

Supporting active learning and perseverance of Freshmen through the implementation of Assessment for Learning principles in a Psychostatistics course at ULiège

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AHE Conference
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Context

Course

Descriptive and inferential psychostatistics Partim 1

1st year BA Psychological Sciences and Logopaedics

60hrs course - 6 credits

Large and growing enrolment (950 in 2021 - 2022)

Insufficient supervision resources

Objectives

At the end of the course, the student will be able to

Analyze data from scientific studies using elementary statistical treatments and interpret the results

Read and understand results of scientific studies containing elementary statistical analyses

Calculate the statistics necessary for the use of standardised tests (e.g. the Z-score)

Adopt a critical attitude towards the generalisation of conclusions based on sample measurements

Activities/ learning support

Course sessions (systematically podcasted)

Corrected exercise session (Practical Work)

- Exercises per chapter
 - Integrative exercises
- } With answers

Exam archive with answer keys

Evaluation

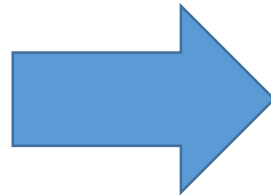
Wordings and data sets from real-life situations

Correction grid with error levels

Context

Identified problems

- Very high failure rate (58 - 62% depending on the year)
- Course perceived as an “entry filter”
- Examination anxiety & students' low perceived course usefulness
- “Quickly forgotten” material



Sequenced online exercise design

- Integrative scaffolding exercises with immediate feedback
- Three sets of recursive exercises
 - Level 1: Chapters 1 to 4
 - Level 2: Chapters 1 to 7
 - Level 3: chapters 1 to 11
- Online test at each level with delayed feedback
- NEW** • 2021-2022: Adding a catch-up option for test 1
- Increasingly exam-like conditions
 - Fewer steps explicitly shown
 - Limited time for completion from test 2 onwards
- Bonus point for the exam if 12/20 average for the 3 tests

2020-2021

1 pt bonus



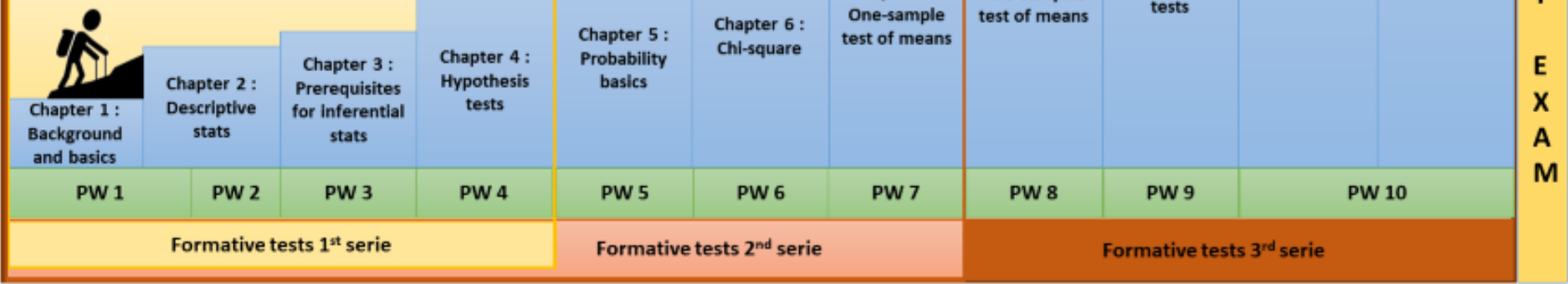
J
A
N
U
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R
Y

E
X
A
M

Low stake test 3

Low stake test 2

Low stake test 1



Mid-sept → mid-december

Formative tests are available one week before low stake tests

2021-2022

1 pt bonus



J
A
N
U
A
R
Y

E
X
A
M

Low stake test 3

Low stake test 2

Low stake test 1 + catch-up

Chapter 1 :
Background
and basics

Chapter 2 :
Descriptive
stats

Chapter 3 :
Prerequisites
for Inferential
stats

Chapter 4 :
Hypothesis
tests

Chapter 5 :
Probability
basics

Chapter 6 :
Chi-square

Chapter 7 :
One-sample
test of means

Chapter 8 :
Two-samples
test of means

Chapter 9 :
Non-
parametric
tests

Chapter 10 :
Correlations &
regressions

Chapter 11 :
Statistical tests
on correlations
and regressions

PW 1

PW 2

PW 3

PW 4

PW 5

PW 6

PW 7

PW 8

PW 9

PW 10





Formative tests 1st serie

Formative tests 2nd serie



Formative tests 3rd serie


Mid-sept → mid-december


Formative tests are available one week before low stake tests


← → ↻  https://www.ecampus.uliege.be/webapps/blackboard/content/listContentEditable.jsp?content_id=_604428_1&course_id=_21037_1 67 %   


Psychostatistique descriptive et inférentielle (partim) 130h Th, 30h Pr


Supports du cours  


Mes notifications 


Notifications de l'enseignant 


Discussions 


Mes notes 


Annonces 


Aide 


Calendrier 


Courrier 


Evaluation des exercices et tests (2020-2021) 


Evaluation des exercices et tests (2021-2022) 


Votre parcours au sein du cours 


Teams - cours à distance 


Arbre décisionnel 


Première série d'exercices 


Deuxième série d'exercices 


Troisième série d'exercices 


Test sur les exercices - 1 

Test sur les exercices - 2 

Test sur les exercices - 3 





Collaborate 



Test exercices par étapes 

TP1 - identification variables 

Gestion de cours

Exercices - ETAPE 1 - question 1

Créer un contenu  Évaluations  Outils  Contenu de partenaire 

 **Question 1 **

Activé : Suivi statistique

Dans le cadre d'une expertise commanditée par le tribunal, une psychologue a récemment fait passer une batterie de tests à une jeune fille ayant été victime d'un grave accident. Cette batterie était composée d'un questionnaire de réaction au stress, d'un test de dépression, d'un test de mémoire, ainsi que d'une auto-évaluation de l'anxiété. Dans le tableau ci-dessous, vous trouverez les moyennes et les variances de ces différents tests dans la population non-pathologique :



TEST	Moyenne	Variances
Réaction au stress	12	9
Dépression	15	16
Mémoire	75	121
Auto-évaluation de l'anxiété	21	49

Les résultats obtenus par la jeune fille à ces tests sont :

- 18 pour le questionnaire de réaction au stress ;
- 24 pour le test de dépression ;
- 49 pour le test de mémoire ;
- 34 pour l'auto-évaluation de l'anxiété.



A partir de ces données, répondez aux questions suivantes :



- Le score au test de mémoire de la jeune fille laisse-t-il penser que celle-ci provient d'une population dont les capacités mnésiques sont inférieures à la population non-pathologique ?
- Quel est le score standardisé de cette jeune fille au test de dépression ?
- Peut-on inférer du score de cette patiente à l'échelle d'auto-évaluation qu'elle provient d'une population présentant un niveau d'anxiété différent de celui des personnes non-pathologiques ?
- Le score au questionnaire de réaction au stress de cette patiente met-il en évidence qu'elle provient d'une population pathologique ?

 **a) Le score au test de mémoire de la jeune fille laisse-t-il penser que celle-ci provient d'une population dont les capacités mnésiques sont inférieures à la population non-pathologique ? **

Activé : Suivi statistique

Afin de répondre à la question, répondez aux questions du test ci-dessous. Vous recevrez un feedback après avoir validé vos réponses.

 **Question 1 a) - questions 1 à 6 **

 **b) Quel est le score standardisé de cette jeune fille au test de dépression ? **

Activé : Suivi statistique

Afin de répondre à la question, répondez à la question du test ci-dessous. Vous recevrez un feedback après avoir validé vos réponses.

Aperçu du test : Question 1 a) - questions 1 à 6

^ Informations sur le test

Description

Instructions

Tentatives multiples Ce test autorise les tentatives multiples.

Forcer l'exécution Vous pouvez enregistrer ce test et le reprendre plus tard.

Les retours en arrière sont interdits pour ce test. Il est interdit d'apporter des modifications aux réponses après la validation.

∨ État d'avancement de la question :

Fermer la fenêtre

↳ ⚠ Vous ne pouvez plus modifier cette réponse après être passé à la question suivante.

Question 1 sur 6 >

Question 1

1 points Enregistrer la réponse

Quelle est l'hypothèse nulle, qui permet de tester si le score au test de mémoire de la jeune fille laisse penser que celle-ci provient d'une population dont les capacités mnésiques sont inférieures à la population non-pathologique ?

- $H_0 : \mu_X < 75$
- $H_0 : \mu_X > 75$
- $H_0 : \mu_X \neq 75$
- $H_0 : \mu_X = 75$

↳ ⚠ Vous ne pouvez plus modifier cette réponse après être passé à la question suivante.

Question 1 sur 6 >

Fermer la fenêtre

Feedbacks


Question 4


1 points sur 1

Quelle est la valeur de la statistique qui vous permettra de calculer la probabilité d'obtenir cette observation si l'hypothèse nulle posée est correcte?

Attention :

- Utilisez une virgule pour marquer les décimales (pas un point)
- Si la valeur est négative ne pas indiquer le « moins », c'est-à-dire mettre la valeur absolue de votre réponse.

Réponse sélectionnée :  2,36

Réponse correcte :  2,36

Tolérance +/- 0 (2.36 - 2.36)

Feed-back de réponse : **C'est correct.**

La valeur Z est de -2,36.

Le calcul à effectuer est le suivant:

$$Z = \frac{49 - 75}{\sqrt{121}} = -2,36$$


Question 5


0 points sur 1

En vous aidant de la table, quelle est la probabilité d'avoir un Z-score inférieur au Z-score obtenu pour la jeune fille?

Attention :

- Utilisez une virgule pour marquer les décimales (pas un point)
- Si la valeur est négative ne pas indiquer le « moins », c'est-à-dire mettre la valeur absolue de votre réponse.

Réponse sélectionnée :  12

Réponse correcte :  0,0091

Tolérance +/- 0 (0.0091 - 0.0091)

Feed-back de réponse : **C'est incorrect.**

Quand on se réfère à la table, la probabilité d'avoir un Z-score inférieur à -2,36 est de 0,0091.

En effet, $P(Z < -2,36) = P(Z > 2,36) = 0,0091$.

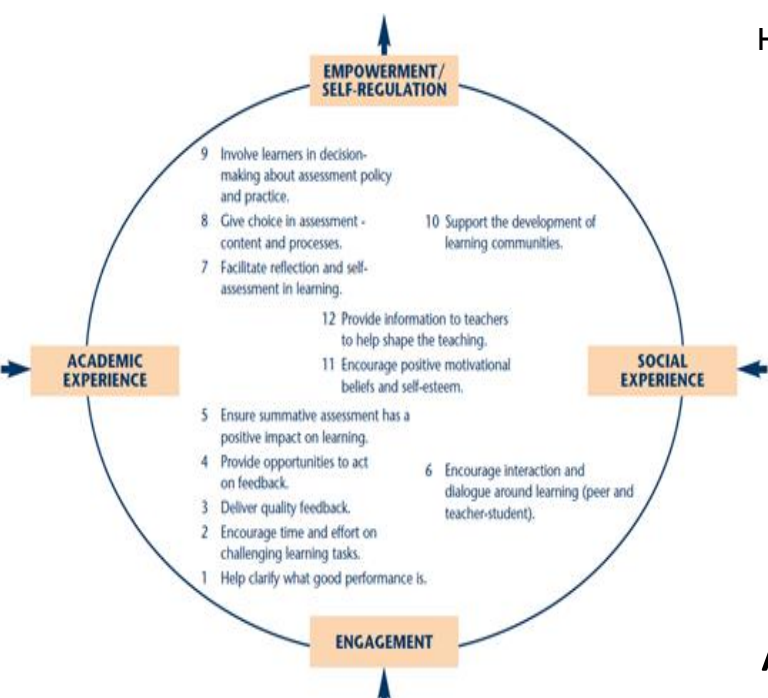
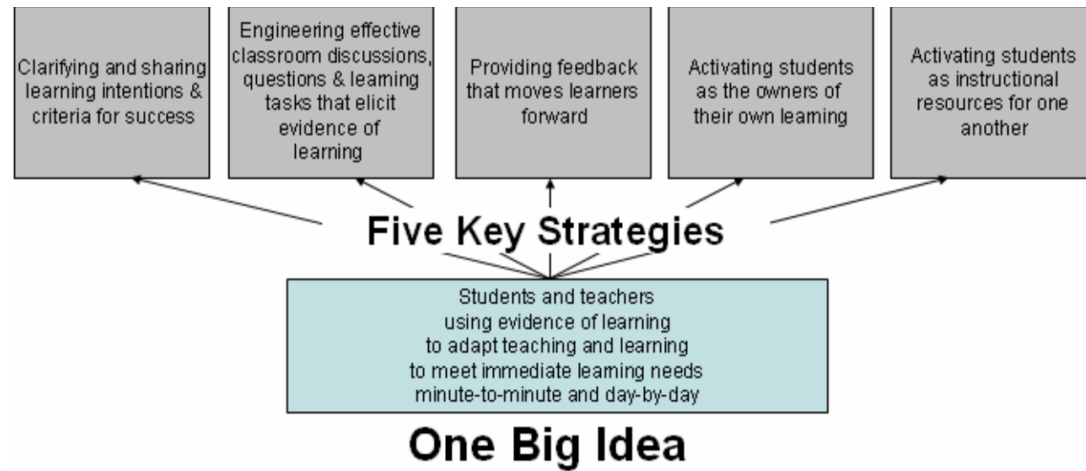
Vous obtenez la valeur 0,9909 si vous avez oublié de prendre en compte le signe "-."

Once the series of questions is completed, feedback is given to the students, and for each question, a feedback of correct and incorrect answers was created

Evaluation

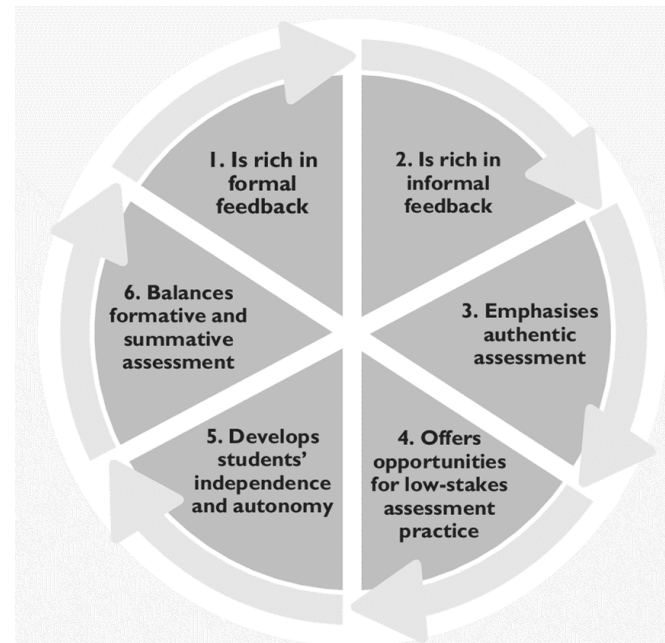
- Potential qualities of the pedagogical redesign
- Data
 - Participation
 - Performance
 - Perception

How the Big Idea and Five Key Strategies of KLT are related (Thompson & Wiliam, 2008)



An Assessment for Learning redesign

Characteristics of a learning environment that supports assessment for learning (adapted from Sambell et al., 2013)

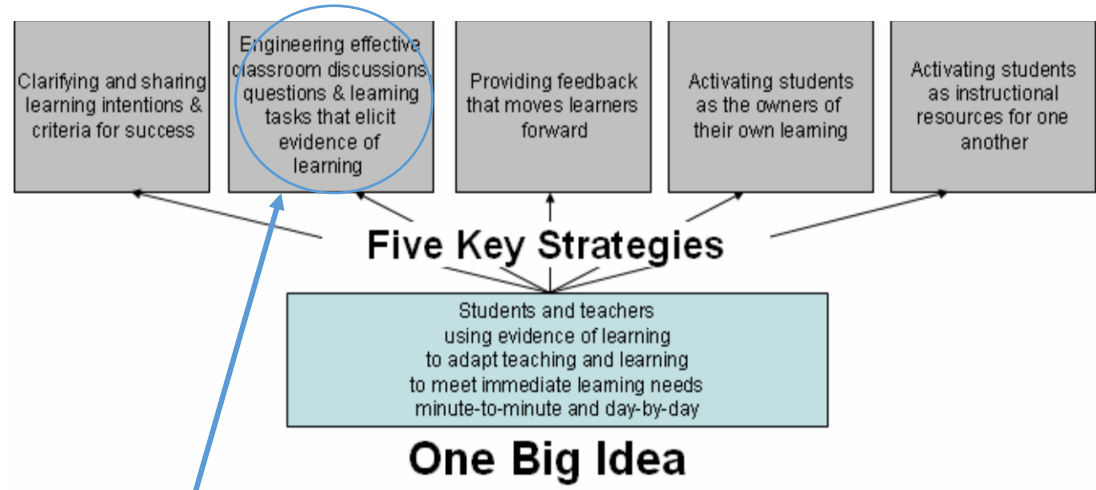
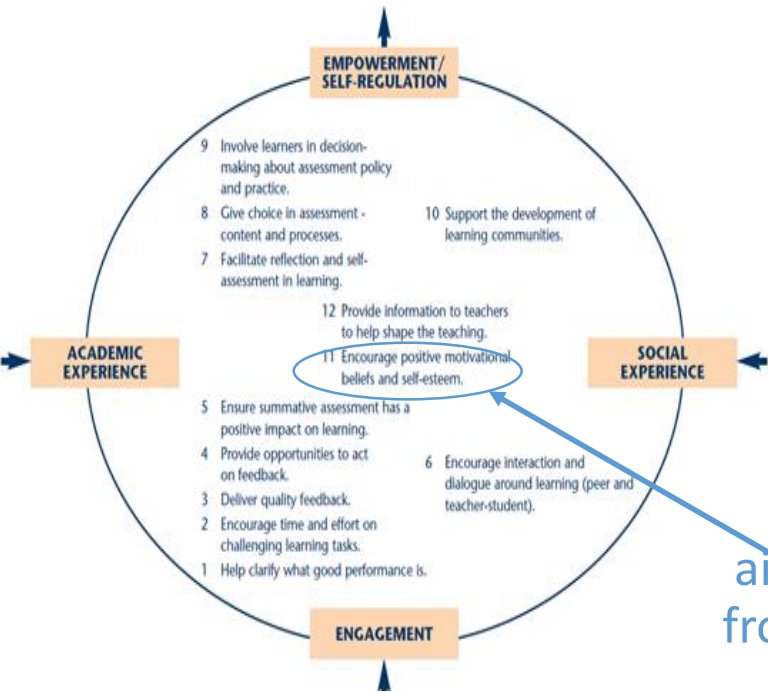


Principles of good formative assessment and feedback and their application to the first year (Nicol, 2009)

Model for the analysis of the potential to support the self-regulation of learning of AfL activities (Leduc et al., 2016)

	Où l'étudiant va		Où l'étudiant se trouve (à ce stade)				Comment s'y rendre	
	Enseigner apprendre (action1)							
Produit d'apprentissage	Contrat et attentes	Situation d'ens-appr.	Performance étudiant	Référents à l'évaluation	Correction proprement dite	Feedback émis sur	Remédier Renforcer	
Processus d'apprentissage	de départ	nouvelle	(consigne + tâche)	(critères, correctifs)	(allo-évaluation, auto-évaluation)	performance étudiant	(action 2)	
	(Auto-)régulation proactive		(Auto-)régulation interactive				(Auto-)régulation retroactive	

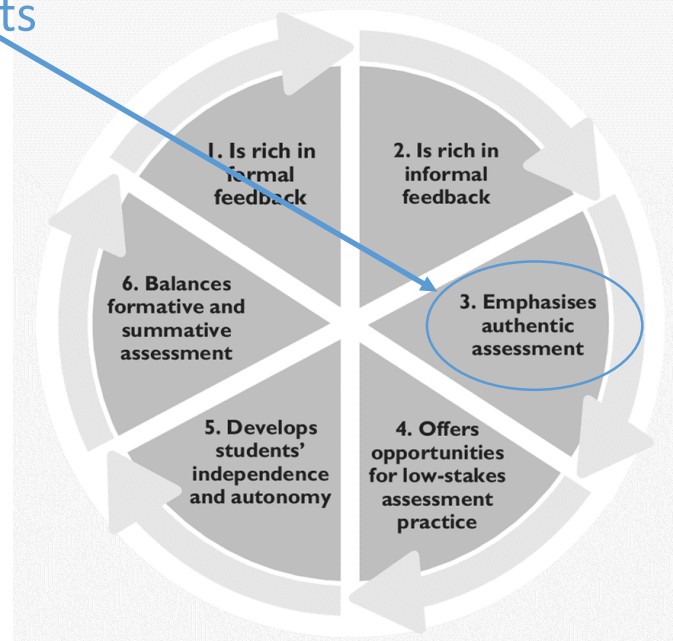
Auto-régulation

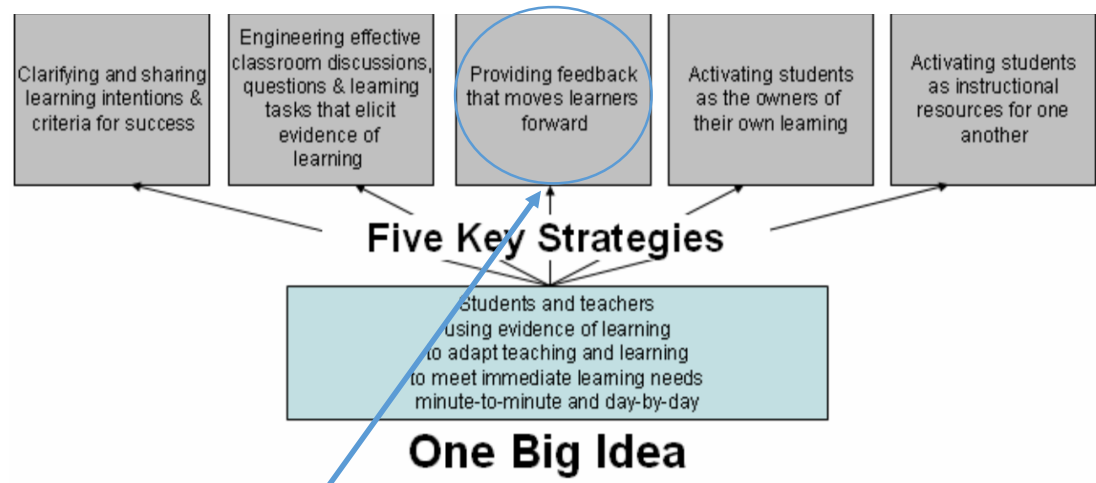
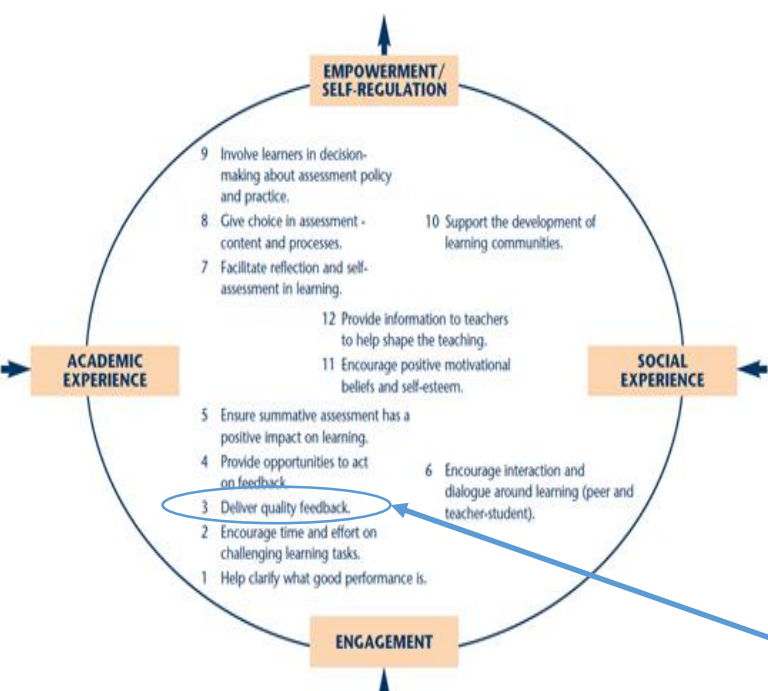


aimed at active learning from authentic situations for future psychologists/logopedists

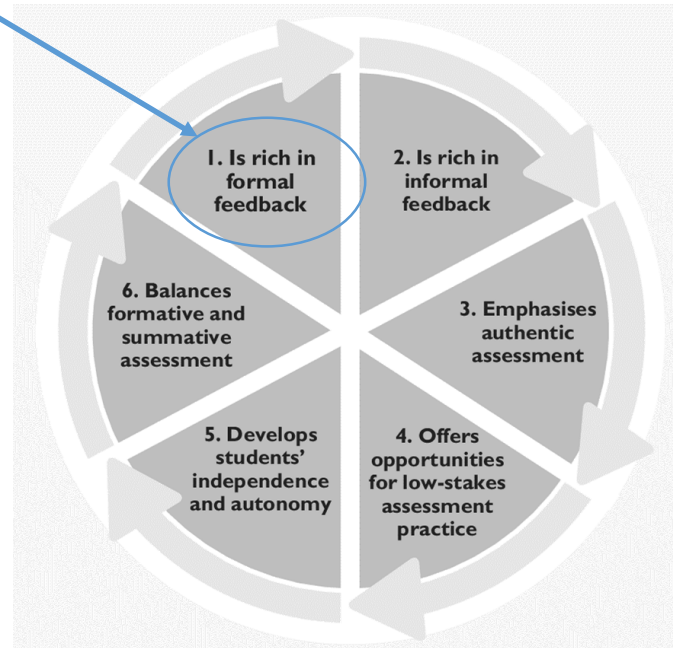
Auto-régulation

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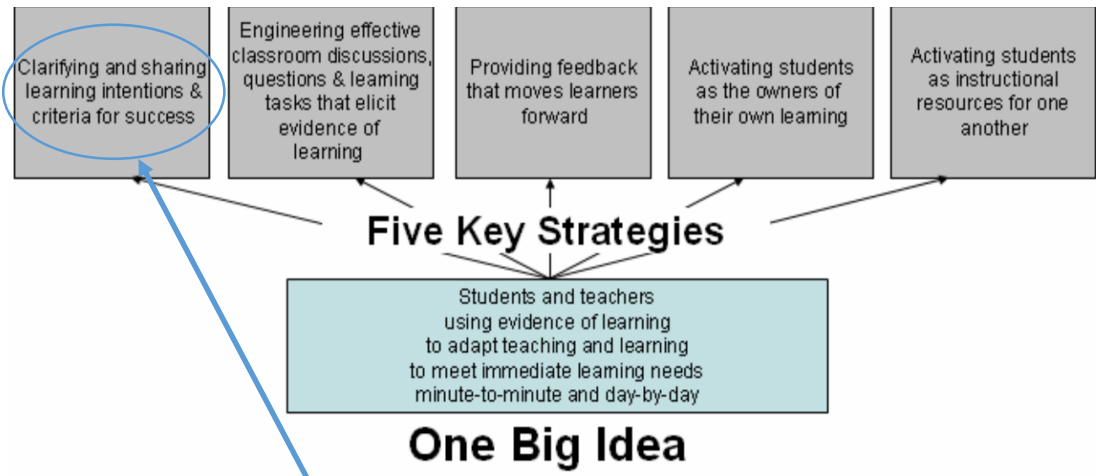
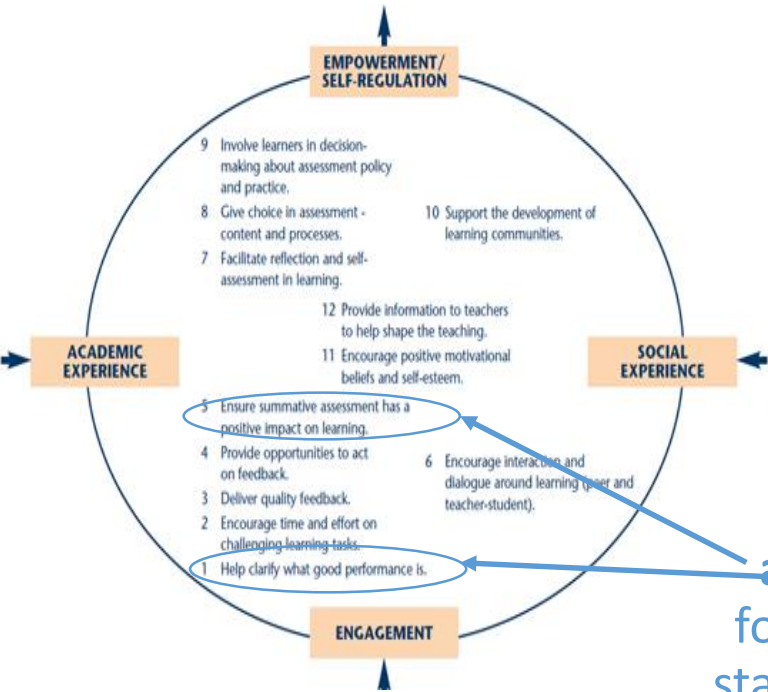


providing automatic quality feedback with comments



Auto-régulation

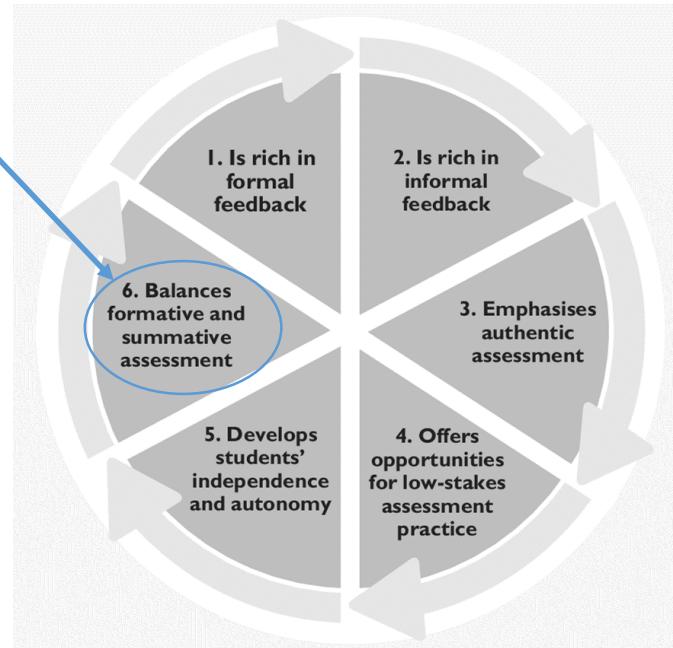
	Où l'étudiant va	Où l'étudiant se trouve (à ce stade)				Comment s'y rendre	
	Enseigner apprendre (action1)						
Produit d'apprentissage	Contrat et attentes	Situation d'ens-appr.	Performance étudiant	Référents à l'évaluation	Correction proprement dite	Feedback émis sur	Remédier Renforcer
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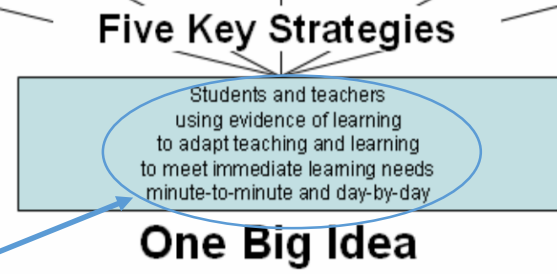
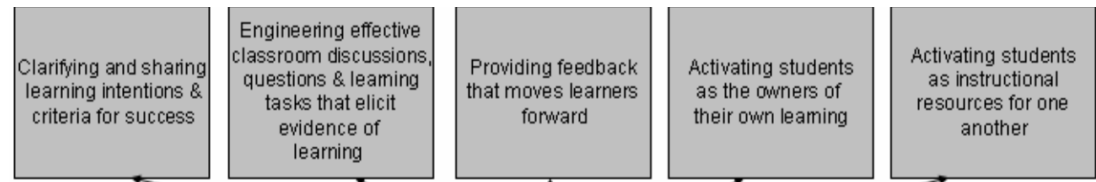
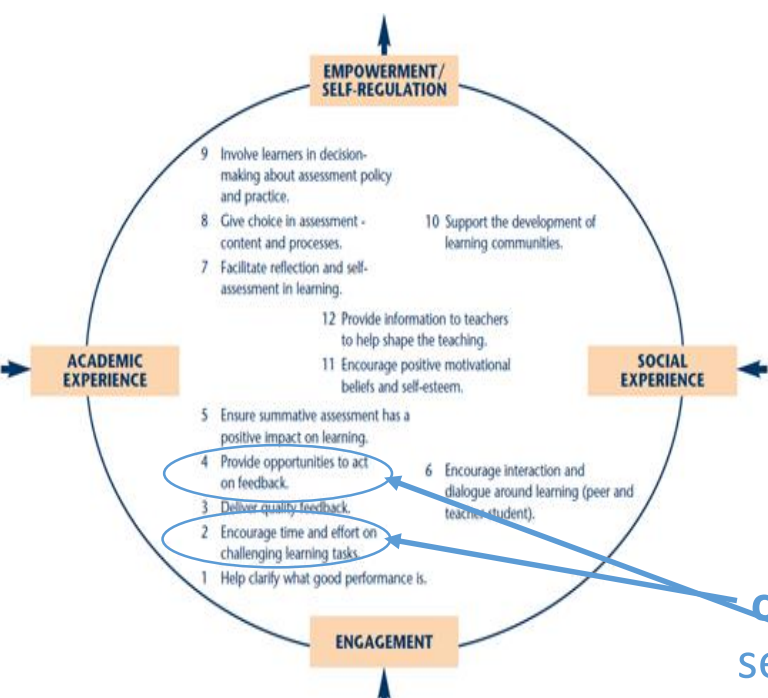


alternating and aligning formative training and low stakes tests (1 bonus point if 12/20 average)

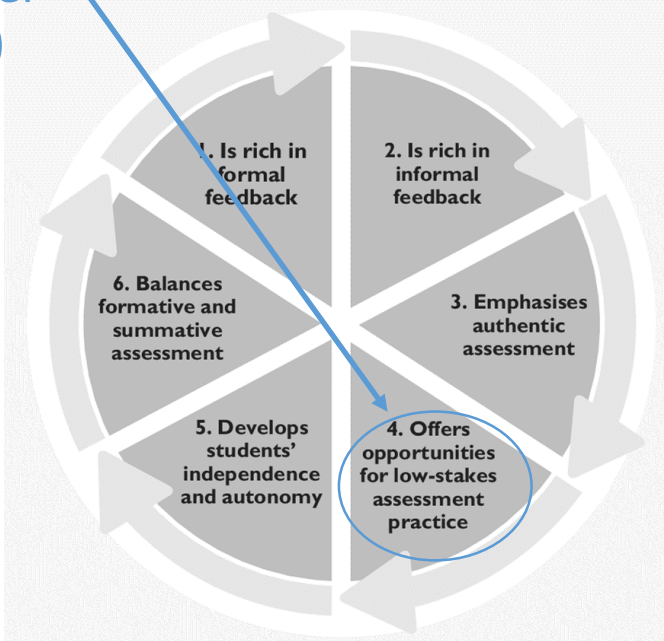


	Où l'étudiant va	Où l'étudiant se trouve (à ce stade)				Comment s'y rendre	
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	(Auto-)régulation proactive	(Auto-)régulation interactive				(Auto-)régulation retroactive	





continuous / stepwise, sequences of increasing difficulty, recursive and cumulative content (closer and closer to the exam)



	Où l'étudiant va		Où l'étudiant se trouve (à ce stade)				Comment s'y rendre
	Enseigner apprendre (action1)						
Produit d'apprentissage	Contrat et attentes	Situation d'ens-appr.	Performance étudiant	Référents à l'évaluation	Correction proprement dite	Feedback émis sur	Remédier Renforcer (action 2)
Processus d'apprentissage	de départ	nouvelle	(consigne + tâche)	(critères, correctifs)	(allo-évaluation, auto-évaluation)	performance étudiant	
	(Auto-)régulation proactive		(Auto-)régulation interactive				(Auto-)régulation retroactive

Participation data

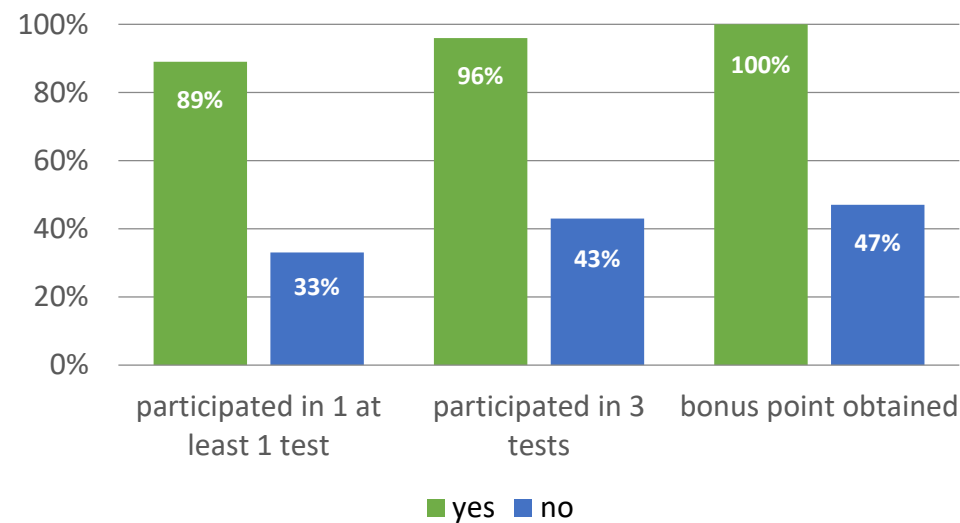
- General participation

	2020-2021		2021-2022	
Participation	Frequence	Percentage	Frequence	Percentage
Test 1	411	46%	551	59%
Test 2	364	41%	451	48%
Test 3	314	35%	374	40%
January exam	538	61%	614	65,6%
June exam	254 <i>(out of 660)</i>	38%		
August exam	203 <i>(out of 594)</i>	34%		
Total	885	100%		

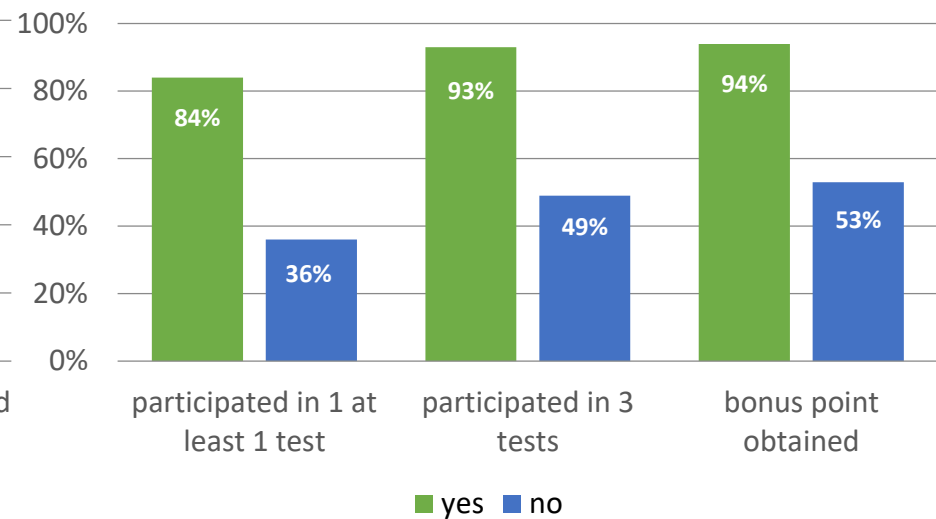
Participation data

- Link between participation in the formative and low stake tests sequence and attendance at the January exam

January 2021 - exam attendance



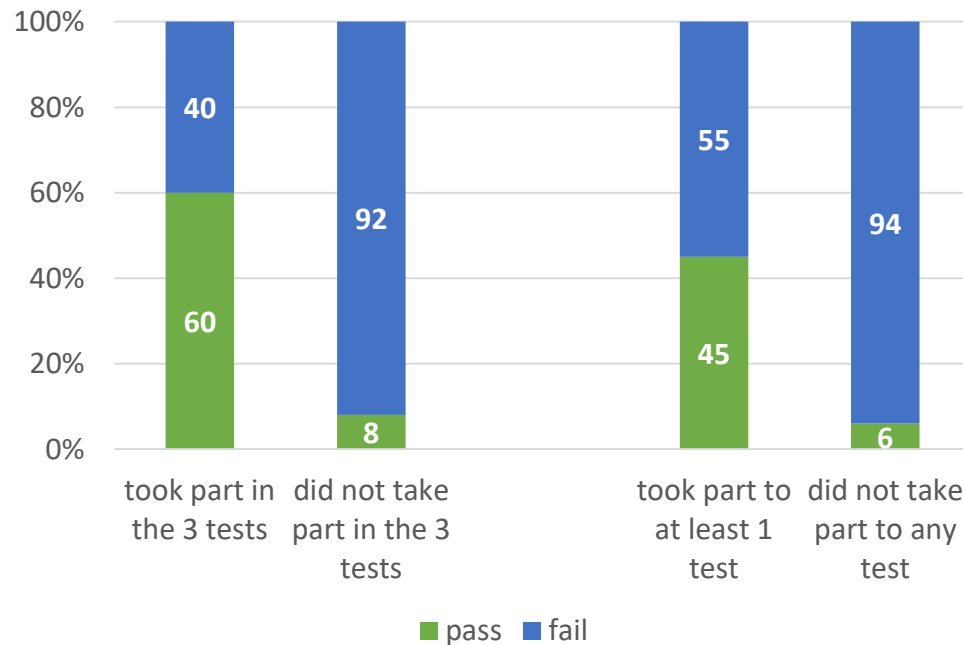
January 2022 - exam attendance



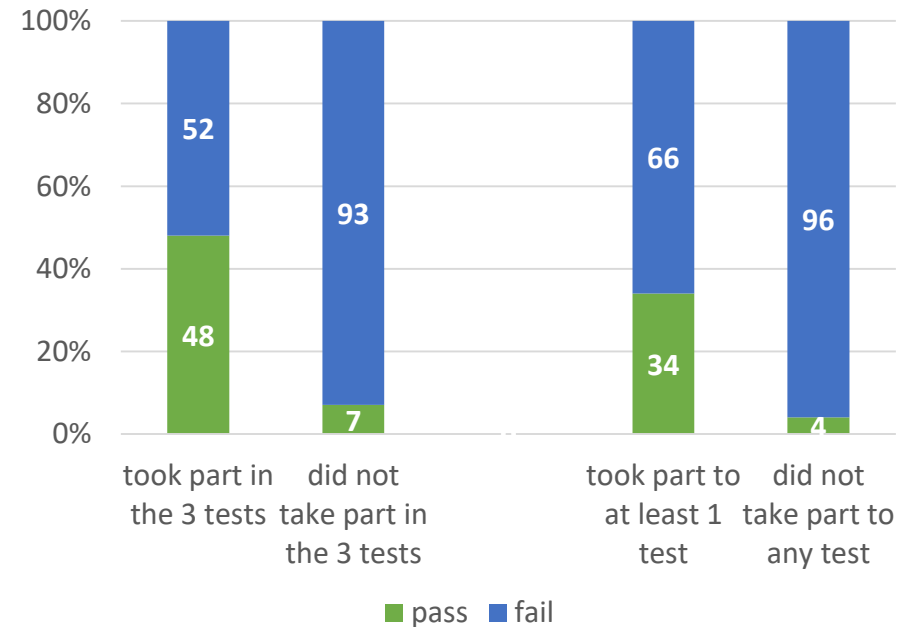
Performance data 2020-2021

- Link between participation in tests and exam success (January)

January 21 - exam success



January 22 - exam success



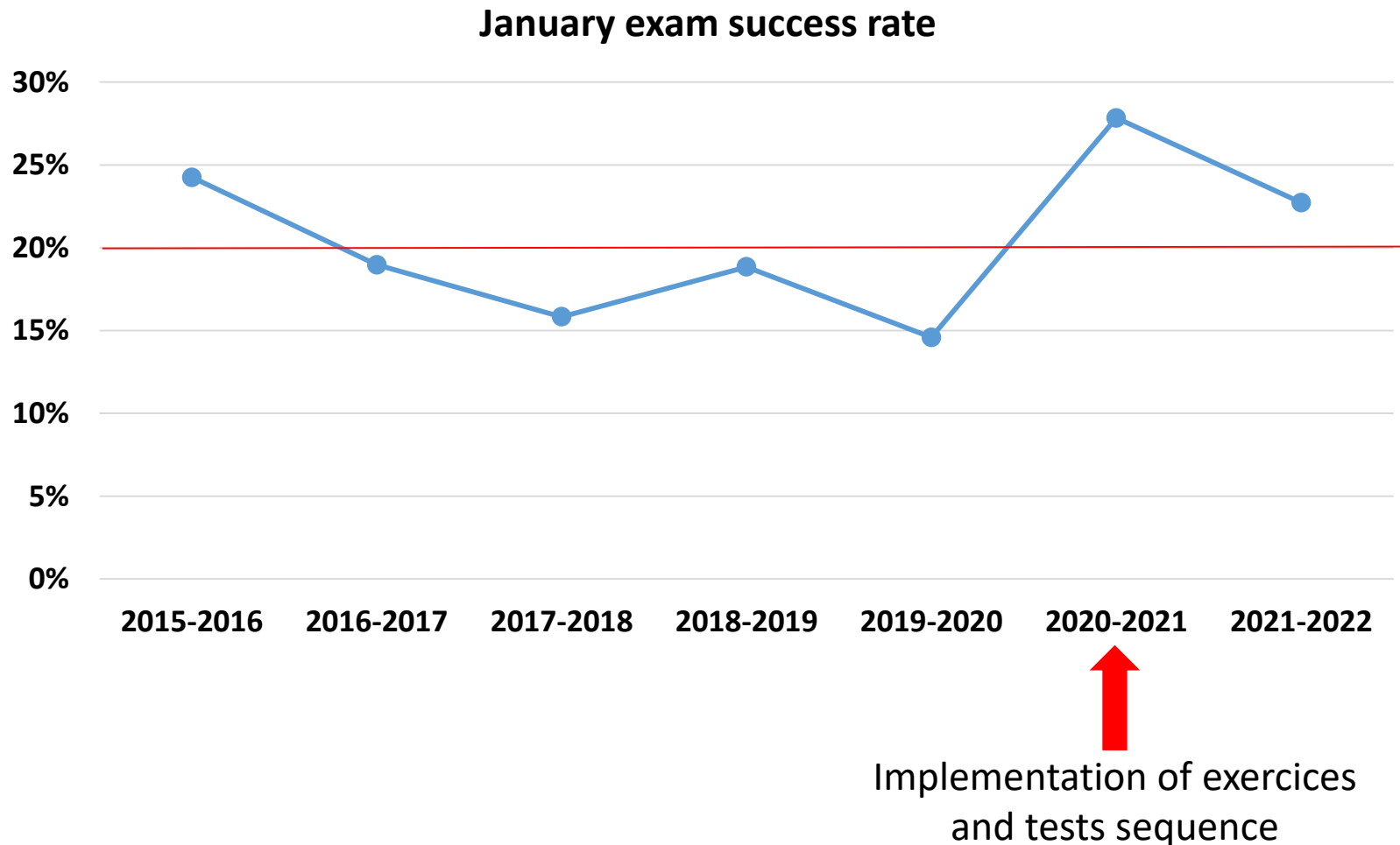
Performance data

- Correlations between tests and exam's performances

	Variables	n	r
2020-2021	3 tests' mean – January grade	885	0.72
	3rd test's grade – January grade	885	0.67
2021-2022	3 tests' mean – January grade	936	0.62
	3rd test's grade – January grade	936	0.60

Performance data

- Exam performance over time



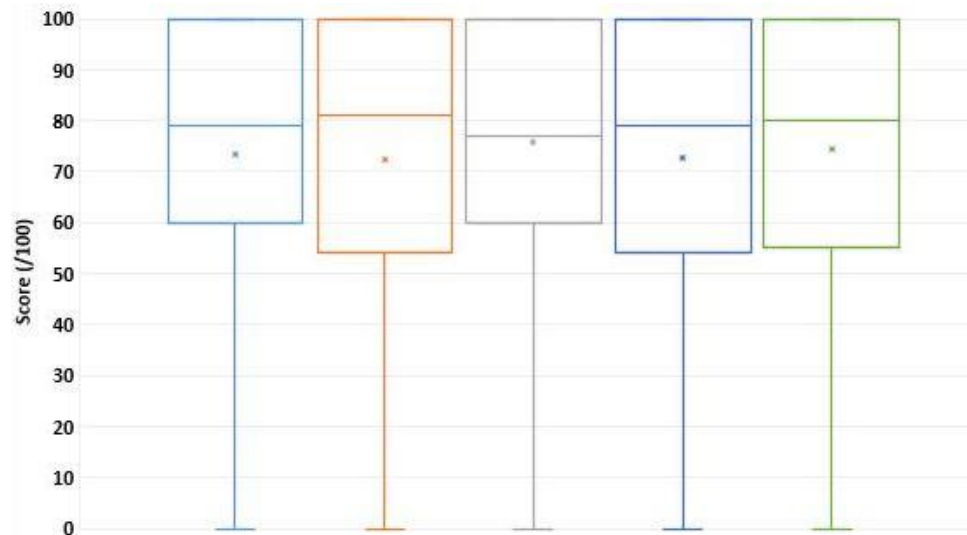
Performance data

- Performances on a similar question
 - Question = Chi-square test

Year	Mean grade (\pm SD)	Question success %
2018	3.26 (\pm 4.08)	35%
2019	2.70 (\pm 4.00)	28%
2020	4.02 (\pm 4.20)	44%
2021	5.07 (\pm 4.33)	54%
2022	5.85 (\pm 4.40)	63%

Perception data 2020-2021

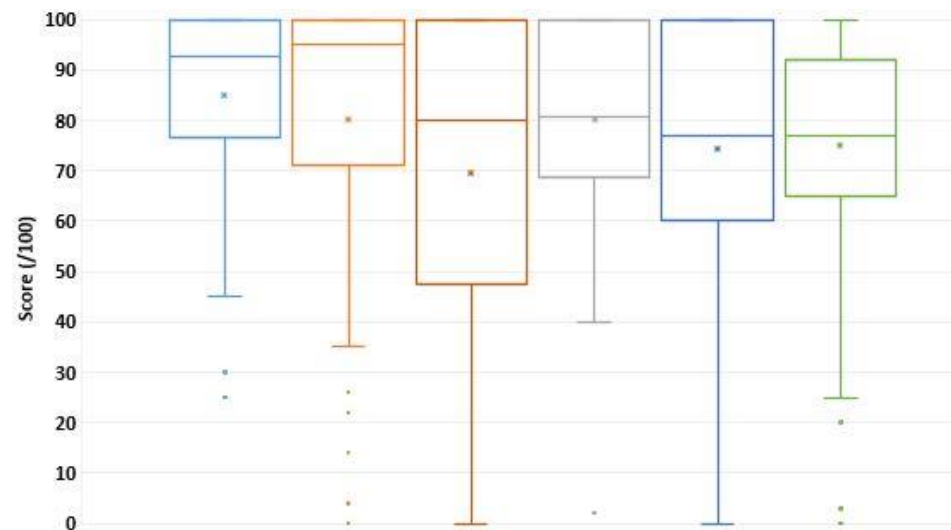
- Analysis of formative and low stake tests and their feedback in the light of Nicol and Brookhart's models



- The exercises and tests helped me to better understand the teacher's expectations
- The exercises and tests helped me to work regularly
- The fact that I received successive feedback after each sub-question in the exercises helped me to improve as the exercises progressed
- The feedback given per question was sufficiently comprehensive
- The feedback per question helped me to understand the procedure for improvement

Perception data 2021-2022

- Analysis of formative and low stake tests and their feedback in the light of Nicol and Brookhart's models



- The exercises and tests helped me to better understand the teacher's expectations
- The exercises and tests helped me to work regularly
- The exercises and tests forced me to work regularly
- The fact that I received successive feedback after each sub-question in the exercises helped me to improve as the exercises progressed
- The feedback given per question was sufficiently comprehensive
- The feedback per question helped me to understand the procedure for improvement

Perception data

- Usefulness of and commitment with the tests sequence - qualitative data

	2020-2021				2021-2022			
	Commitment		Perceived usefulness		Commitment		Perceived usefulness	
	Formative (n=45)	Low stake (n=50)	Formative (n=38)	Low stake (n=74)	Formative (n=44)	Low stake (n=63)	Formative (n=29)	Low stake (n=48)
Training/exercising	20	9	7	4	21	16	6	6
Exercise resolution ability			4	3				
Regular work		3		2		5		11
Understanding	2	2			5			
Coverage of subject							6	3
Self-evaluation	10	15	10	18	11	17	7	24
Self-regulation	2		6	3	2	1	2	4
Exam consistency								9
Tests preparation					7		10	
Course success	6	3			4			
Tests success	2				1			
Exam preparation	8	18	12	16	13	22	8	24
Bonus point	7	34	1	4	3	46		5

Perception data

- Usefulness of and commitment with the tests sequence - qualitative data

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					5			
							6	3
Self-evaluation	10	15	10	18	11	17	7	24
Self-regulation	2							
Exam consistency								
Tests preparation								
Course success	6	3						
Tests success	2				1			
Exam preparation	8	18	12	16	13	22	8	24
Bonus point	7	34	1	4	3	46		5

« The practice of the exercises, I could see the difficulty of the teacher's exercises »

« Because they are an excellent training, for my part, the best way to pass this subject is by practicing with exercises »

Perception data

- Usefulness of and commitment with the tests sequence - qualitative data

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	Commitment		Perceived usefulness		Commitment		Perceived usefulness	
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Exercise resolution ability			4	3				
Regular work		3		2		5		11
					5			
							6	3
Self-evaluation	10	15	10	18	11	17	7	24
Self-regulation	2		6	3	2	1	2	4
Exam consistency								0
Tests preparation								
Course success	6	3						
Tests success	2				1			
Exam preparation	8	18	12	16	13	22	8	24
Bonus point	7	34	1	4	3	46		5

« practice performing the exercises without being tempted to look at the solutions »

« I saw these as training with feedback, which is very interesting for a student »

Perception data

- Usefulness of and commitment with the tests sequence - qualitative data

	2020-2021				2021-2022			
	Commitment		Perceived usefulness		Commitment		Perceived usefulness	
	Formative (n=45)	Low stake (n=50)	Formative (n=38)	Low stake (n=74)	Formative (n=44)	Low stake (n=63)	Formative (n=29)	Low stake (n=48)
Training/exercising	20	9	7	4	21	16	6	6
Exercise resolution ability			4	3				
Regular work		3		2		5		11
Understanding	2	2			5			
Coverage of subject							6	3
Self-evaluation	10	15	10	18	11	17	7	24
Self-regulation	2		6	3	2	1	2	4
Exam consistency								9
Tests preparation					7		10	
Course success	6	3			4			
Tests success	2				1			
Exam preparation	8	18	12	16	13	22	8	24
Bonus point	7	34	1	4	3	46		5

Perception data

- Usefulness of and commitment with the tests sequence - qualitative data

	2020-2021				2021-2022			
	Commitment		Perceived usefulness		Commitment		Perceived usefulness	
	Formative (n=45)	Low stake (n=50)	Formative (n=38)	Low stake (n=74)	Formative (n=44)	Low stake (n=63)	Formative (n=29)	Low stake (n=48)
Training / exercises	20	9	7	4	21	16	6	6
Regular work		3		2		5		11
Understanding	2	2			5			
Coverage of subject							6	3
Self-evaluation	10	15	10	18	11	17	7	24
Self-regulation	2		6	3	2	1	2	4
Exam consistency								9
Tests preparation								
Course success	6	3						
Tests success	2							
Exam preparation	8	18						
Bonus point	7	34	1	4	3	46		5

« I wanted to assess myself to know if I was on the right track or not »

« What interested me the most was seeing my mistakes in the tests so that I no longer made them on the exam »

Perception data

- Usefulness of and commitment with the tests sequence - qualitative data

	2020-2021				2021-2022			
	Commitment		Perceived usefulness		Commitment		Perceived usefulness	
	Formative (n=45)	Low stake (n=50)	Formative (n=38)	Low stake (n=74)	Formative (n=44)	Low stake (n=63)	Formative (n=29)	Low stake (n=48)
Training/exercising	20	9	7	4	21	16	6	6
Exercise resolution ability			4	3				
Regular work		3		2		5		11
Understanding	2	2			5			
Coverage of subject							6	3
Self-evaluation	10	15	10	18	11	17	7	24
Self-regulation	2		6	3	2	1	2	4
Exam consistency								9
Tests preparation								
Course success	6	3						
Tests success	2							
Exam preparation	8	18						
Bonus point	7	34	1	4	3	46		5

« They allowed to see by step if we were able to complete the tests. So it's a good way to see if you've understood everything correctly »

Perception data

- Usefulness of and commitment with the tests sequence - qualitative data

	2020-2021				2021-2022			
	Commitment		Perceived usefulness		Commitment		Perceived usefulness	
	Formative (n=45)	Low stake (n=50)	Formative (n=38)	Low stake (n=74)	Formative (n=44)	Low stake (n=63)	Formative (n=29)	Low stake (n=48)
Training/exercising	20	9	7	4	21	16	6	6
Exercise resolution ability			4	3				
Regular work		3		2		5		11
Understanding	2	2			5			
Coverage of subject							6	3
Self-evaluation	10	15	10	18	11	17	7	24
Self-regulation	2		6	3	2	1	2	4
Exam consistency								9
Tests preparation					7		10	
Course success	6	3			4			
Tests success	2				1			
Exam preparation	8	18	12	16	13	22	8	24
Bonus point	7	34	1	4	3	46		5

Perception data

- Usefulness of and commitment with the tests sequence - qualitative data

	2020-2021				2021-2022			
	Commitment		Perceived usefulness		Commitment		Perceived usefulness	
	Formative (n=45)	Low stake (n=50)	Formative (n=38)	Low stake (n=74)	Formative (n=44)	Low stake (n=63)	Formative (n=29)	Low stake (n=48)
Training/exercising	20	9	7	4	21	16	6	6
Exercise resolution ability			4	3				
Regular work		3		2		5		11
Understanding	2	2			5			
							6	3
					11	17	7	24
					2	1	2	4
Exam consistency								0
Tests preparation								
Course success	6	3			4			
Tests success	2				1			
Exam preparation	8	18	12	16	13	22	8	24
Bonus point	7	34	1	4	3	46		5

« For the same reason as the exercises: I did them as a practice for the January exam, trying to do them in the most similar conditions possible »

« the feeling of really preparing for the exam »

Perception data

- Usefulness of and commitment with the tests sequence - qualitative data

	2020-2021				2021-2022			
	Commitment		Perceived usefulness		Commitment		Perceived usefulness	
	Formative (n=45)	Low stake (n=50)	Formative (n=38)	Low stake (n=74)	Formative (n=44)	Low stake (n=63)	Formative (n=29)	Low stake (n=48)
					21	16	6	6
						5		11
					5		6	3
Self-evaluation	10	15	10	18	11	17	7	24
Self-regulation	2		6	3	2	1	2	4
Exam consistency								0
Tests preparation								
Course success	6	3						
Tests success	2				1			
Exam preparation	8	18	12	16	13	22	8	24
Bonus point	7	34	1	4	3	46		5

« They were of a style very close to that of the examination. Doing them under similar conditions and receiving direct feedback on my performance really helped me prepare adequately for the level of difficulty of the exam »

« They prepare very well for the exam because they put us in the same conditions »

Perception data

- Usefulness of and commitment with the tests sequence - qualitative data

	2020-2021				2021-2022			
	Commitment		Perceived usefulness		Commitment		Perceived usefulness	
	Formative (n=45)	Low stake (n=50)	Formative (n=38)	Low stake (n=74)	Formative (n=44)	Low stake (n=63)	Formative (n=29)	Low stake (n=48)
Training/exercising	20	9	7	4	21	16	6	6
Exercise resolution ability			4	3				
Regular work		3		2		5		11
Understanding	2	2			5			
Coverage of subject							6	3
Self-evaluation	10	15	10	18	11	17	7	24
Self-regulation	2		6	3	2	1	2	4
								9
« I wanted to see if I was able to get the bonus point »							10	
Course success								
Tests success	2				1			
Exam preparation	8	18	12	16	13	22	8	24
Bonus point	7	34	1	4	3	46		5

« get the bonus point and therefore benefit from help for my exam »

Conclusions

Self-regulation perspectives underpinned by :

- a continuous AfL sequence (3 online test-practice dyads progressively aligned with the exam)
- Participation/Performance/Perception data
 - relationship between test participation and exam success (74% of students who passed the 3 tests passed the exam), and correlation between test and exam performance
 - reported improvement through exercises and tests due to the procedure and feedback

Prospects for 2022-2023

- New data collection about regulation following the « 3Ps »
- Change in the modalities of the Practical Works to match the format of the online pedagogical sequence