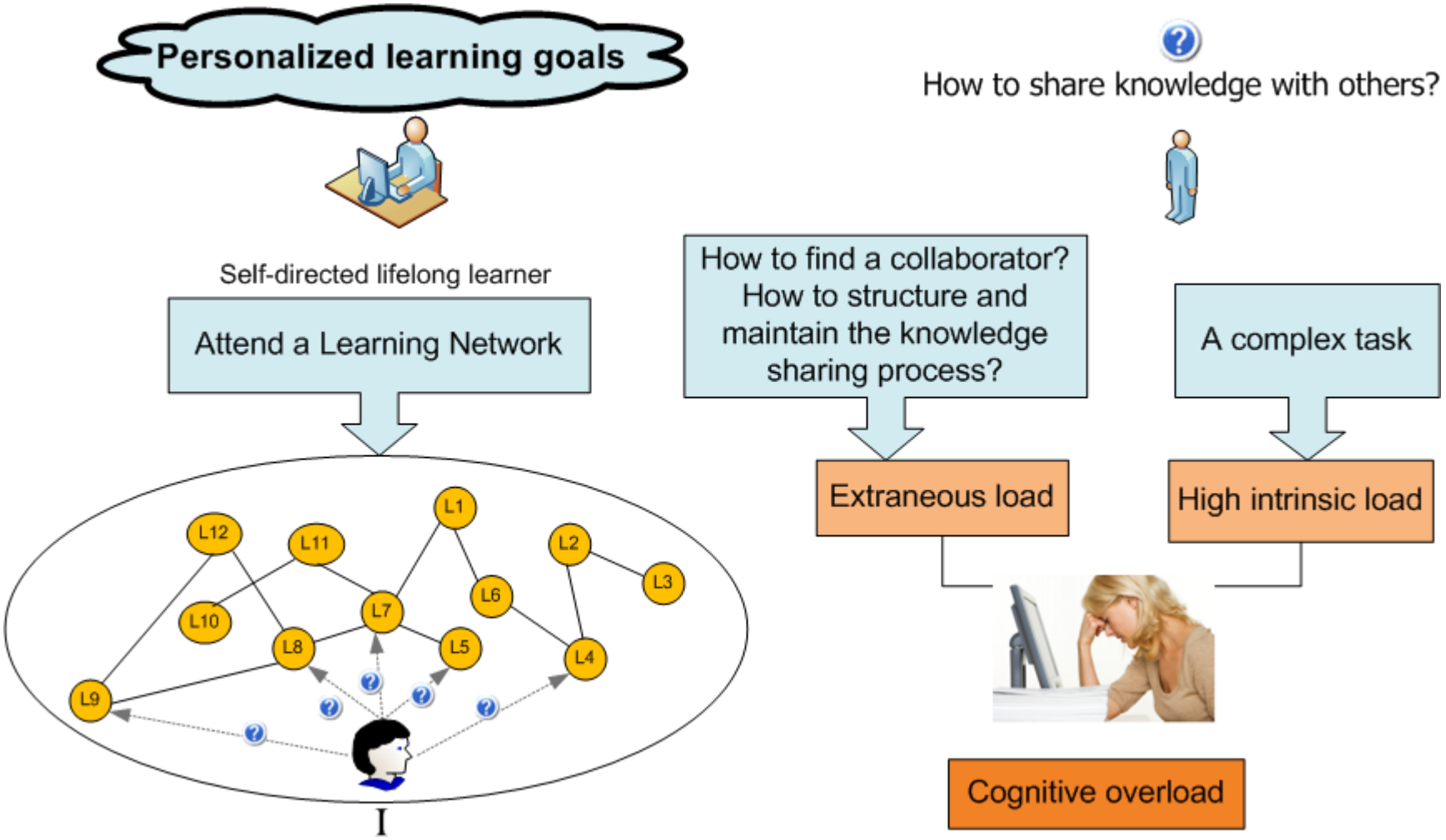
Effect of using peer tutoring to support knowledge sharing in Learning Networks: A cognitive load perspective

Ya Ping Hsiao, Francis Brouns, & Peter Sloep

Door: Dominique Ubachs
Locatie: ATH. 3.39

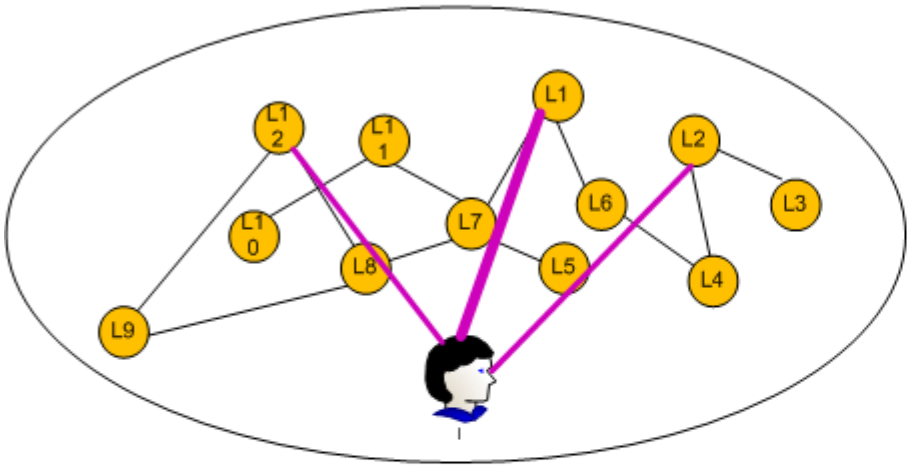
Key words

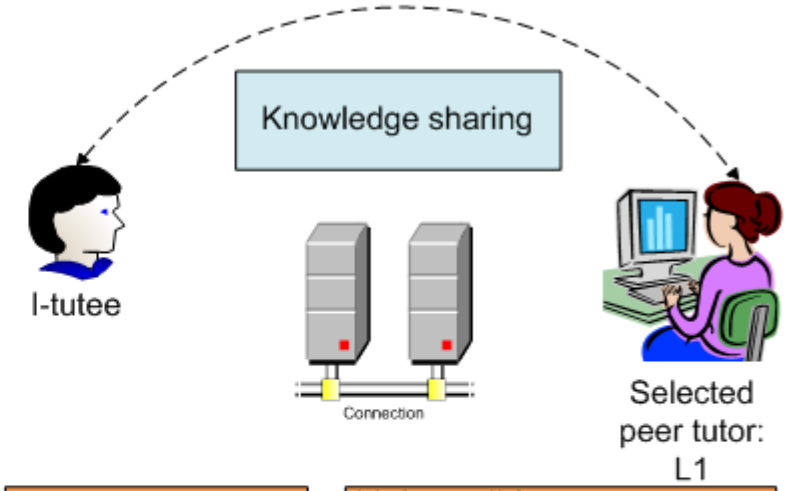
- Learning Networks
- Knowledge sharing
- Cognitive load theory
- Peer tutoring


Personalized learning goals
How to share knowledge with others?
Self-directed lifelong learner
Attend a Learning Network
How to find a collaborator? How to structure and maintain the knowledge sharing process?
A complex task
Extraneous load
High intrinsic load
L1
L2
L3
L4
L5
L6
L7
L8
L9
L10
L11
L12
Cognitive overload

3

Using technology-enhanced peer tutoring to reduce extraneous load during knowledge sharing





Using an automatic peer tutor selection to select suitable tutors: L1, L2, L12 are selected.

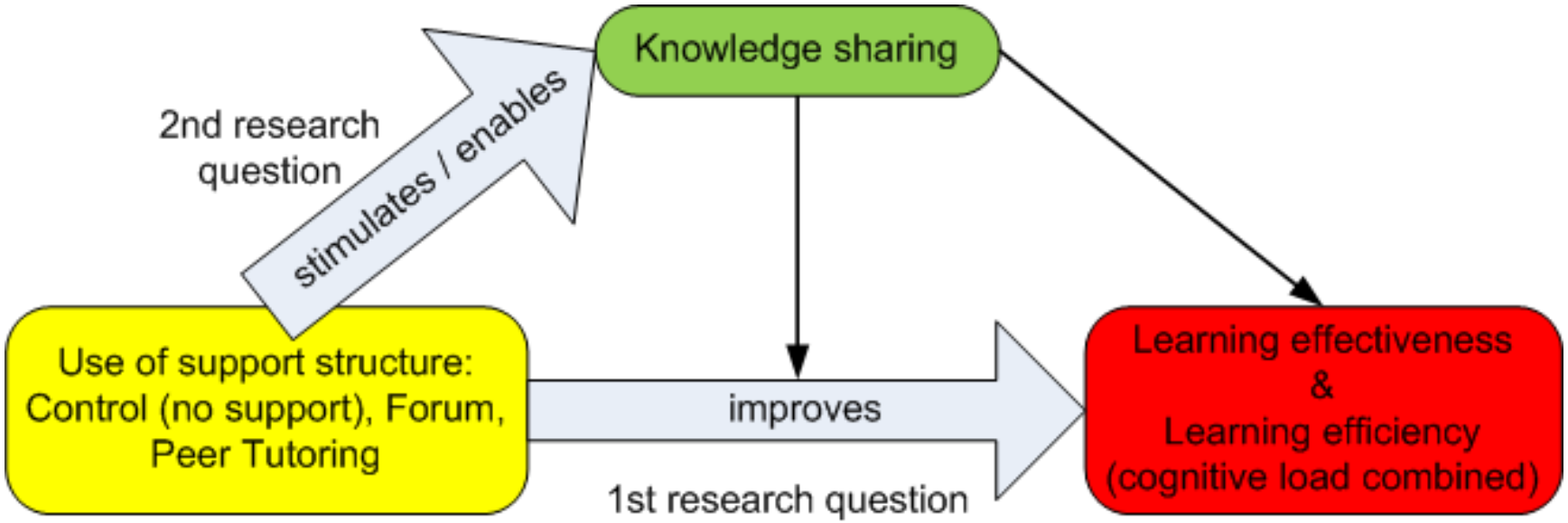
This reduces extraneous load.

Using role specifications to assign role tasks of tutor and tutee.

Using wiki as an interaction structure to scaffold the communication and collaboration process of knowledge sharing.

Both mechanisms reduce extraneous load.

Research questions



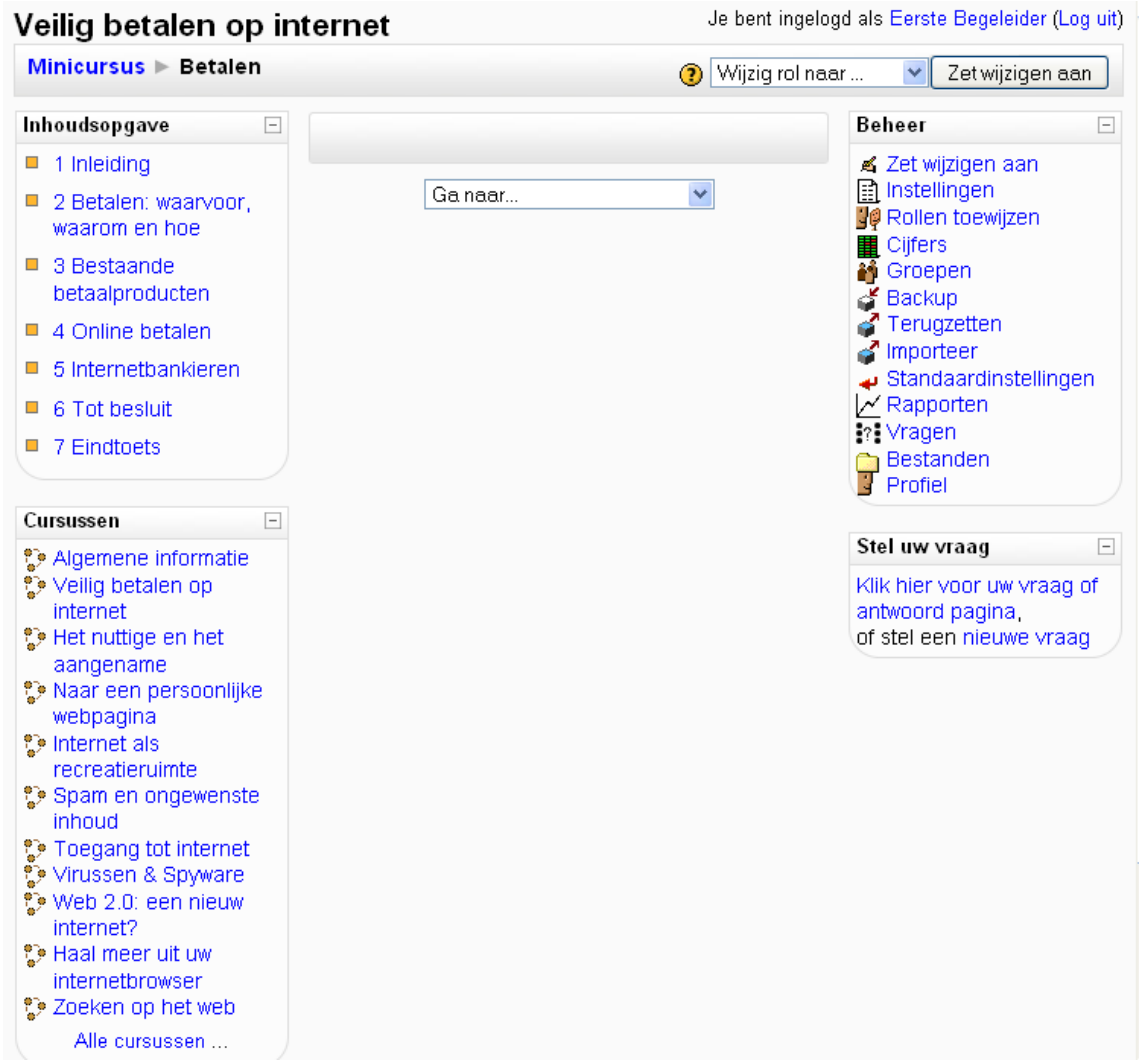
Hypotheses

- There is a significant interaction effect on learning effectiveness and efficiency between using different supports and task complexity.
- There is a significant interaction effect on knowledge sharing between using different supports and task complexity.

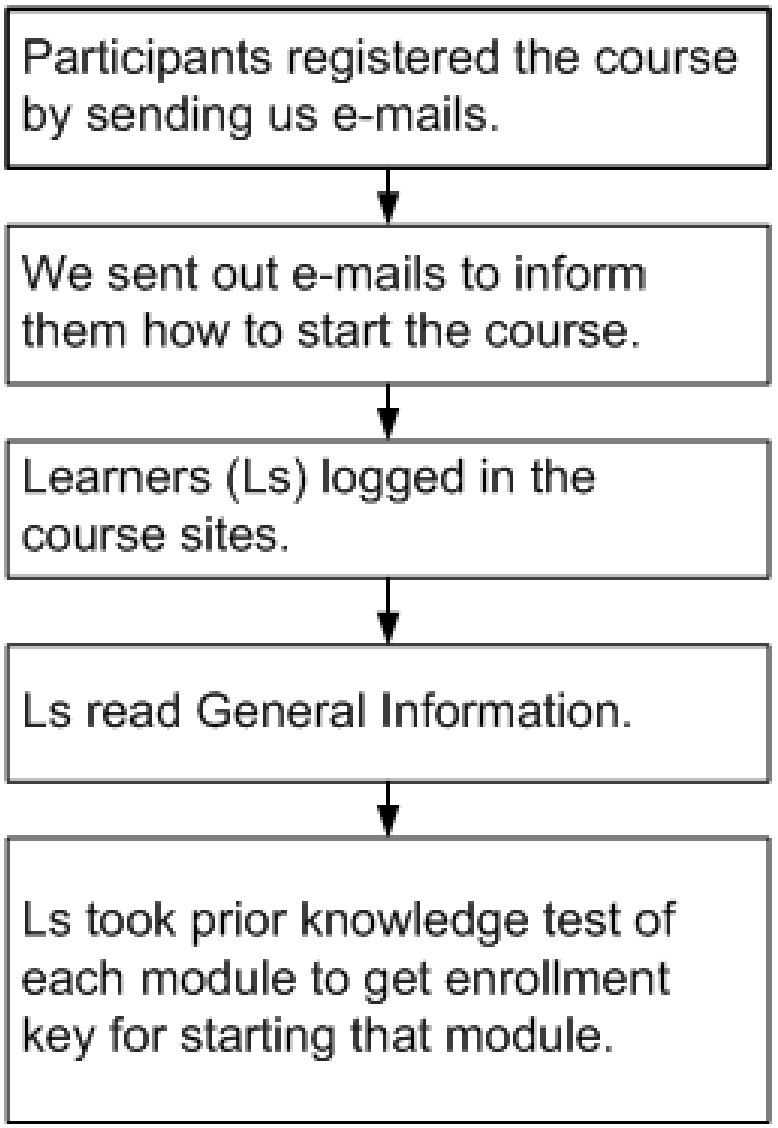
Factorial design

Task complexity	Support		
	Control	Forum	PT
Simple	CS (n=88)	FS (n=88)	PTS (n=89)
Complex	CC (n=90)	FC (n=89)	PTC (n=90)

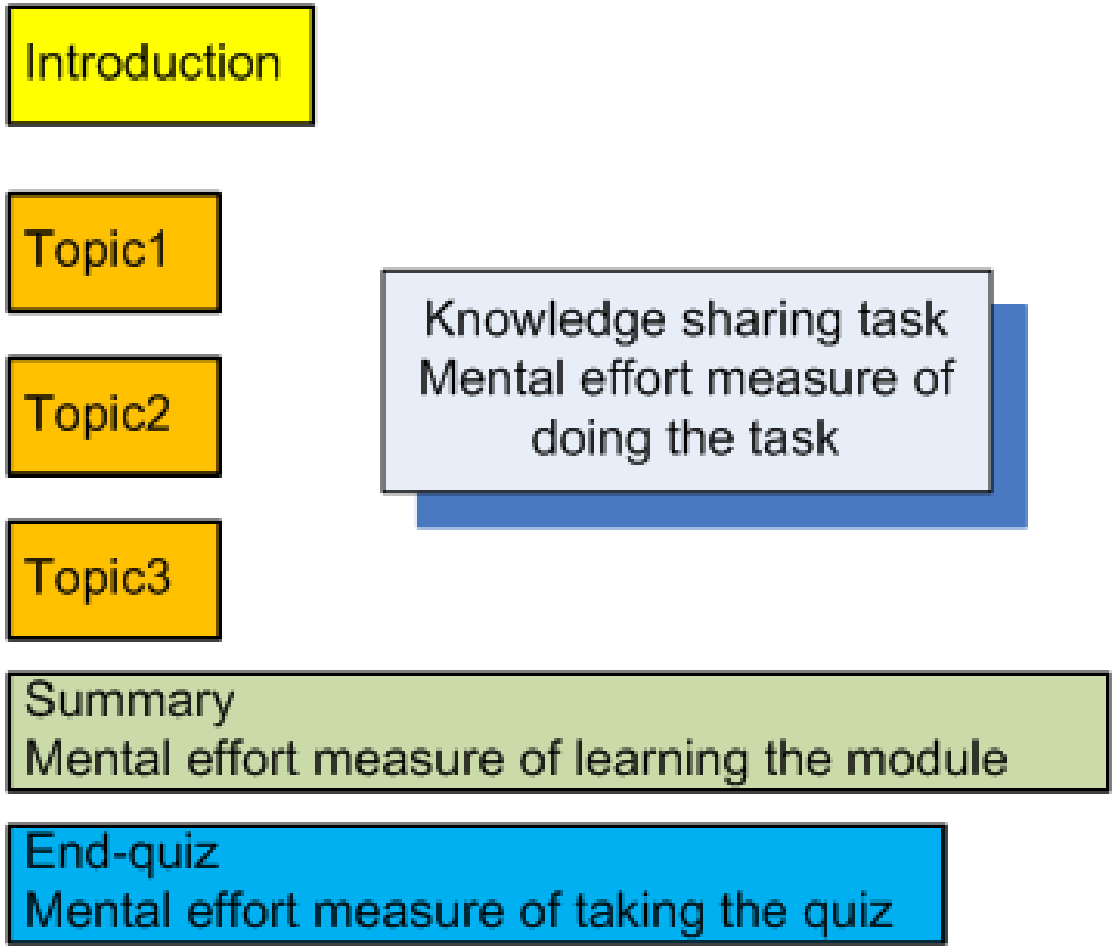
A LN of Internet Basics



Procedures


Participants registered the course by sending us e-mails.
We sent out e-mails to inform them how to start the course.
Learners (Ls) logged in the course sites.
Ls read General Information.
Ls took prior knowledge test of each module to get enrollment key for starting that module.

Learning activities for each module



Dependent variables

- Prior knowledge tests
- Post-tests (Learning effectiveness)
- Differences between prior knowledge tests and post-tests (Learning effectiveness)
- Mental effort invested during the learning process
- 2 Adaptive efficiency scores (Learning efficiency):

$$Efficiency = \frac{zP_{test} - zE_{learning}}{\sqrt{2}}$$

Data analysis for the 1st hypothesis

- The data were analyzed with 3 (supports: Control vs. Forum vs. PT) $\times$ 2 (task complexity: simple vs. complex) analyses of variances (ANOVA) with between-group measures on both factors.

Results of the 1st hypothesis (1)

- With regards to scores of prior knowledge tests, post-tests and difference scores between prior knowledge tests and post-tests, no effects were statistically significant at the .05 significance level.

	Mental effort on knowledge sharing tasks	Efficiency 1 (post-test scores)	Efficiency 2 (diff. scores)
Supports	$F(2, 808)=2.67$, $p>.05$	$F(2, 797)=2.77$, $p>.05$	$F(2, 797)=2.34$, $p>.05$
Task complexity	$F(1, 808)=12.54$, $p<.05$	$F(1, 797)=18.30$, $p<.05$	$F(1, 797)=7.81$, $p<.05$
	More mental effort was invested on complex than simple tasks.	Simple tasks have higher efficiency than complex ones.	
Interaction effect	$F(2, 808)=13.84$, $p<.05$ (C: 4.36, F: 4.78, PT: 4.96)	$F(2, 797)=8.82$, $p<.05$ (C: 0.10, F: -0.02.78, PT: -0.23)	$F(2, 797)=5.60$, $p<.05$ (C: 0.09, F: -0.05, PT: -0.21)
	These interaction effects are significant: Using different supports has no effect on simple tasks, but it does on complex tasks.		

Results of the 2nd hypothesis

	Forum simple	Forum complex	PT simple	PT complex
Total inquiries submitted	16	13	16	9
Invitations sent	n/a	n/a	58	34
Responses provided/invitations accepted	9	9	7	3
Percentage responses/inquiries	56,25%	69,23%	43,75%	33,33%
Valid answers	5	6	3	1
Percentage valid answers/inquiries	31,25%	46,15%	18,75%	11,11%

Discussion

- Forum and PT were not sufficiently used.
- Self-directness ->many missing values
- Technical mistake we made->no mental effort of learning the modules
- No time limit->difficulty of measuring cognitive load