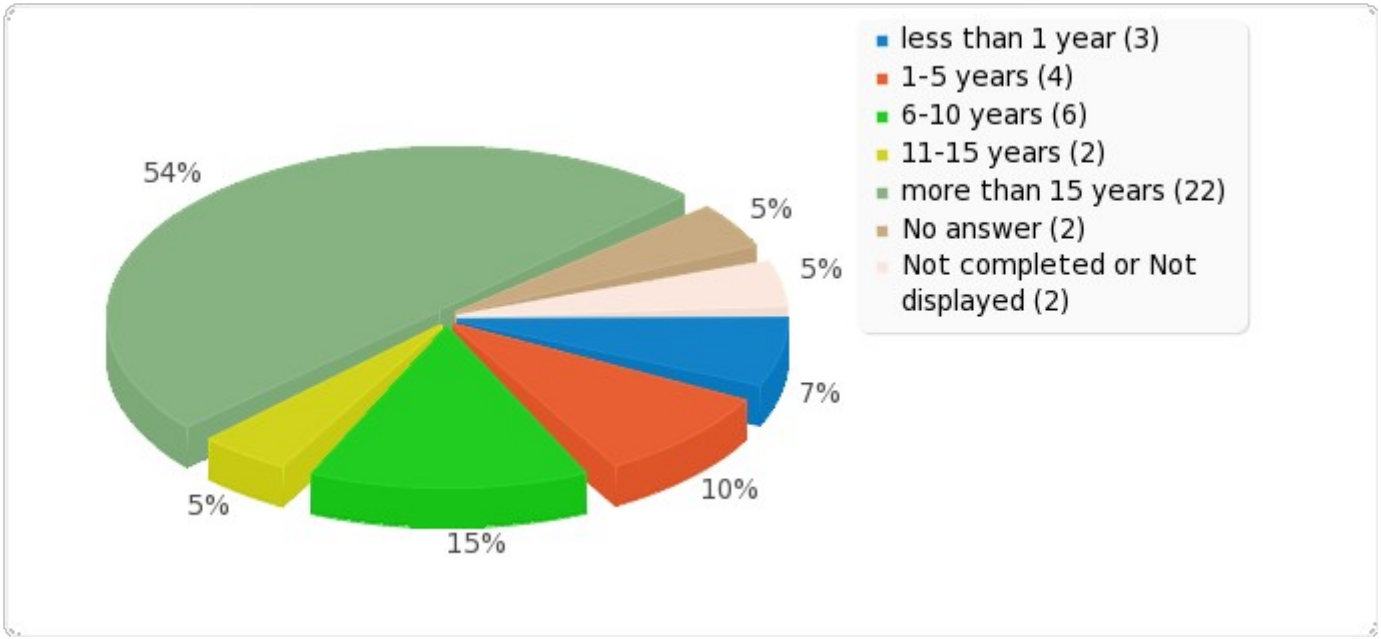
A sample of 32 instructors (9 female, 23 male).



The instructors' responses came from 5 STEM schools at the Manchester University.

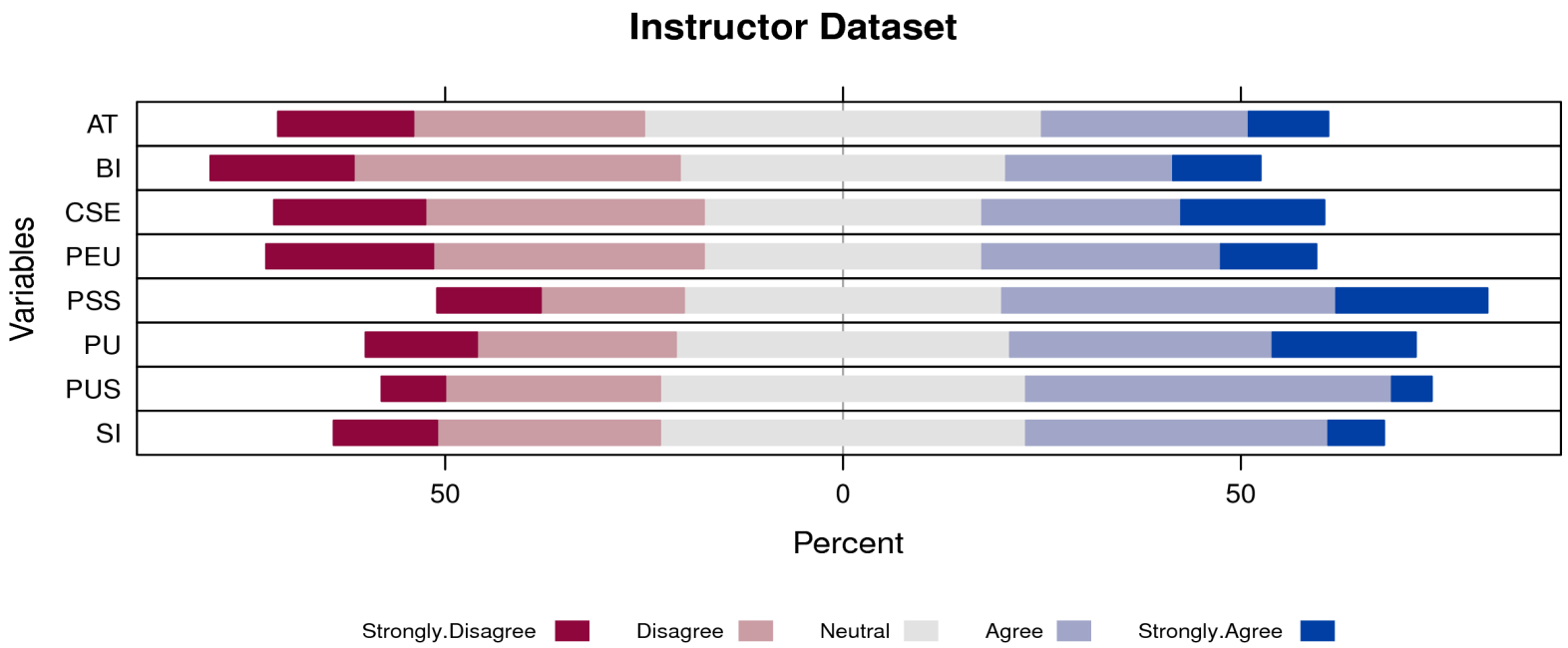
Data Collection and Instruments

- These results show that most of the instructors surveyed has a very experienced.



- This factor is significant since we want to determinate the willingness to use technology.

Data Analysis



Data Analysis

Descriptive analysis for the instructors' dataset

variable	mean	standard deviation
AT	12.6	3.5
BI	11.0	3.3
CSE	11.6	4.4
PEU	11.3	3.4
PSS	10.7	2.7
PU	12.5	3.9
PUS	12.4	3.0
SI	11.9	2.9

Data Analysis

Instructors' dataset: Pearson correlation values (lower triangle), scale reliability (Cronbach alpha) on the diagonal in parentheses.

	AT	BI	CSE	PEU	PSS	PU	PUS	SI
AT	**(0.86)**							
BI	0.62	(0.76)						
CSE	0.68	0.54	**(0.89)**					
PEU	0.50	0.65	0.49	(0.71)				
PSS	0.70	0.67	0.67	0.70	(0.53)			
PU	0.82	**0.72**	0.72	0.47	0.59	**(0.84)**		
PUS	0.83	**0.75**	0.48	0.47	0.58	0.78	(0.78)	
SI	0.65	0.44	0.44	0.35	0.55	0.57	0.53	(0.70)

The reliability of the dataset =0.91

Data Analysis

Descriptive statistics for the students' dataset

variable	mean	standard deviation
AT	8.6	2.6
FE	14.2	2.7
PR	4.9	1.6
PS	8.6	2.5
PU	10.5	2.4

	AT	FE	PR	PS	PU
AT	(0.62)				
FE	0.38	(0.69)			
PR	0.10	0.25	(0.39)		
PS	**0.44**	0.56	0.33	(0.59)	
PU	**0.59**	0.46	0.21	0.54	(0.56)

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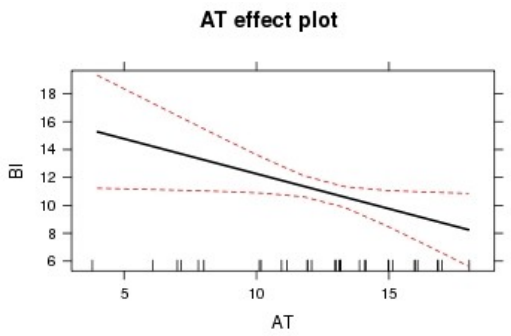
The reliability of the dataset =0.79

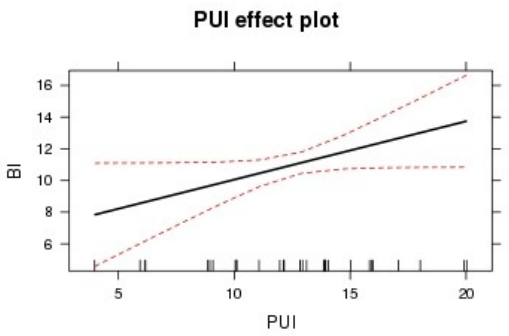
Hypotheses Testing

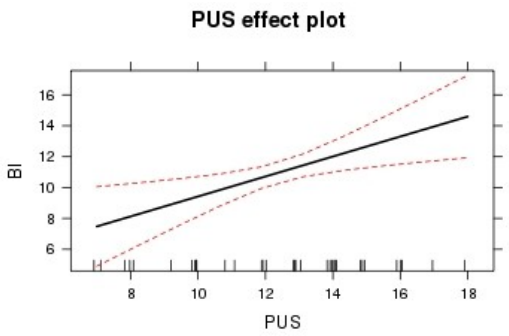
Results of a GLM regression analysis of the instructors' dataset

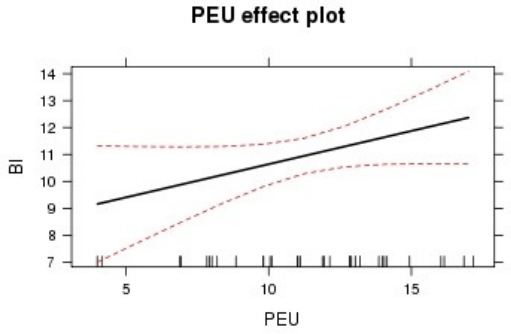
Hypothesis	Independent variable	Dependent variable: Behaviour Intention	
		β	p-value
H1a	PUS	0.65	0.01
H2a	PU	0.37	0.05
H3a	PEU	0.25	0.08
H4a	PSS	0.34	0.15
H5a	CSE	0.00	0.99
H6a	SI	0.00	0.99
H7a	AT	-0.50	0.04

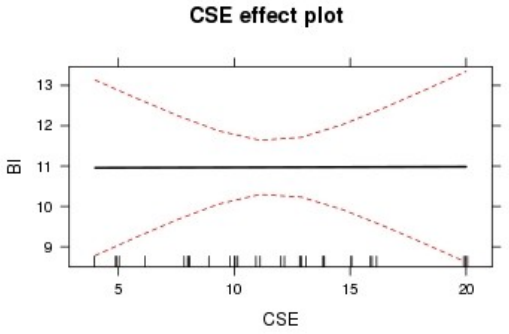
Hypotheses Testing

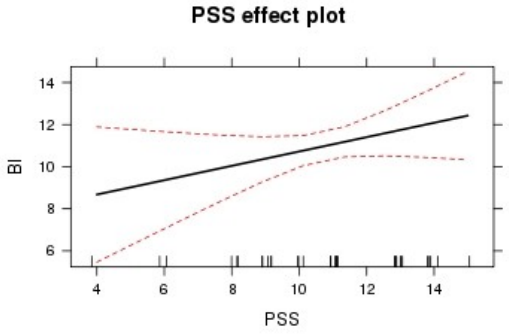


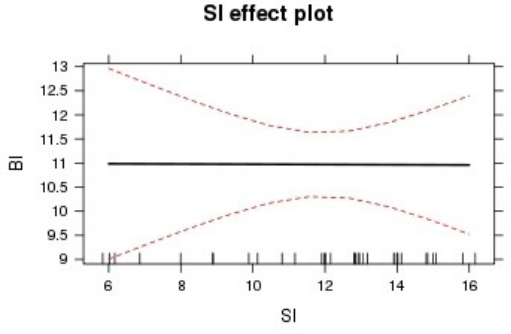










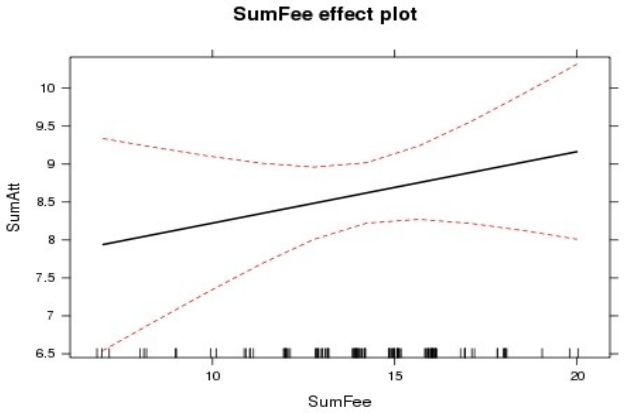


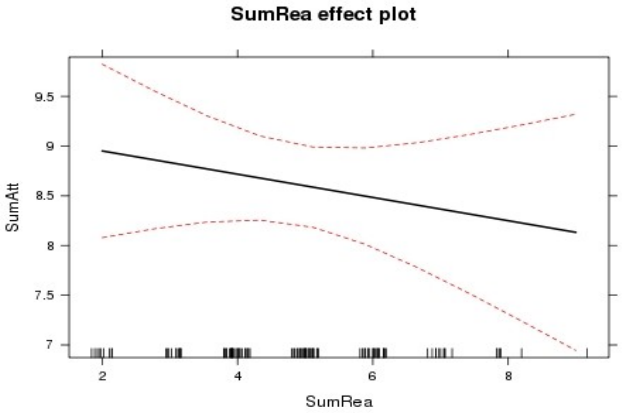
Hypotheses Testing

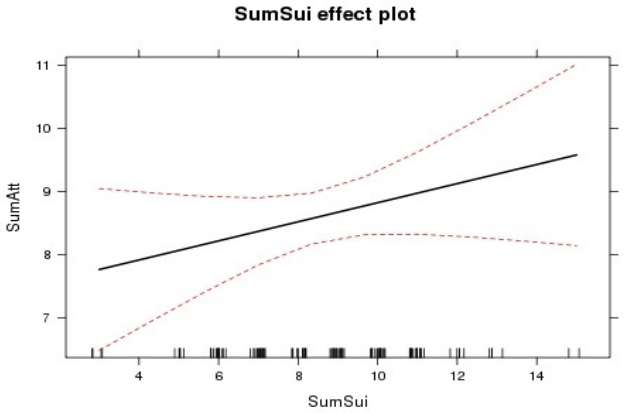
Results of a GLM regression analysis of students' dataset

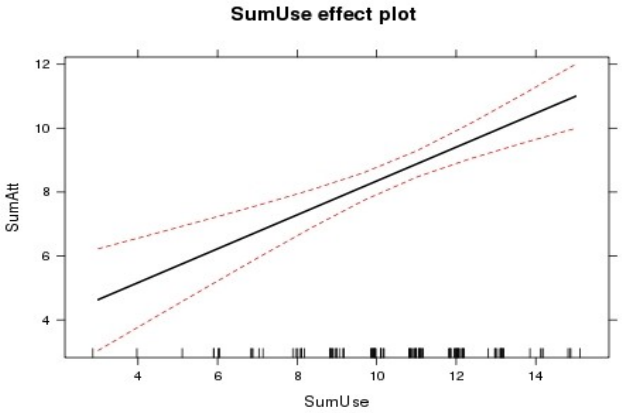
Hypothesis	Independent variable	Dependent variable: attitude	
		β	p-value
H1b	PU	0.53	$1.34x10^{-6}$
H2b	PS	0.15	0.17
H3b	FE	0.09	0.32
H4b	PR	-0.12	0.39

Hypotheses Testing









Conclusions

- Instructors' behavioural intention to use web-based assessment ⟶ PUS
- Teachers' opinions strongly influence on the students' attitude towards the adoption of technology.

We measured the instructors' perception regarding students' can enhance their learning as a way to encourage instructors to use e-assessment.

Conclusions

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- Teachers' opinions strongly influence on the students' attitude towards the adoption of technology.

We measured the instructors' perception regarding students' can enhance their learning as a way to encourage instructors to use e-assessment.

Conclusions

- Enhance students' appreciation through stimulating instructors use of web-based assessment.

It is a important matter for policy-makers, who can potentially develop useful strategies to convince instructors to adopt technology by **demonstrating students' improvements of their learning.**

Conclusions

- “Perceived Usefulness” has an important impact on instructors' behavioural intention use web-based assessment.
  - This finding is largely consistent with other studies.

- Whether instructors perceive web-based assessment as a **useful** and where using it also increases their productivity, their intentions to use it will be significant increased.

Conclusions

Attitude is predicted negatively.

- Instructors perceive that it is useful to use technology, they are not **totally convinced** to adopt it as the attitude variable shows.

- Instructors still keep some attitudes that it is more effective to do mathematical exercises and exams by hand, rather than using technology.

Conclusions

- “Perceived Ease of Use”
- “Computer Self-Efficacy”
- “Perceived System Satisfaction”
- “Social Influence”

are not major determinants to predict instructors' behavioural intention to use web-based assessment.

Conclusions

- “Perceived Usefulness” is the major factor impacting students' attitude to use web-based assessment.
- This result is consistent with other studies.
- In order to obtain a favourable students' attitude to use web-based assessment, it is necessary to increase **perceived usefulness.**

Conclusions

- “Perceived Suitability”
- “Perceived Feedback”
- “Perceived Reliability”

are not important factors determining students' attitude.

Conclusions

- For both models “**Perceived Usefulness**” is the most important factor to predict the use of technology.

- It seems that the main driver for adoption of such a technology is the user's belief that using technology will **enrich his/her performance**.

Conclusions

- To develop strategies in order to stimulate the use of technology particularly in the assessment process.

- First at all, there is a need to built some to effective schemes to convince to instructors who have the power to persuade to students to use more broadly technology.

Conclusions

- We are particularly interested in fomenting and enhancing mathematical activities and task involved in the assessment process by making them more efficient and effective by using of technology.

Conclusions

- We believe that we have gained some interesting insights regarding to the adoption of technology considering perceptions and opinions of instructors as of students for the assessment of mathematics subjects.

- We consider that these insights can be useful for policy-makers, instructors and students.


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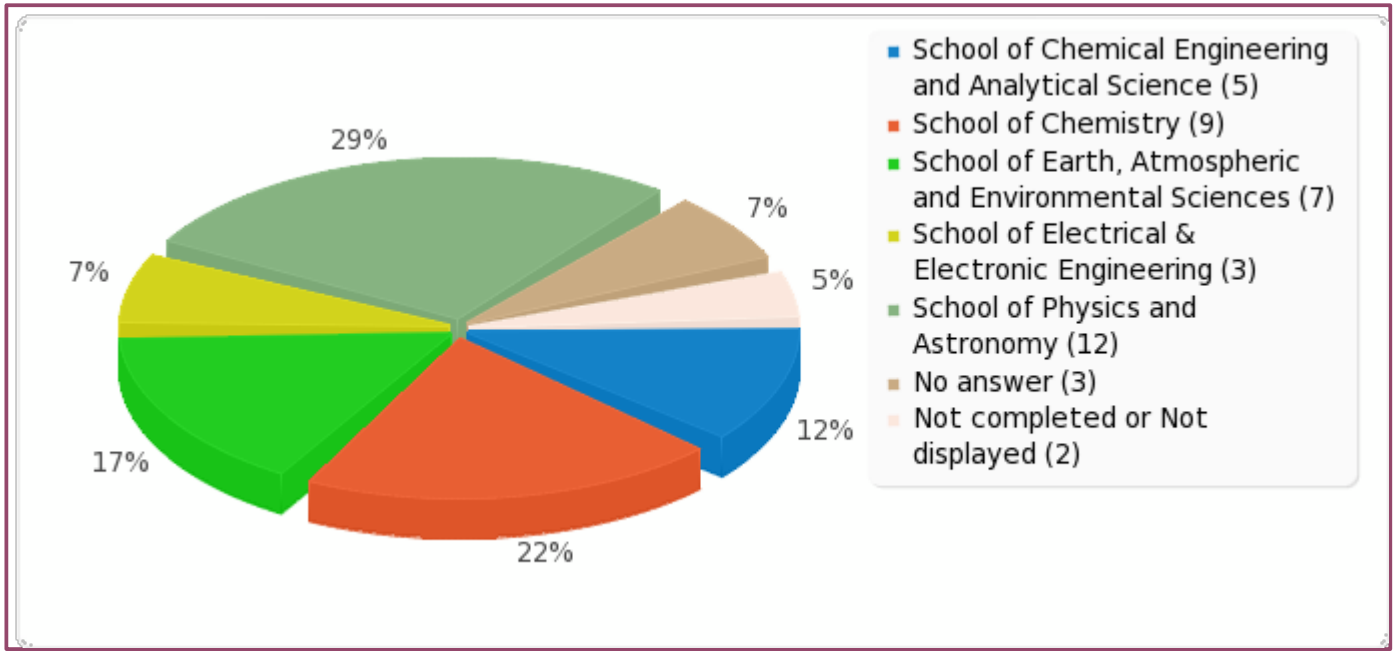
Dankie
Gracias
اركش
Спасибо
Merci
Takk
Köszönjük
Terima kasih
Grazie
Dziękujemy
Dėkojame
Ďakujeme
Vielen Dank
Paldies
Kiitos
Täname teid
谢谢
Thank You
Tak
感謝您
Obrigado
Teşekkür Ederiz
Σας Ευχαριστούμ
감사합니다
ขอบคุณ
Bedankt
Děkujeme vám
ありがとうございます
Tack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