



An Analysis of Types of Assessment Questions and Cognitive Loading in Undergraduate Students of Construction Studies at the University of KwaZulu-Natal



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Outline



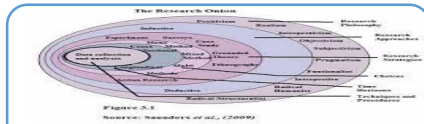
Theoretical background



Conceptual model



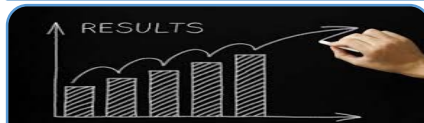
Theoretical underpinning



Research design



Research instrument



Results



Discussion and implications



Limitations

Theoretical Background

Traditional epistemologies

As old as

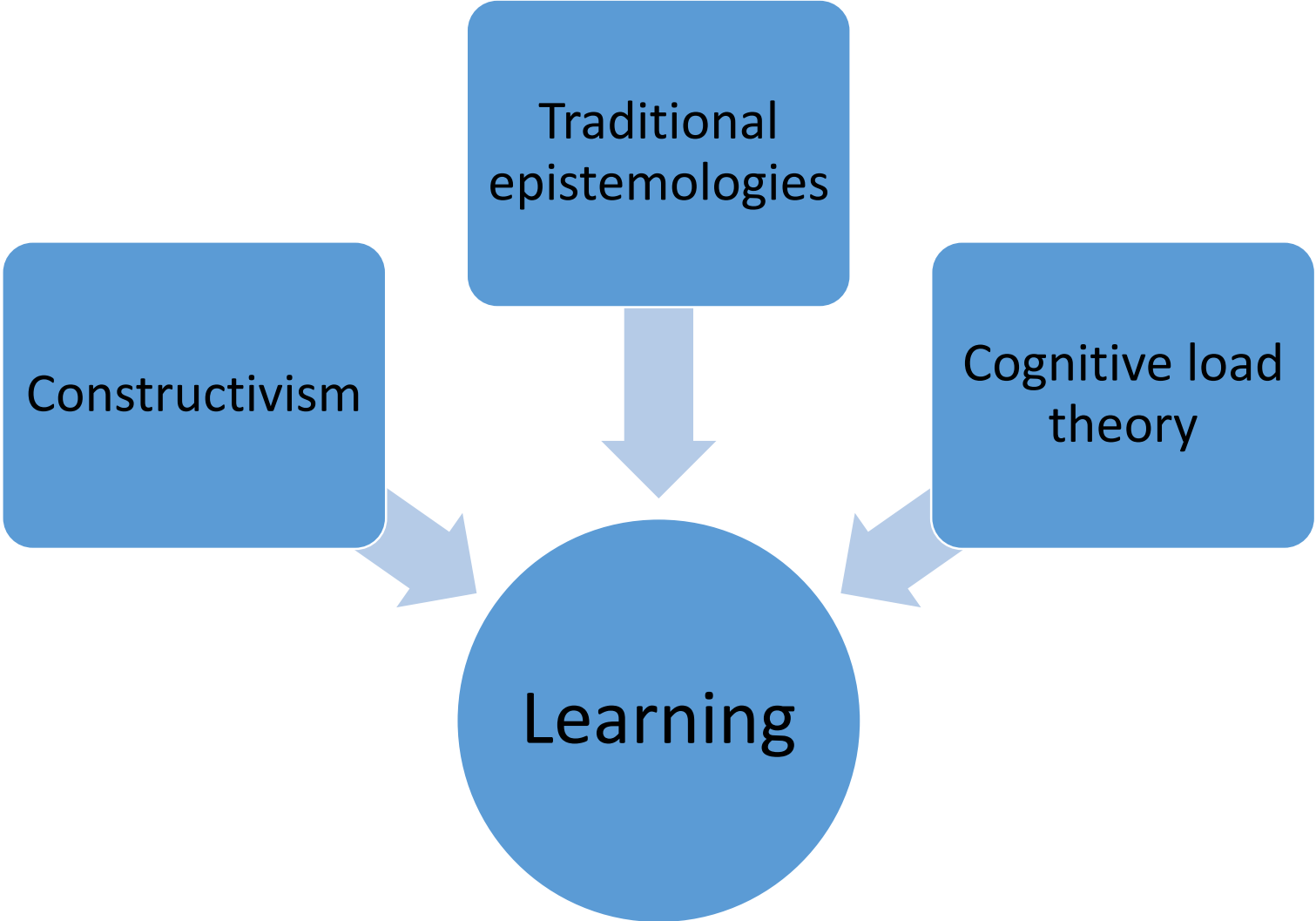
Sage on the stage



Theoretical Background



Theoretical Background



Outline



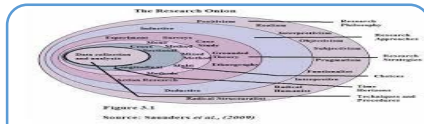
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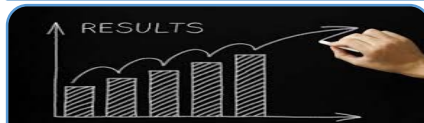
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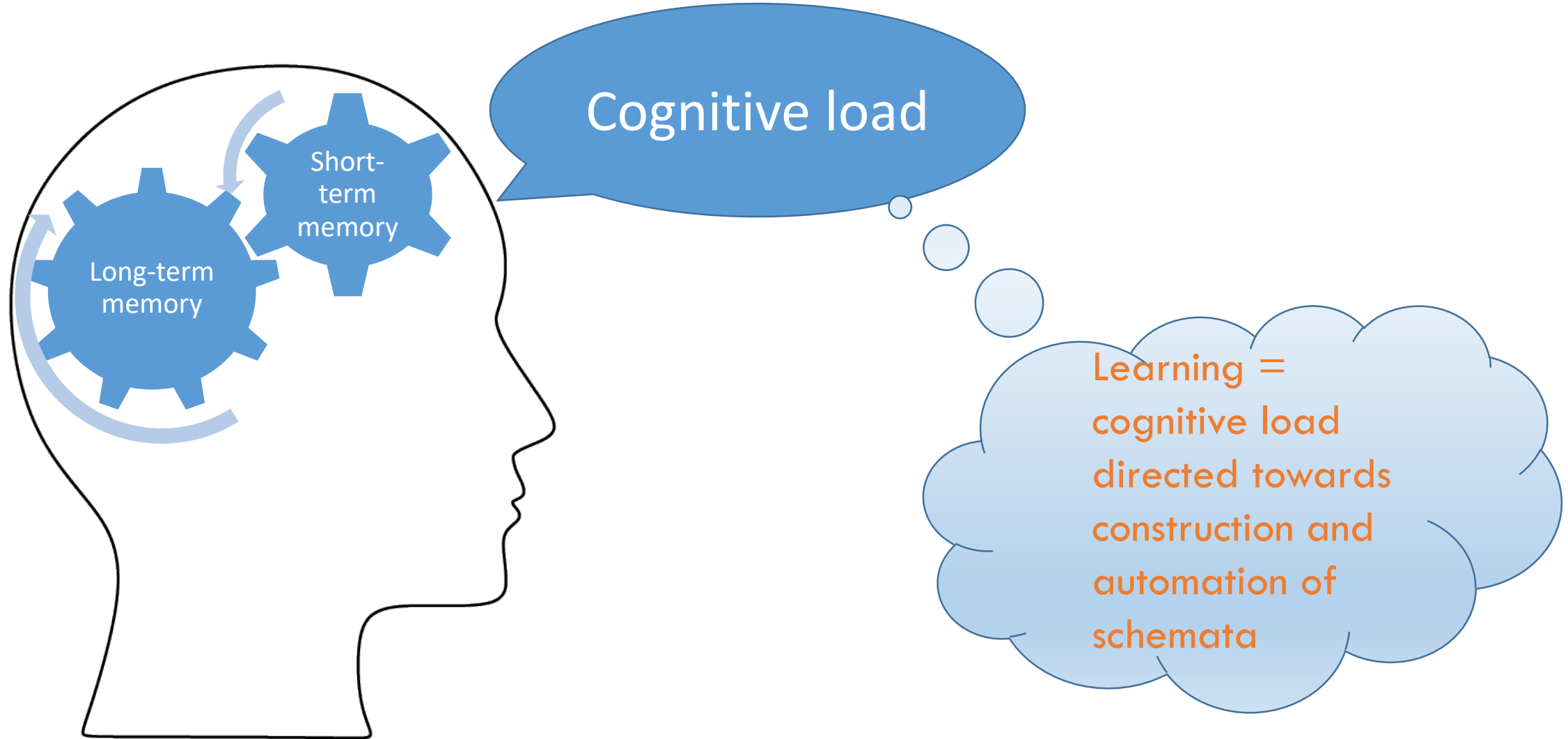


Discussion and implications



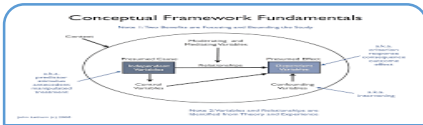
Limitations

Theoretical Framework





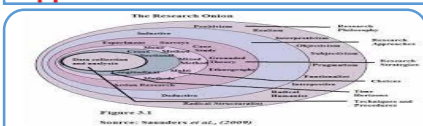
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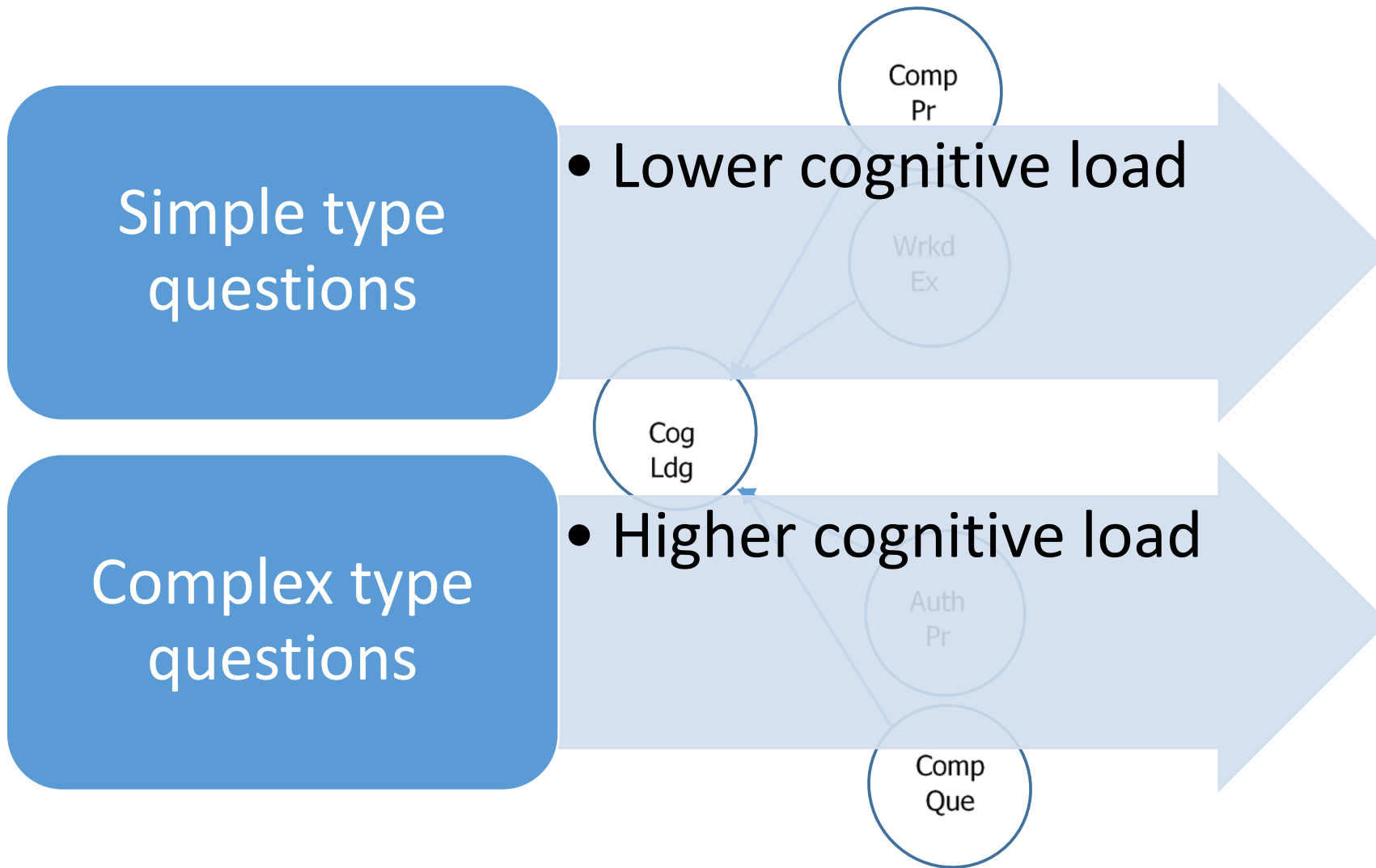


Discussion and implications



Limitations

Research Conceptual Framework



Outline



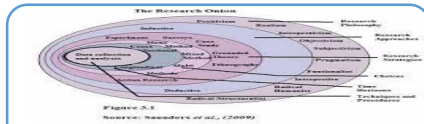
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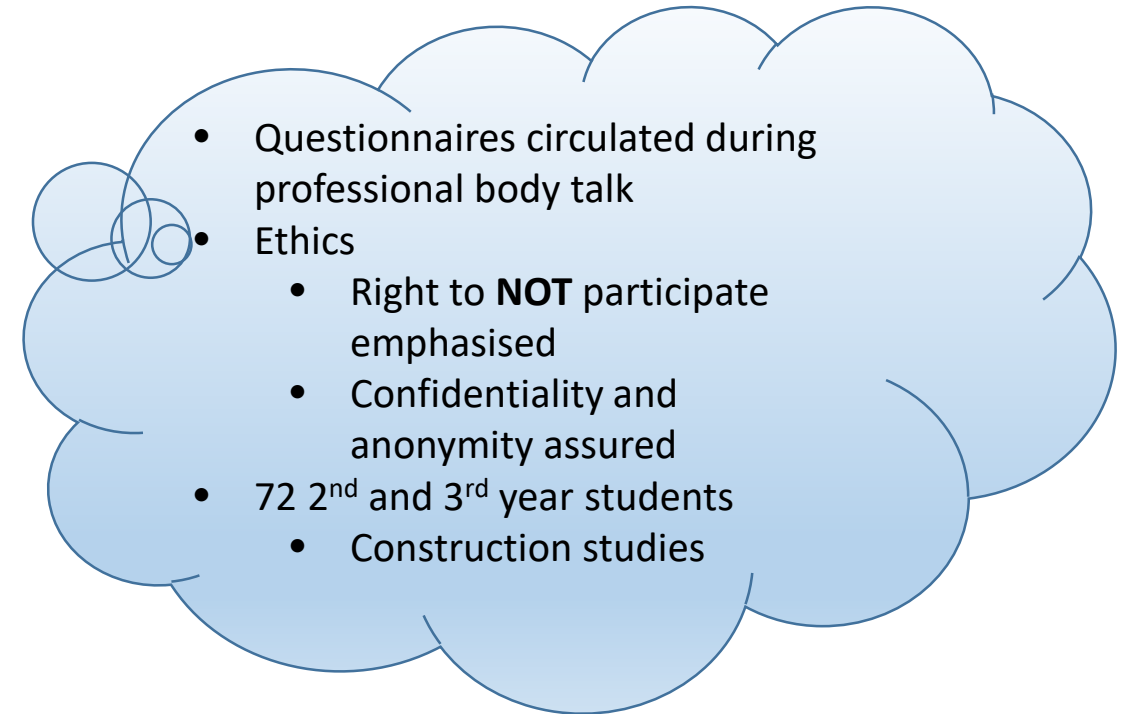
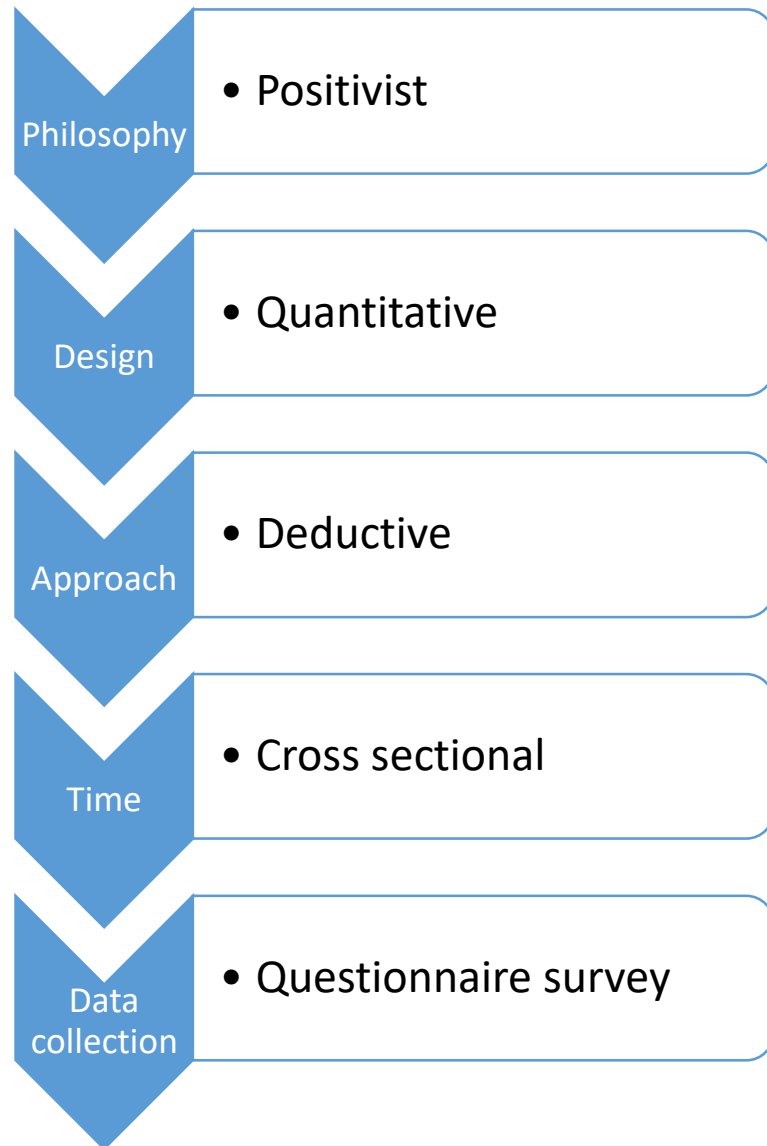


Discussion and implications



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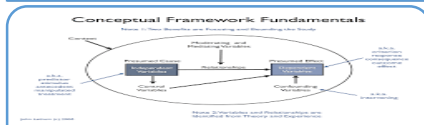
Research Design



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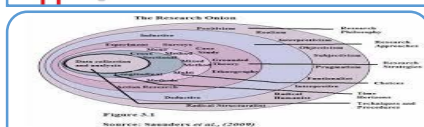
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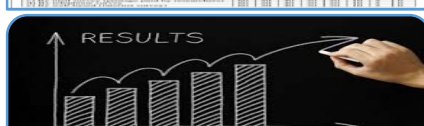
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Measurement Instrument

Construct

Complex and Ambiguous Questions

I was given assignments and tests which were **difficult to understand and solve**

I was given problems which did **not have enough information** for me to solve them

I was required to solve questions which were **not clear**

I was expected to do

I was given questions which could be **interpreted in more than one way**

I was given problems which were **not easy to understand** clearly

I was given questions which were **not expressed clearly**

Authentic Problems

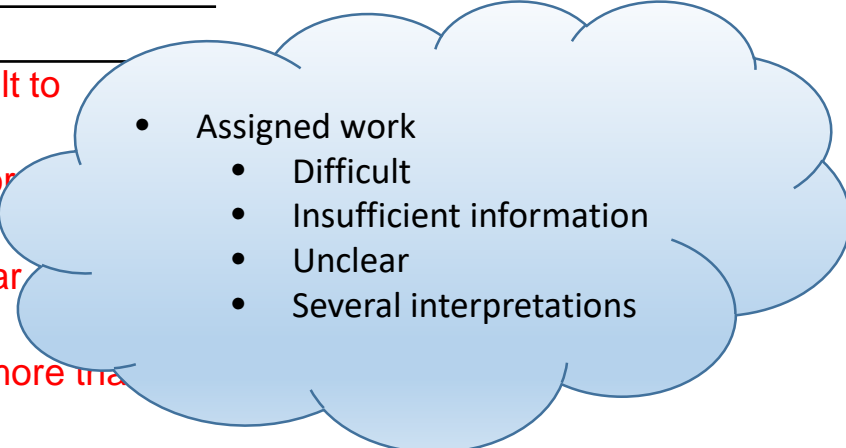
I was given problems based on actual **industry real life**

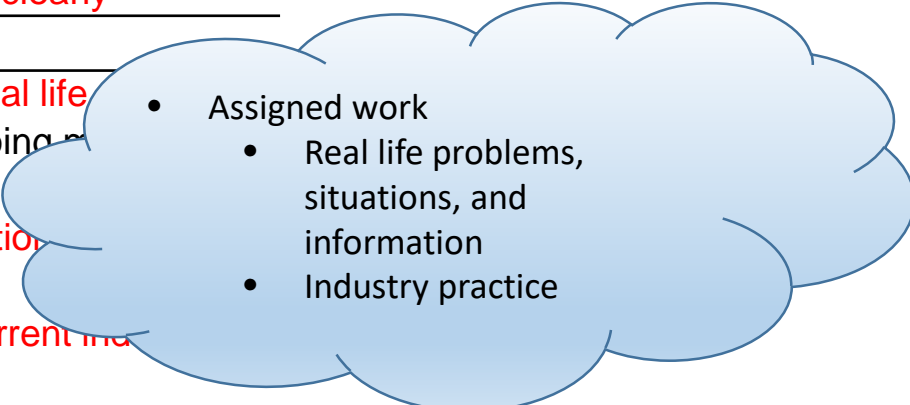
I was expected to use **real life situations** when doing school work

I was required to collect some **real world information** for school work

I was given work which was relevant to actual **current industry practice**

I was required to come up with my own solutions to problems

- 
- Assigned work
 - Difficult
 - Insufficient information
 - Unclear
 - Several interpretations

- 
- Assigned work
 - Real life problems, situations, and information
 - Industry practice

Measurement Instrument (Cont'd)

Worked Examples

I was given some **worked examples to practice** on
I was given examples with clearly defined **steps on how to solve** problems to practice on
I was given problems with **model solutions** to practice on

- Tutorials/Examples
 - Use
 - Steps to solve
 - Model solutions

Completion Problems

I was given **partially worked examples** to complete
I was given **partly finished model solutions** to problems
the solution
I was given problems which were **partly solved** to practice on
I was given problems and **part of the solution** to work on
I was given problems which had **gaps that I had to fill in**

- Tutorials/Examples
 - Partly worked

Cognitive Loading

I was expected to **remember too many things** from each lecture
I was **overwhelmed with the amount of information** I was expected to remember
I was given with **too much information** during the lecture
The information I was given during lectures was **confusing**
The information I was given in class was **complicated and difficult** to understand
I was **overwhelmed** with the amount of work I had to do
I was given **too many projects**, assignments and tests

- Too much to remember
- Too much information
- Overwhelmed
- Confusing
- Complicated and difficult
- Too much assigned work

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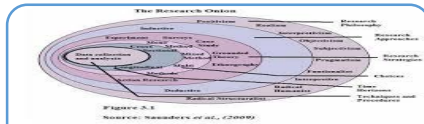
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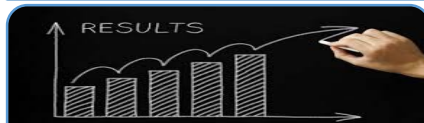
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Limitations

Results – Factor Analysis

Table 1 Rotated Component Matrix^a

	Component		
	1	2	3
CAQ1	0.610		
CAQ2	0.842		
CAQ3	0.873		
CAQ4	0.633		
CAQ5	0.779		
CAQ6	0.729		
AP1		0.706	
AP2		0.865	
AP3		0.837	
AP4			
WE4			0.610
CP1			0.846
CP2			0.887
CP3			0.910
CP4			0.760
CP5			0.807

Factors differently
– omitted from
analysis

Table 2 KMO and Bartlett's Test for Types of Questions

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.782
Bartlett's Test of Sphericity	Approx. Chi-Square	860.623
	Df	190
	Sig.	0.000

Fairly good
sample size

Results – Reliability and Validity

Table 3 Measurement Instrument Analysis

Research Constructs		Mean	Cronbach's Test		C.R.	AVE	Item Loadings
			Item-total	α Value			
Complex and Ambiguous Questions	CAQ1	3.194	0.550	0.848	0.744	0.564	0.610
	CAQ2		0.734				0.842
	CAQ3		0.805				0.873
	CAQ4		0.501				0.633
	CAQ5		0.613				0.779
	CAQ6		0.598				0.729
Authentic Problems	AP1	3.794	0.591	0.855	0.813	0.622	0.706
	AP2		0.782				0.865
	AP3		0.761				0.837
	AP4		0.607				0.773
	AP5		0.613				0.753
Worked Examples	WE1	3.374	0.595	0.825	0.667	0.502	0.752
	WE2		0.780				0.753
	WE3		0.685				0.610

All Cronbach alpha good – above 0,70
 All item-correlations are good – above 0,50
 All AVE are good – above 0,50
 All item loadings are good – above 0,50

Low composite reliability due to few items

Results – Reliability and Validity

Table 3 Measurement Instrument Analysis (Cont'd)

Research Constructs		Mean	Cronbach's Test		C.R.	AVE	Item Loadings
			Item-total	α Value			
Completion Problems	CP1	2.879	0.800	0.929	0.895	0.712	0.846
	CP2		0.841				0.887
	CP3		0.878				0.910
	CP4		0.781				0.760
	CP5		0.728				0.807
Cognitive Loading	CL1	3.811	0.473	0.856	0.720	0.543	0.573
	CL2		0.624				0.711
	CL3		0.683				0.779
	CL4		0.535				0.685
	CL5		0.732				0.842
	CL6		0.724				0.822
	CL7		0.604				0.712

All Cronbach alpha good – above 0,70
 All item-correlations are good – above 0,50
 All AVE are good – above 0,50
 All item loadings are good – above 0,50

Measures exhibit good reliability

Results - Correlations

Table 4 Inter-construct Correlations

		CAQ	AP	WE	CP	CL
CAQ	Pearson Correlation	1				
AP	Pearson Correlation	0.100	1			
WE	Pearson Correlation	0.246*	0.294*	1		
CP	Pearson Correlation	0.271*	0.179	0.592**	1	
CL	Pearson Correlation	0.644**	0.185	0.306**	0.395**	1

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations indicate good discriminant validity

Results – Regression Analysis

Table 5 Model Summary^b

Model	R	R Square	Adjusted R Square
1	0.644 ^a	0.415	
2	0.306 ^b	0.094	
3	0.395 ^c	0.156	
4	0.185 ^d	0.034	

a. Predictors: (Constant), CAP

b. Predictors: (Constant), WE

c. Predictors: (Constant), CP

Table 6 ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	13.693	1	13.693	49.626	0.000 ^b
2 Regression	3.114	1	3.114	7.334	0.008 ^b
3 Regression	5.198	1	5.198	13.153	0.001 ^b
4 Regression	1.139	1	1.139	2.517	0.117 ^b

a. Dependent Variable: CL

b. Predictors: (Constant), CAP

Complex and authentic problems induce the largest amount of cognitive load

Only Authentic problems has no significant relationship with cognitive loading

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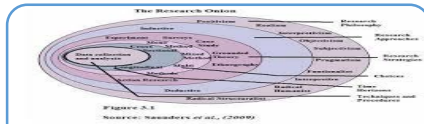
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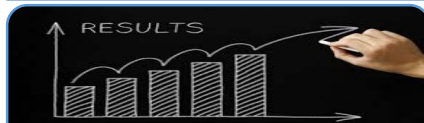
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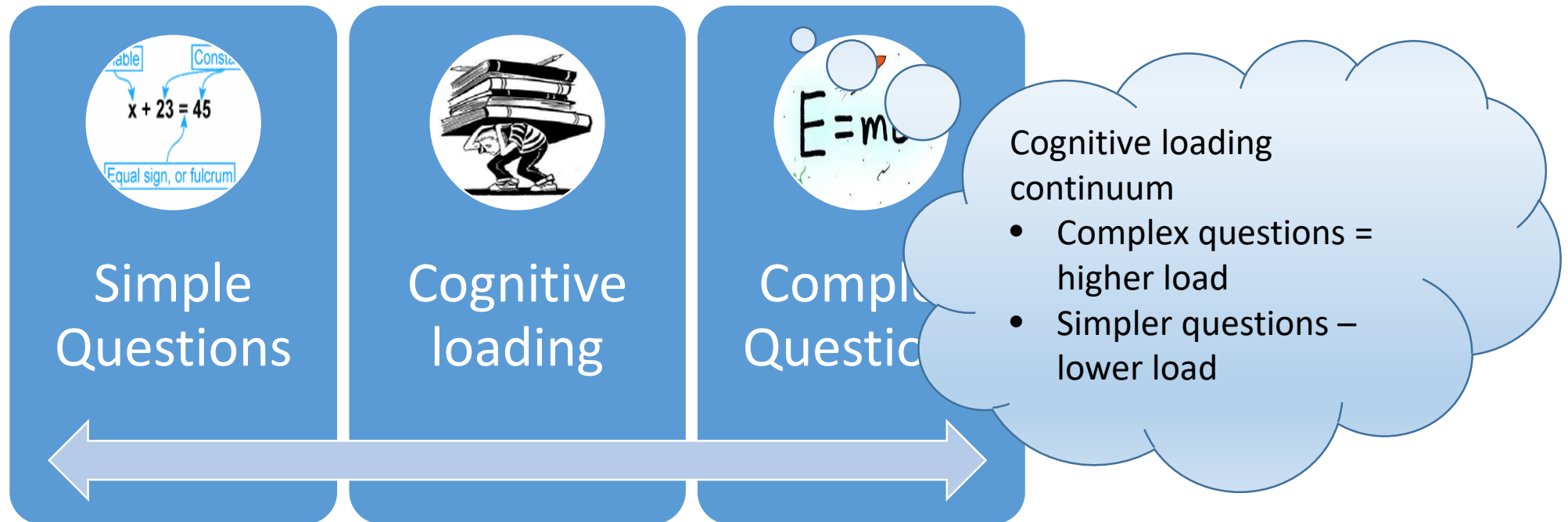


Discussion and implications



Limitations

Discussion of Findings



Implications of Findings

- Theoretical
 - Different conceptualisation
 - Corroborates other findings
 - Suggests new measures
- Practical
 - Complex problems (often favoured) = high cognitive load
 - Simpler questions (learning ? ? ?) = lower cognitive load

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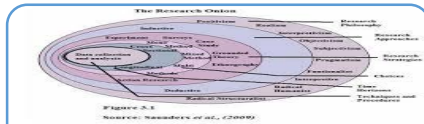
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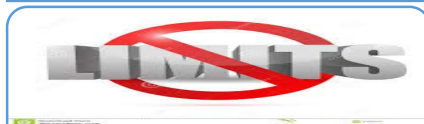
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Limitations

Limitations

- New measures not tested
- Conveniently selected sample

The End

Thank you for listening



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