A quest for evidence of learning in two peer-turoring schemes at a Belgian university

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Research questions

- How does learning occur in SI-Pass study sessions? => *how students perceive learning activities during SI sessions in mathematics, physics, statistics for psychology*
- What kind of learning in SI-PASS sessions: the targeted one? => *which learning activities are directed towards a deep learning approach?*
- Is the SI-PASS approach special? => *Does the reported type of learning differ between SI-PASS and another tutoring program?*

Malm, J. (2021). A Study on Learning Activities in Supplemental Instruction. In A. Strømmen-Bakhtiar, R. Helde, E. Susen (Eds.), *Supplemental Instruction: Volume 2: Student Learning Processes* (pp. 25-46). Münster, Germany: Waxmann Verlag.

A typical semester

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	
167	122	110	98	96	74	84	78	84	80	80	37	20	1130

Engineering : average attendance 39% & 6,5 students per session

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R 13	
34	39	59	48	47	24	24	31	38	46	28	37	25	480

Bio-engineering: 17% & 2,4 students per session

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R 13	
166	142	144	142	110	88	90	75	80	72	68	65	50	1292

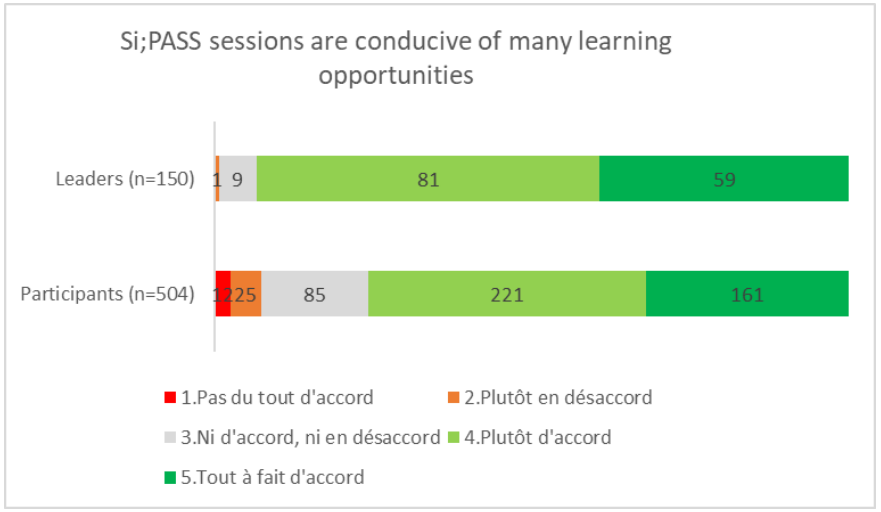
Psychology : 34% & 3,8 students per session

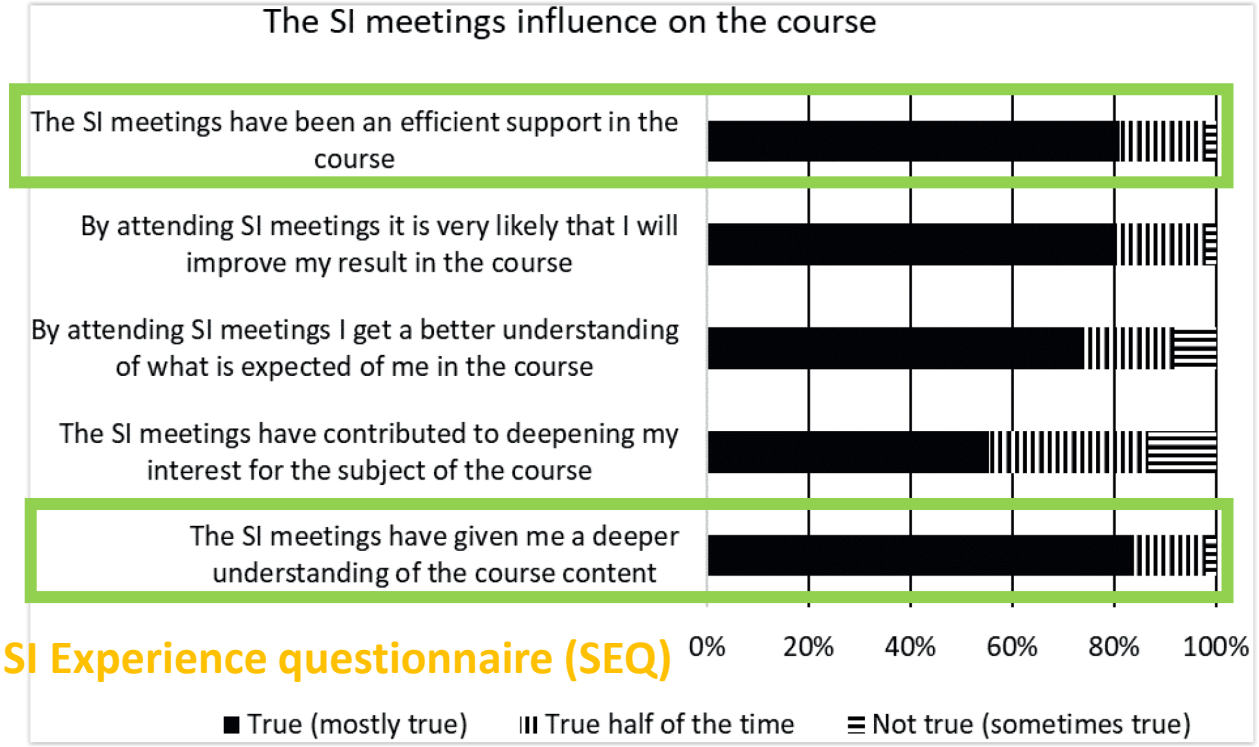
R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R 13	
30	20	17	9	12	11	12	7	12	9	12	10	9	170

Sciences : 19% & 4,3 students per session

Self-reported data show a rather high feeling of learning

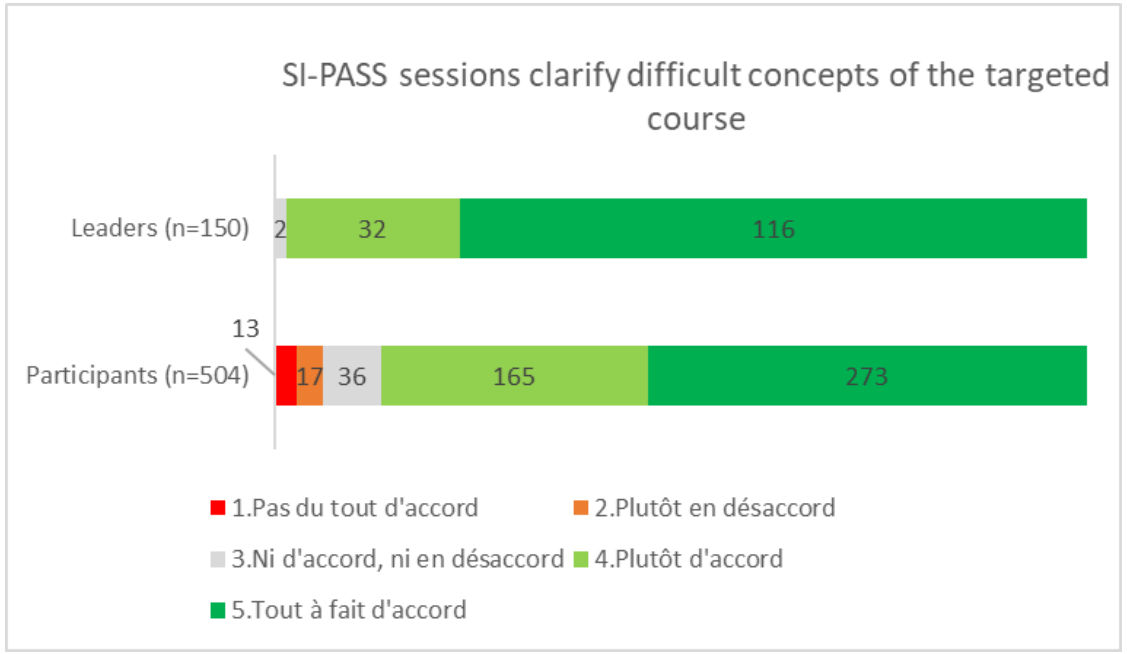
SI Experience questionnaire (SEQ)

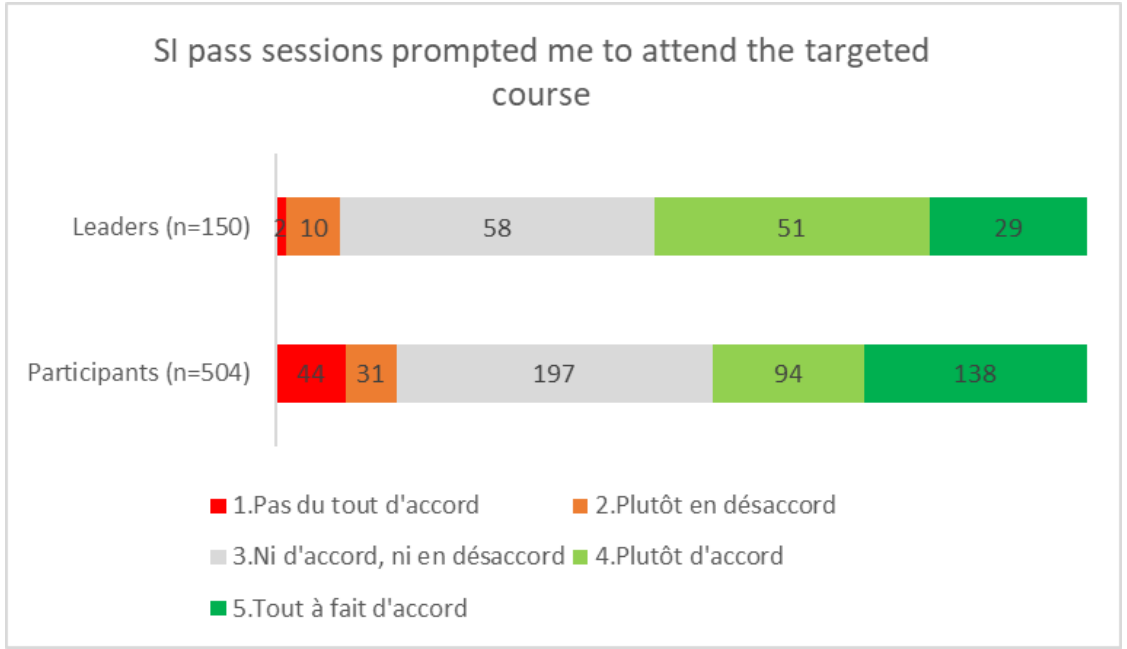




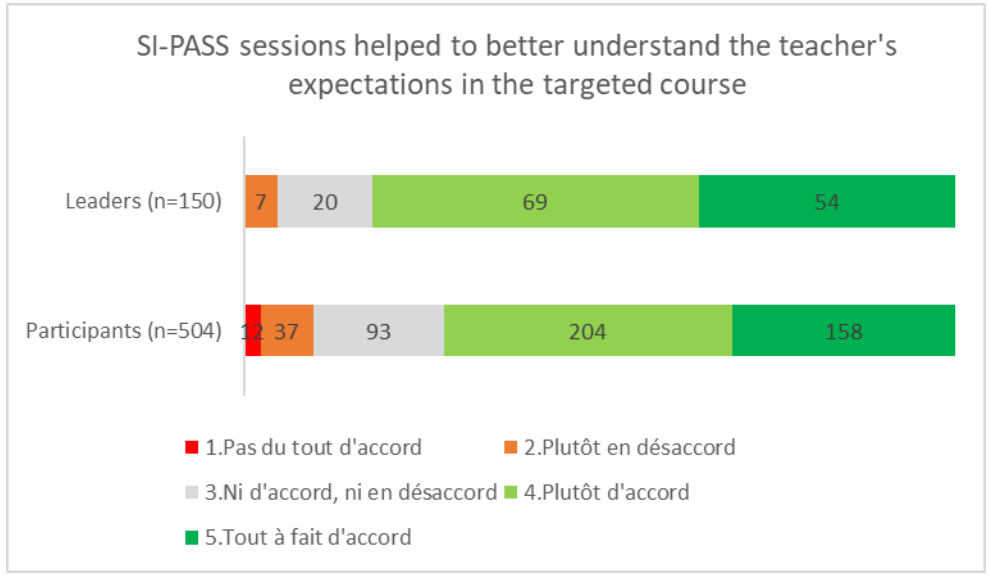
SI Experience questionnaire (SEQ)

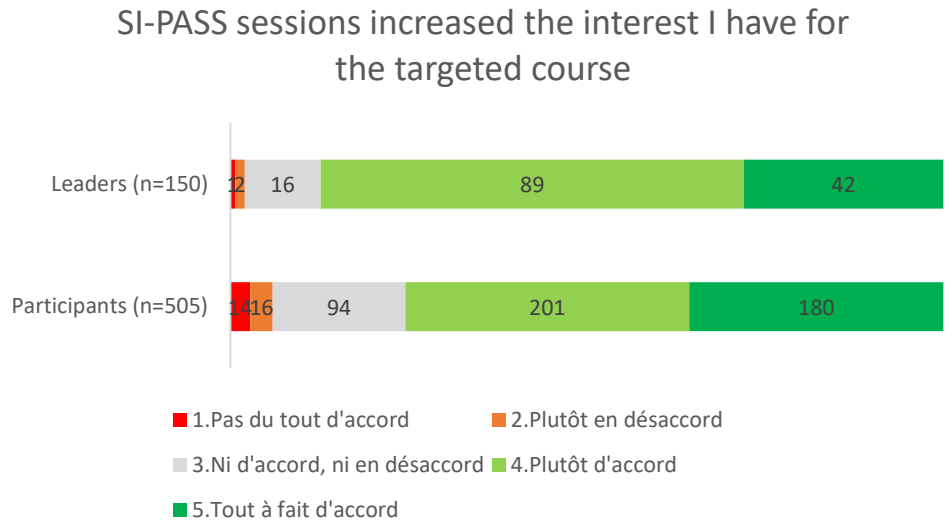
Ad hoc questionnaire

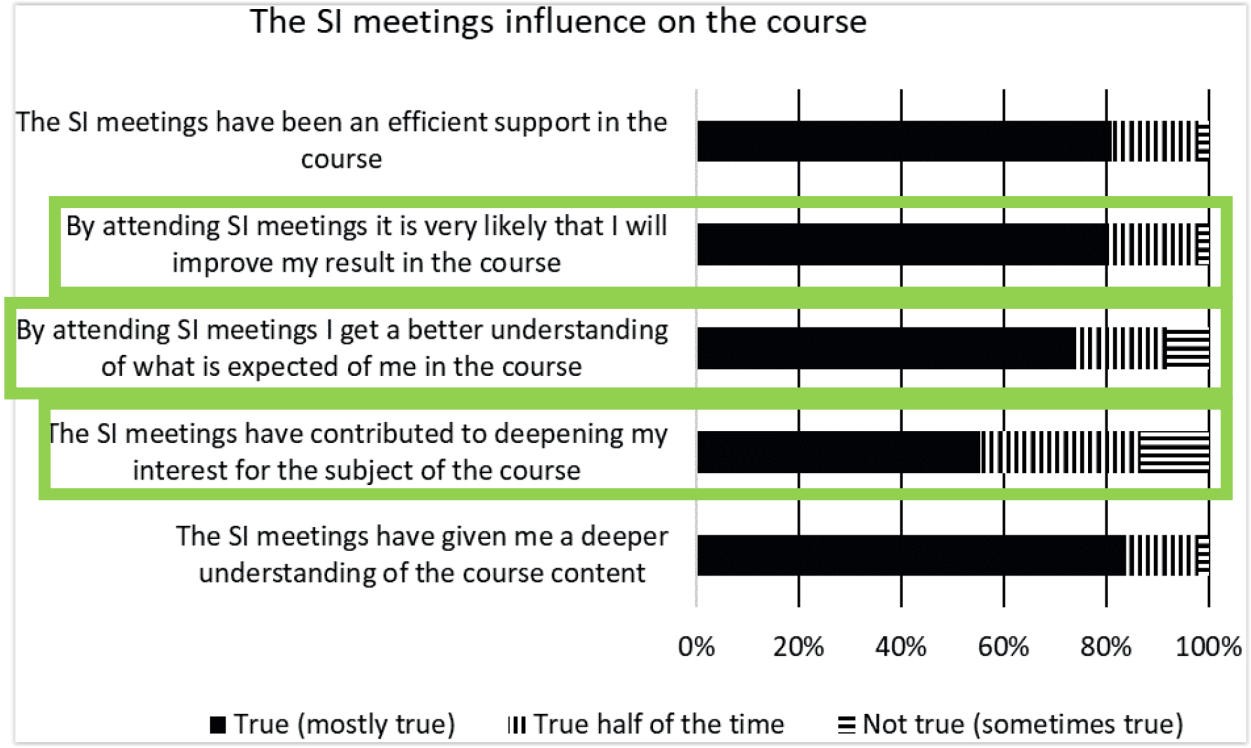


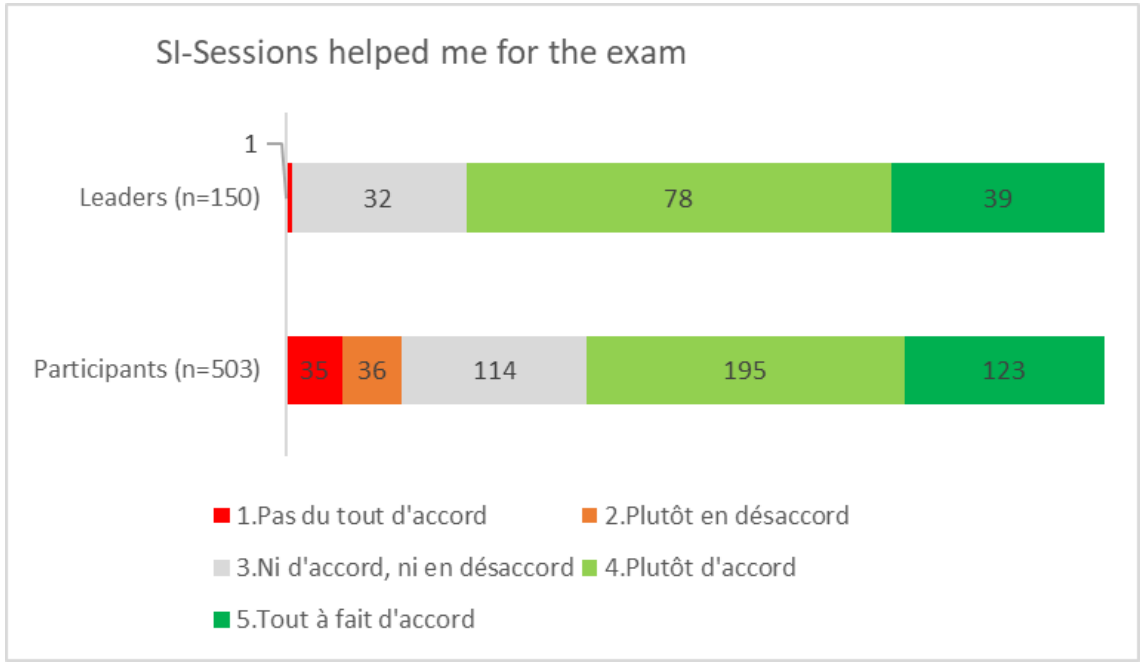


… and positive claimed influence on expectations, value and performance









In times of accountability and evidence-based learning…

One Sample T-Test FSA

One Sample T-Test

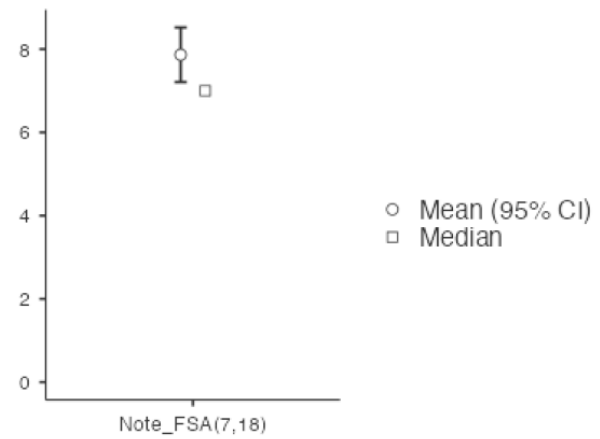
		Statistic	df	p	Mean difference		Effect Size
Note_FSA(7,18)	Student's t	2.0455	199.00	0.02106	0.68500	Cohen's d	0.14464

Note. H_a $\mu > 7.18$

Descriptives

	N	Mean	Median	SD	SE
Note_FSA(7,18)	200	7.8650	7.0000	4.7359	0.33488

Plots



One Sample T-Test GxABT

One Sample T-Test

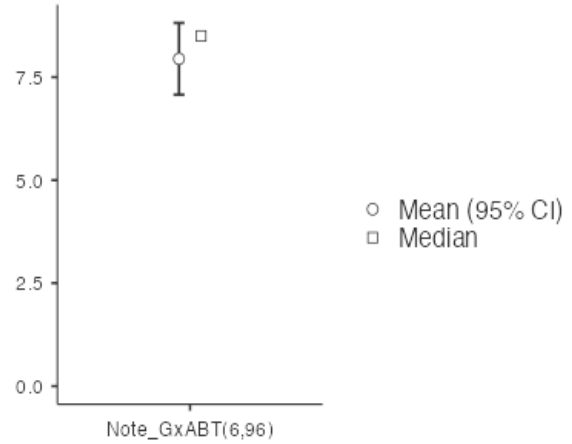
		Statistic	df	p	Mean difference		Effect Size
Note_GxABT(6,96)	Student's t	2.2147	89.000	0.01467	0.98444	Cohen's d	0.23344

Note. H_a $\mu > 6.96$

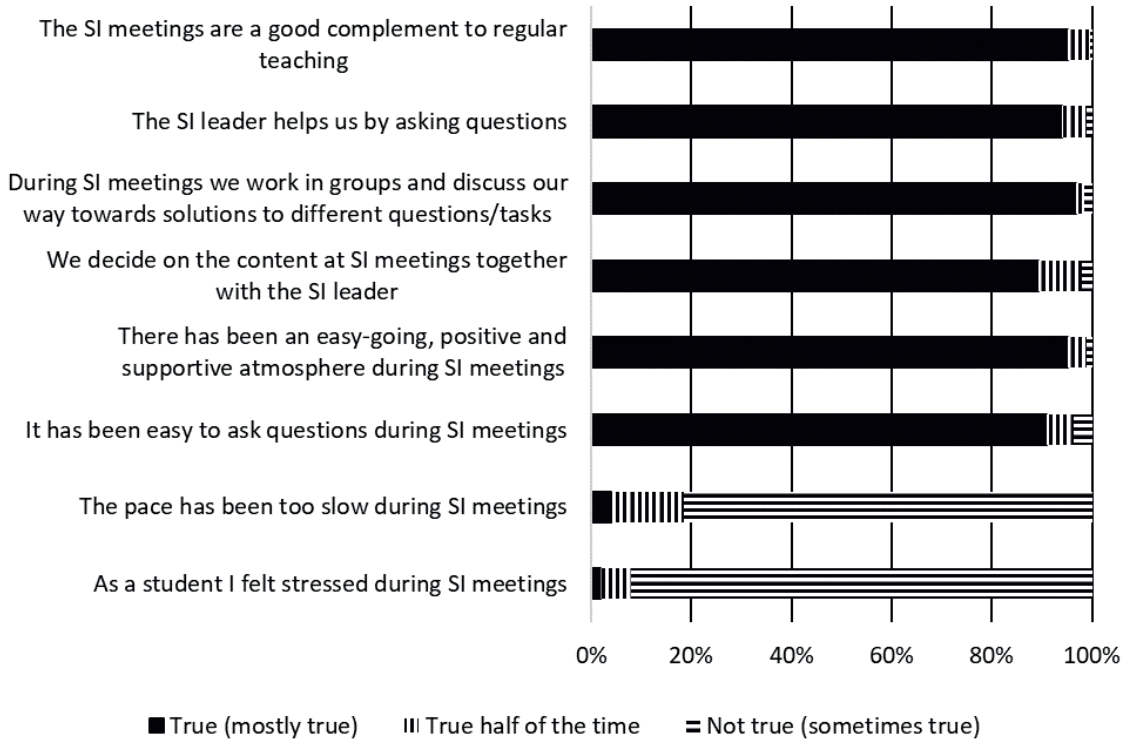
Descriptives

	N	Mean	Median	SD	SE
Note_GxABT(6,96)	90	7.9444	8.5000	4.2170	0.44451

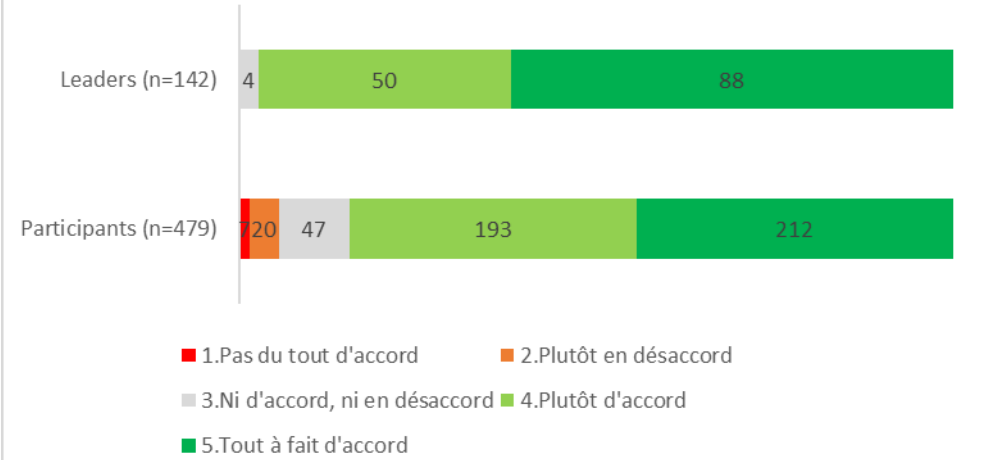
Plots



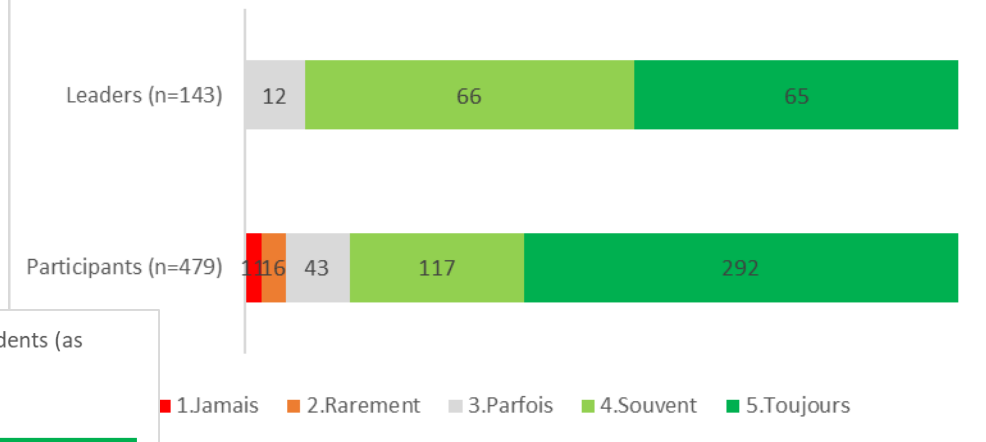
Control statements if SI methodology was used during SI sessions



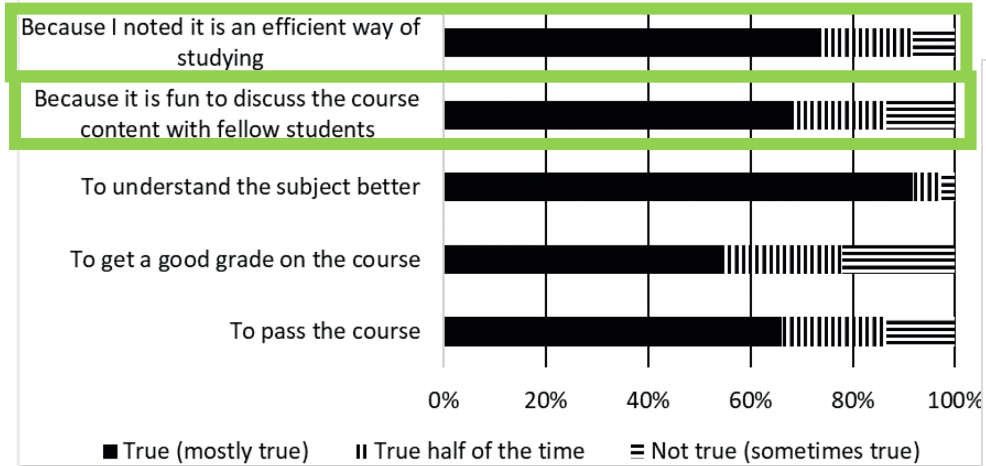
SI-PASS = interesting method to learn with each other



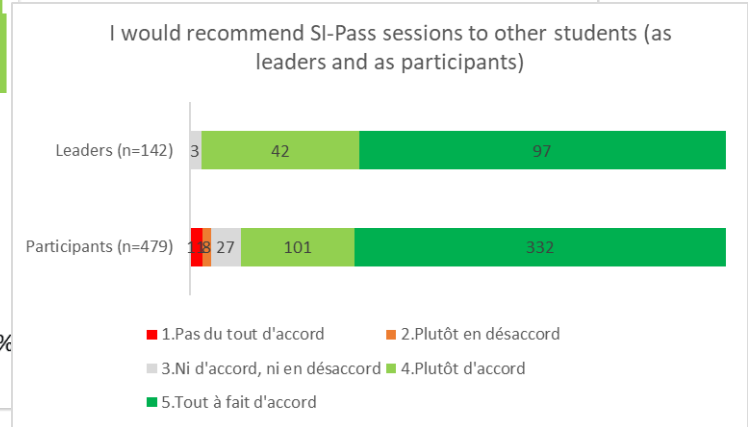
Leaders and participants happy with each others



Reasons why I participated in SI sessions



I would recommend SI-Pass sessions to other students (as leaders and as participants)



An attempt to refine self-reported data on learning activities

Tab. 1: The action verbs used on the survey ordered according to suggested associated level in the SOLO taxonomy

Quantitative phase		Qualitative phase	
Unistructural (I)	Multistructural (II)	Relational (III)	Extended abstract (IV)
Identify	Explain	Analyse	Generalise
Define	Solve	Apply	Hypothesise
Name	Describe	Argue	Reflect
Tell	List	Compare	Theorise
Memorise	Do algorithms	Contrast	Create
Quote	Clarify	Criticise	Synthesise
Do a simple procedure	Examine	Explain causes	Value
Recognise	Interpret	Relate	Develop
Recall	Extend	Motivate	Assess
Repeat	Rework	Predict	Debate
	Prove		Validate
	Classify		
	Combine		
	Revise		

SOLO categories let students identify the action verbs that best describe the learning activities in which they engage during SI sessions.

Superficial Levels		**Deeper Levels**	
I. Unistructural	**II. Multistructural**	**III. Relational**	**IV. Extended Abstract**
Identifier Définir Nommer Dire Citer Répéter une procédure simple Reconnaître Rappeler Répéter	Expliquer Résoudre Décrire Lister Faire des exercices Expliquer Clarifier Examiner Interpréter Étendre Retravailler Prouver Classer Combiner Réviser	Analyser Appliquer Argumenter Comparer Contraster Critiquer Expliquer les causes Mettre des éléments en relation Justifier Prévoir	Généraliser Faire des hypothèses Réfléchir Théoriser Créer Synthétiser Estimer Développer Évaluer Débattre Valider

Qualtrics

Dans la liste ci-dessous, je surligne les cinq verbes qui, selon moi, décrivent le mieux ce que les participants font au cours de mes rencontres SI-PASS.

Identifier Expliquer Analyser Généraliser Définir Résoudre
Appliquer Faire des hypothèses Nommer Décrire Argumenter
Réfléchir Dire Liste[illegible] briser
Faire des exercices Contraster Créer Citer Clarifier Critiquer
Synthétiser Répéter une procédure simple Examiner
Expliquer les causes Estimer Reconnaître Interpréter
Mettre des éléments en relation Développer Rappeler Étendre
Justifier Évaluer Répéter Retravailler Prévoir Débattre Prouver
Valider Classer Combiner Réviser

Cliquer ici pour surligner le verbe choisi

N Leaders = 12
N students = 85

N Leaders = 22
N students = 169

Replication of Joakim's verbs survey

Tab. 2: The most common verbs used by students and SI leaders to describe learning activities in SI sessions in the two basic courses in mathematics

Linear Algebra		
	% of answered surveys that marked the verb	
Verb	Students	SI leaders
Explain	48%	50%
Clarify	40%	33%
Analyse	30%	33%
Reflect	27%	50%
Solve	25%	25%
Explain causes	21%	17%
Motivate	19%	17%
Argue	18%	0%
Apply	12%	8%

Calculus in One Variable		
	% of answered surveys that marked the verb	
Verb	Students	SI leaders
Explain	49%	45%
Solve	38%	32%
Clarify	35%*	14%*
Reflect	24%	27%
Analyse	20%	9%
Motivate	18%	32%
Argue	15%	9%
Apply	13%*	50%*
Explain causes	10%	9%

*Note. % = percentage of answered surveys that marked the verb. Only verbs being marked on ≥10% of student surveys were included in the table. Statistically significant differences ($p < 0.05$) in response frequencies for a verb between students and SI leaders using a chi-square test are marked by *.*

	Students (N=433)	SI Leaders (N=142)	
Explain	47%	41%	
Clarify	38%	44%	
Reflect	34%	52%	
Rework	25%	38%	
Relate	20%	31%	
Synthesise	16%	23%	
Recall	14%	13%	**Compare**: 18% >< 4%
Solve	13%	8%	**Debate**: 18% >< 9%
Apply	13%	9%	**Develop**: 17% >< 8%
Analyze	13%	11%	**Motivate**: 17% >< 10%

Joakim: "analyse, reflect, explain causes, motivate, argue, and apply suggest that learning activities reach into the qualitative phase of learning" (p. 32)

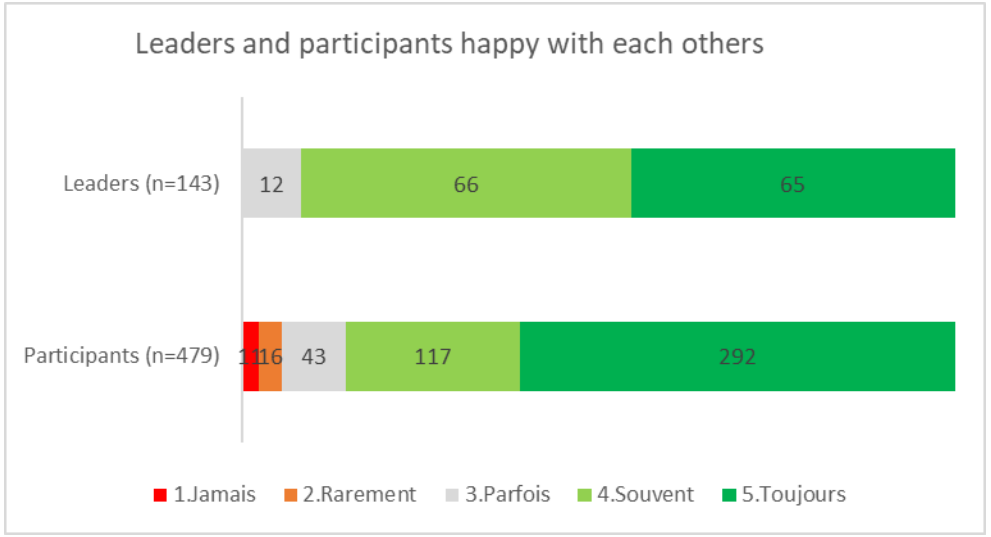
Comment 1: multi-years/multy-disciplines
Comment 2: analyse & solve missing in Liege for L
Comment 3: 5 verbs for L
Comment 4: all attendance levels on board

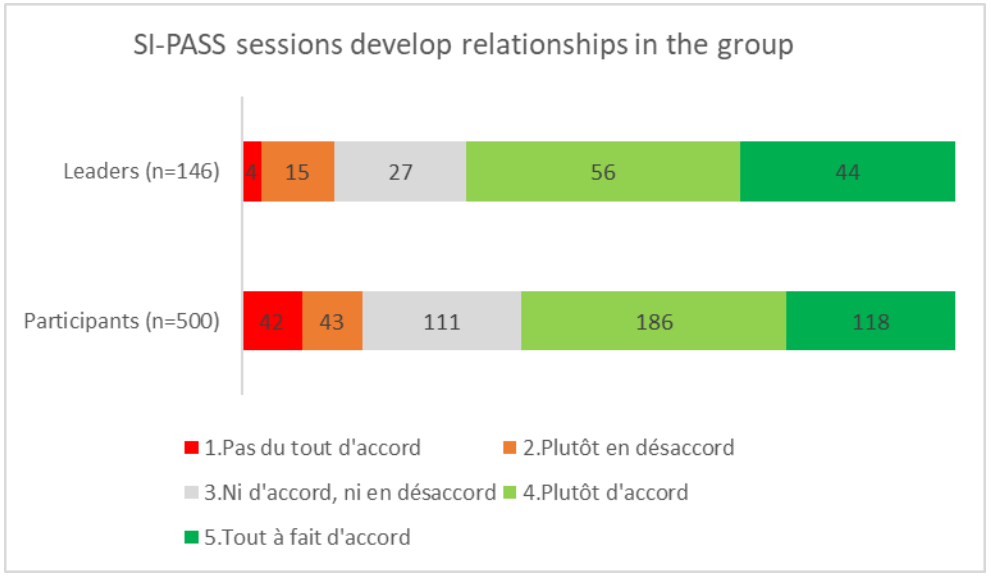
Besides the TOP10

1180 verbs students & 425 verbs Leaders

SOLO Categories - SI-PASS	Students	Leaders
Multistructural II (44.735%)	557 (34.704%)	161 (10.031%)
Extended Abstract IV (24.113%)	267 (16.636%)	120 (7.477%)
Relational III (18.879%)	195 (12.15%)	108 (6.729%)
Unistructural I (12.274%)	161 (10.031%)	36 (2.243%)

Additional verbs comfort the social aspect



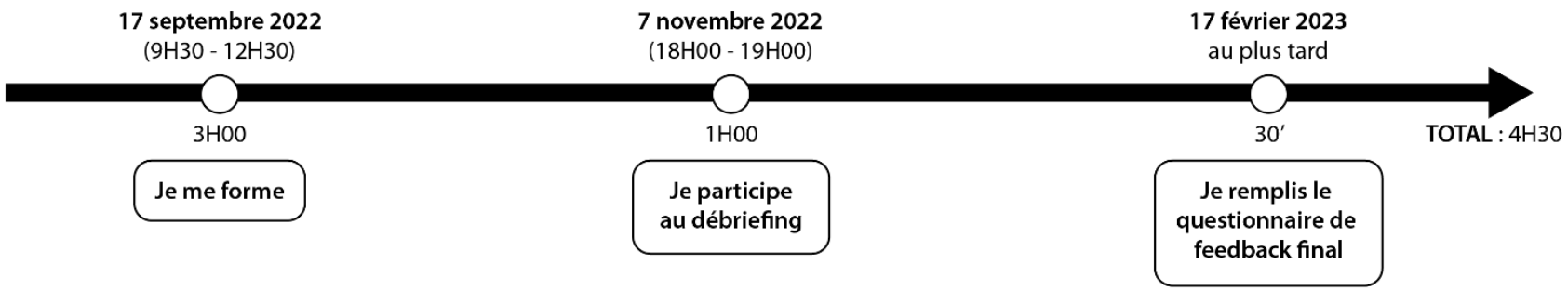


	pepps	si-pass
Help each other	11	17
Feel comforted	19	2
Give/receive info	8	5
Advise	10	1
Listen	10	1
Discuss	9	2
Share	9	2

Pour deux des cinq verbes choisis, je donne une explication dans le contexte de mes rencontres SI-PASS **(merci de bien recopier le verbe auquel se rapporte l'explication !).**

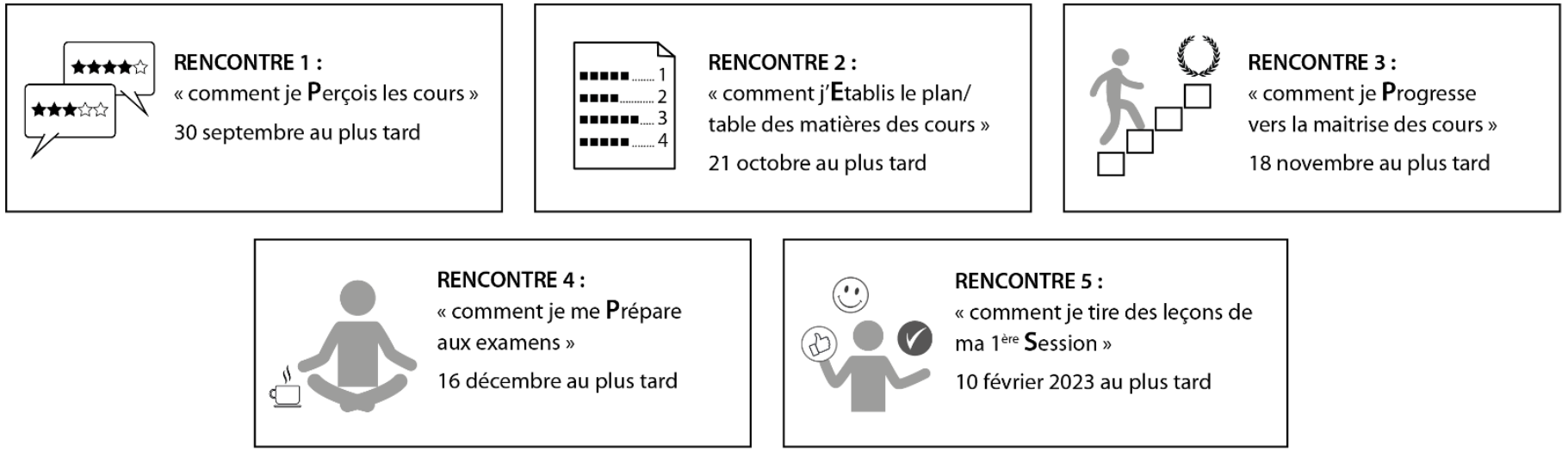
J'ajoute un verbe à la liste si j'estime qu'elle pourrait être complétée.

Ce à quoi je m'engage en tant que parrain/marraine PEPPS



J'organise 5 rencontres : 5 heures

+ 2H30 Préparation rencontres
+ 1H00 Questionnaires intermédiaires
+ 2H00 Ajustements



Hypothesis: verbs describing PEPPS sessions will be different (level 1).

Similar verbs but with different intensities?
A bit more of level 1 in PEPPS (describe/tell)?

263 PEPPS participants	
Explain	64%
Clarify	43%
Predict	29%
Compare	22%
Reflect	22%
Describe	21%
Tell	21%
Analyze	17%
Identify	16%
Debate	16%

192 Leaders PEPPS	
Explain	66%
Clarify	48%
Reflect	35%
Debate	23%
Describe	22%
Predict	22%
Compare	20%
Develop	19%
Relate	18%
Recall	17%

	Students (N=433)	SI Leaders (N=142)	
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Apply	13%	9%	**Develop**: 17% >< 8%
Analyze	13%	11%	**Motivate**: 17% >< 10%

1180 verbs students & 425 verbs Leaders

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Relational III (18.879%)	195 (12.15%)	108 (6.729%)
Unistructural I (12.274%)	161 (10.031%)	36 (2.243%)

875 verbs students & 580 verbs Leaders

SOLO Categories - PEPPS	Students	Leaders
Multistructural II (39.725%)	346 (23.78%)	232 (15.945%)
Extended Abstract IV (23.161%)	187 (12.852%)	150 (10.309%)
Relational III (22.818%)	208 (14.296%)	124 (8.522%)
Unistructural I (14.296%)	134 (9.21%)	74 (5.086%)

Conclusion

- Explain II, Clarify II, Reflect IV in Lund and in Liège in a program meant to trigger deep learning
- Analyse III missing in Liège making deep learning even more fragile
- Explain II, Clarify II, Reflect IV find their way in another program which is not meant to support a meaning-oriented academic approach.
- Beware of the words?
- Larger samples, more contexts
- Call to field observations?