Effect of an online module designed to promote first-year dental students evidence-based study strategies

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Effect of an online module designed to promote first-year dental students' evidence-based study strategies.

ABSTRACT

OBJECTIVE: To investigate the effect of a one-semester-long online module to promote study strategies based on neuroscience applied to education in first-year dental students at the University of los Andes in Santiago, Chile.

METHODS: After four weeks, the 2018 first academic semester started, all 82 first-year dental students (72% females, 28% males, average 19 years old) were invited to voluntarily complete an anonymous self-reported Study Strategies Questionnaire (SSQ) at the first session of the Introduction to Dentistry course, which served as a baseline. Subsequently, the session included an interactive workshop on learning how to learn to analyse how the human brain learns and relate this to some mental tools to foster learning. Further, during the semester, students were sent information on their emails to reinforce the contents seen during the learning how to learn activity so that they could use the toolbox of study techniques to improve their learning in all subjects. At the end of the semester, students were again invited to voluntarily complete an anonymous second SSQ to assess the effects of the study intervention. Both SSQs were compared and analysed using IBM Statistical Package for the Social Sciences (SPSS).

RESULTS: A total of 75 and 71 students answered the SSQ before and after the intervention, respectively. The most significant changes observed after the intervention were the reduction in the number of students who studied checking for messages on their smartphones (p 0.023), those who used to highlight and/or underline in notes or textbooks (p 0.001), and studied the day before an exam ($p > 0.0001$). On the other hand, there was a significant increase in those students who studied without access to social networks (p 0.046), wrote notes or words in a margin of texts ($p < 0.0001$), practised self-testing ($p < 0.0001$), and studied a couple of days before ($p < 0.0001$).

CONCLUSIONS: The effects of a one-semester-long module to promote evidence-based study strategies on first-year dental students can have a significant impact in increasing some practices that, according to the literature, can improve their academic achievements and learning.

Keywords: study strategies, learning, dental students, neuroscience

INTRODUCTION

Studies in cognitive and educational psychology provide evidence of how higher education students should approach their study to improve learning and retention in order to maximise their academic results[1] and improve education,[2]. Therefore making students learn, that is, establishing neural networks in the brain[3] is an essential part of teaching, as through this they can be helped to increase their understanding and achievements.[4] However, specific study techniques known to be better than others are not always taught or applied in education,[1, 5] which is also true for dental students.[6] Many, but not all study strategies relate to better exam results,[7, 8] but dental students seem largely unaware of the benefits of these proven study and learning techniques.[9] Thus, many students spend a lot of time studying using low-efficacy techniques.[10]

A publication by Dunlosky[8] examined 10 strategies to boost learning in educational situations from which five turned out to be useful, while the other five were not. The most effective techniques were practice testing and distributed practice. Others like interleave practice, elaborative interrogation and self-explanation showed promising results. On the other hand, often-used strategies like re-reading, highlighting and underlining, summarisation, mnemonics and imagery for text were showed to be of limited effectiveness. Further, many students still study highlighting, re-reading and cramming (blocked practice) the night before an assessment,[8] believing that these are effective strategies.[11] As stated by Roediger & Pyc [1] '*Things learned in a few hours, on one occasion and for one purpose, cannot possibly have formed many associations with other things in the mind*'.

Disturbingly, a study on second-year dental students showed that re-reading of notes or textbooks was the most frequently used technique followed by highlighting important topics.[9] Then, they only focus on those highlighted parts.[12] Although 'distributed re-reading' could help, Dunlosky[8] suggests it is better to use that time in another technique. Further, as highlighted by Karpicke et al.[13] re-reading can make students overconfident, believing that they have mastered some content more than they have (something called illusion of competence), making them decide to discontinue studying.[6] Re-reading is popular as it is relatively easy for students to do, but they should be encouraged to use other study techniques when revisiting texts or notes. According to Roediger & Pyc,[1] reading is critical for learning as repetition of information does improve memorising it but how the repetition is performed determines the extent of improvement.

In a study technique that has been shown to be less effective than re-reading as students tend to focus on individual concepts for it, and they spend less time thinking about connections across notions, is the highlighting and underlining of what students believe is important when studying for an assessment in order to later re-read the highlighted portions.[1] Despite being less effective than re-reading, highlighting at least ensures that students have read the material.[8]

Summarising or paraphrasing important ideas in a text has shown some success in learning among

undergraduate students, although it takes a long time and some might have difficulties writing helpful summaries and would need extensive training.[8] Research shows mixed results regarding whether summarisation is useful as it works in some situations, but it does not in others.[14]

Mnemonics and imagery for text are learning techniques which involve developing internal images that elaborate on what the student is trying to learn, making it easier to remember and helping to hold large volumes of content in memory,[15]. Thus, information becomes more easily accessible or meaningful, helping students to learn large amounts of information.[8, 16]

In a study strategy where, interestingly, recalling facts, concepts or events is a more effective learning strategy than reviewing by re-reading notes, strengthening the memory,[15] Greving et al.[17] found that the testing effect of retrieval practice or self-testing, wherein a student engages in creating questions and answers from study material[6] (for example using flashcards),[14] promotes retention more than restudying, as well as substantially boosting students' long-term memory and learning. Dvorak[18] suggests that rather than passively reviewing a book or notes, the best learning strategy is to try to actively recall the very same information; a strategy sometimes called the read-recite-review method.[14] Further, research suggests that practising test-enhanced learning that requires a bit more effort recalling from memory works better than just recognising the correct answer of a test, [8] and can also boost clinical knowledge for critical thinking.[9] In like manner, self-testing of medical students was a stronger predictor of first-semester academic performance than aptitude.[19]

In a simple and effective learning strategy[20] in which studying is divided into several sessions across an extended period of time,[21] there exists the option of the distribution of multiple practices or study opportunities, usually called distributed practice, distributed learning or spacing effect.[22] Thus, to remember newly learned material for an extended period and store it in the long-term memory, this should be revisited within 24 hours of the initial exposure, and once understood the space between study session can be moved to days, weeks and then months.[23] This is the opposite of what is known as massed practice or cramming.[22] Unfortunately, as the empirical evidence for its benefits is overwhelming when compared to cramming, students do not use distributed practice while they study.[8] One more powerful scheduling study technique is interleaving of two or more subjects or skills to help to remember related topics of what one is trying to learn.[15, 23] In this case, the study strategy involves switching, in the same study session, between different subjects or ideas that are related in some way.[24] Interleave practice, especially effective in problem-solving,[25] is similar to distributed practice in that both involve spacing the study across time, but the former refers to studying different subjects in that period.[8] Elaborative interrogation and self-explanation are other promising study strategies, especially for those students with some background knowledge.[8] These imply giving meaning to new material, providing it with plausible explanations[1] using one's own words and at the same time relating it to known content with as much detail as possible.[15]

Proper content instruction can help students achieve academic success, but teaching them how to study

that content will allow them to become learners throughout their lives,[8] and therefore the use of learning strategies can help students increase their academic achievement. However, even the best strategies outlined above will only work to help students learn better when they are motivated to use these strategies correctly.[14]

At the time of a preliminary study conducted in 2017, our first-year students received a single workshop on studying techniques at the beginning of the semester, but we did not notice the desired impact on their studying strategies with the preliminary study. This showed us that many of our first-year dental students were not using the most helpful study strategies outlined above, suggesting that they required guidance. Based on this, the current prospective study aimed to investigate the effect of a one-semester-long online module to promote study strategies based on neuroscience applied to education in first-year dental students at the University of los Andes in Santiago, Chile.

MATERIALS AND METHODS

Ethical approval

The Faculty of Medicine Scientific Ethical Committee of the University of the Andes reviewed and gave the study its full approval (reference number CEC02120).

The questionnaire

Based on previous investigations [7, 9, 13-15, 26-30] and our own students' interviews the current study researchers developed a Study Strategies Questionnaire (SSQ) to determine how participating students approached their learning process.

The SSQ draft content was validated through a focus group with six second-year dental students from the same school. They were requested to use their experience while they were in their first months at university. The intention here was to ask these students to review and feedback the wording and content of the questionnaire to ensure it sampled all the relevant and pertinent information and that it appeared appropriate for the intended purpose. Subsequently, to assess its temporal consistency, the SSQ was implemented twice in 10 second-year students with an interval of 14 days, resulting in a Cohen's kappa intra-rater reliability score of 0.74.

Eventually, the SSQ included three sections of questions for the students to answer (Fig. 1). The first questionnaire, before the intervention, asked them how they prepared before the teaching and learning activity (two answer options); the second, what did they do during the activity (five answer options); and the third one, how they studied after the activity to prepare for the assessment (five sub-sections with 22 answer options). All these questions had the option to include a different strategy that was not found in the list.

This second questionnaire implemented at the end of the intervention was the same as the baseline

one, except for a final 5-point Likert scale question about the utility of the entire learning how to learn protocol that is described below.

Participants and data collection

After four weeks of the beginning of the first semester of the 2018 academic year one of the researchers (JT) invited all 82 first-year University of los Andes dental students (72% females, 28% males), with a mean age of 19.0 years (sd = 0.7), to voluntarily and anonymously complete the paper self-reported SSQ at the first session of the Introduction to Dentistry course, which served as a baseline.

Once again, at the end of the semester, and therefore after all final examinations (mostly multiple choice), the whole class of 82 students was invited to voluntarily complete a second anonymous SSQ to assess the effect of the study intervention.

Intervention

As part of a scheduled session of the Introduction to Dentistry course, all students received an explanation and the objectives of the study, followed by the implementation of the SSQ (baseline). This session included a workshop on learning how to learn to analyse how the human brain learns and relate this to some mental tools to foster learning. The workshop had the following contents which were delivered interactively using the audience response system Pollev (Polleverywhere®, San Francisco, California, United States):

- The difference between studying and learning;
- The two ways the brain uses to learn: focused and diffused thinking;
- Deep learning in education and how to accomplish it;
- How to face procrastination while studying?
- Studying little by little makes better learning;
- Differences between the long term and working memories;
- The importance of sleeping to learn better;
- What is the scientific evidence about how to study to learn better?

The last content focused on practical exercises about highlighting and underlining, retrieval practice (self-testing), interleaving and distributed practice.[1, 8, 21, 23, 29, 31-34]

During the workshop session, students read three texts of one page each (approximately 300 words apiece); Paper A about learning printed on blue paper, Paper B about space learning printed on green paper and Paper C about procrastination printed on yellow paper. Colour papers were used to differentiate the texts later when practising interleaving.

Students were encouraged to use the standard methods they usually used to study any text (underlining, highlighting, making notes, etc.). Then, as part of the workshop, it was explained to them to be cautious about overusing the underlining or highlighting technique as it might be ineffective and misleading, giving the illusion that they dominate the concept.[35] The literature suggests doing this only for the main ideas

with words or notes in a margin that synthesise key concepts.[1, 8, 14]

Secondly, and after a break, they practised retrieving information, self-questioning and writing down answers to questions projected on the screen.[28] This was based on the information provided in Paper B. Next, they had to do a similar exercise with Paper C and Paper A, followed again by other questions from papers C, B and A. The purpose of this practice was to reinforce the concept of interleaving contents of known topics with other related ones.[36]

Finally, a similar pre-recorded lecture about learning how to learn was uploaded to the University Learning Management System Canvas® (Instructure Inc., Salt Lake City, Utah, USA), in order to facilitate the revisiting of all these concepts any time students wanted and at their own pace.

During the semester after the workshop, students were sent information on their emails to reinforce the contents seen during the learning how to learn activity so that they could use the toolbox of study techniques to improve their learning in all subjects. We wanted to provide them with a type of structure that they could later apply to their entire learning process, combining these tools with their current study techniques.

Chronologically, they received the following emails, which were programmed for the whole semester in the announcements section of Canvas®:

- One week after the workshop, a short, accurate, and straight-forward graphical representation reminding them of the need to limit the underlining and highlighting of the main content and instead, making marginal notes when studying texts, trying to retrieve the information before re-reading notes or books, and interleaving similar contents. The same email was re-sent at weeks 7, 9 and 11.

- Summative assessments two weeks before each midterm (there were four of them, one for each subject), a reminder to start preparing these tests and avoid cramming. This email also included three open-ended questions about the forthcoming assessment from the last academic year to help students practise elaborative interrogation and self-explanation.[8]

- One week before these tests, again the same three open-ended questions about the forthcoming assessment from the last academic year for distributed practice.[21]

- The night before the assessment, a reminder to have a good night and sufficient sleep to help consolidate the knowledge acquired prior to the assessment.[14, 27]

Data analysis

SSQ results were manually digitised by one researcher (JT) into a spreadsheet and descriptively analysed to summarise participants' characteristics and frequencies of the SSQ responses. T-tests were used to compare SSQs scores before and after the protocol, using the IBM Statistical Package for Social Sciences Windows® version 24 (SPSS Inc. IBM, Chicago, IL, USA). One researcher (JT) merged written

comments of similar meaning from the SSQ open-ended questions.

RESULTS

Participants and data collection

Before and after the intervention, a total number of 75 (91.5%) and 71 (86.6%) students accepted the invitation and completed the written consent as well as all items of the SSQ, in approximately seven minutes. There were seven (three before and four after the learning how to learn protocol) students who completed only some questions, and therefore their SSQs were not included in the study.

Before the intervention

Immediately after the workshop on learning how to learn, the vast majority (95%) of students considered it helpful. Of them, 33% believed that the study strategies learned and practised during the session would definitely help them to improve their learning; 63% stated they might be useful; while 3% were not sure and 2% thought definitely not.

At the time of the workshop, four weeks after the beginning of their university studies, the majority (63%) of first-year dental students at our school only sometimes prepared themselves before a learning activity; with 23% doing it always. Similarly, 57% of them sometimes reviewed the recommended textbooks before an activity; 31% never did; and only 12% did it always (Table 1).

Regarding what students did during a teaching and learning activity, the most common method they used to record the content was taking notes in a notebook (37%), followed by completing PowerPoint® handouts (26%). After an activity, the vast majority studied alone (70%), while 26% studied in small groups; 97% of all the students studied in a quiet and silent room; and 45% did it without having access to social networks; 30% did it checking for messages on smartphones; while 24% did it while listening to music.

Concerning learning methods, 26% of students tended to highlight and underline notes or textbooks, while 20% just reviewed them. On the other hand, 19% of students rewrote and summarised notes or the content of textbooks, while 6% practised recall techniques or self-testing. None of them reported interleaving similar topics while studying.

Students' study habits before an assessment showed that 66% did study a couple of days before, while 24% did it just the day before; and only 10% studied regularly.

After the intervention

Students who sometimes prepared to study activities in advance remained the vast majority (65%), followed by 24% who did it always. A total of 61% reviewed recommended textbooks before the teaching and learning activities, while 28% never did it. As before the intervention, most students took notes in a notebook (34%) and PowerPoint® handouts (32%). Similarly, the majority studied alone (71%).

As regards to the conditions in which they study, 52% did it without access to social media, but still, 19%

studied checking messages on smartphones; and 27% liked listening to music while studying. The most common study methods were reviewing (18%), rewriting/summarising (16%) notes or textbooks, writing notes or words in a margin of texts (15%) and practising self-testing (16%). A high 75% of students studied a couple of days before an assessment, while 11% crammed the day before.

At the end of the semester, most of the students considered that the protocol about learning how to learn helped them to improve their study strategies, as 19.8% completely agreed and 47.6% agreed with that statement; 23.9% considered it neutral; while 8.7 disagreed (Fig. 1).

DISCUSSION

The current study investigated the effect on first-year dental students of a one-semester long online module on learning how to learn, that incorporated teaching methodologies promoting neuroscience-based study strategies. Interestingly, and although not statistically significant, there was a slight decrease in those students that never prepared for an activity; from 14% to 11% at the beginning and end of the semester, respectively, and the study results showed that both before and after the intervention, most students only sometimes prepared themselves in advance of a teaching and learning activity (Table 1). At the end of the intervention, most students considered the module to be helpful to improve their study strategies. (Fig. 1) The above was despite the increasing workload through our course programme described in an earlier study.[37]

Similarly, the majority of students (57% before and 61% after the intervention) only sometimes reviewed the recommended literature for the subject, despite the fact that if they did so, they would get more out of class making it much more likely to remember the concepts in the future.[14] Again, there was a slight decrease in those students that never did it; from 31% to 28%. Nevertheless, at the beginning and end of the study, the number of students who never studied the recommended textbooks before an activity (31% & 28%, respectively), was considerably higher than those who reviewed just notes or similar (14% & 11%, respectively). This might indicate that our students consider notes to be enough to prepare for a learning activity, although they were also expected to read and understand chapter books; teaching activities not always cover everything they needed to learn. It might also be due to the fact that our first-year students had not developed the reading habits needed for university studies. In like manner, second-year students from a U.S.A. dental school reported that they were unlikely to read the assigned materials before class.[38]

Regarding what students did during teaching and learning activities before the intervention, the vast majority (84%) took notes, completed handouts, made summaries, concept maps, or captured images of slides or classmates' notes; 16% paid attention without taking notes. Similarly, after the intervention, the majority (89%) captured the content of the activity with similar methods. However, and possibly due to the intervention, there was a reduction, although not statistically significant, in those students who

only paid attention without taking notes, from 16% before to 11% after the intervention. Further, those who completed handouts increased from 26% to 32% before and after the study, respectively (*p* 0.036). Interestingly, the number of students who took notes on a computer or tablet during class remained the same (11% before and after the intervention). This despite having been told that the evidence suggests that students who take notes in longhand remember more information about the lecture than those who type it on laptops; the former need to process the information and express it in their own words to be able to record it.[39]

Not only the vast majority (≥96%) of students kept their good habits of studying in a quiet and silent place, but also ≥70% continued studying alone. Further, similar percentages studied in small (≤3 students) and large groups (≥4 students) before and after the study, and so the study intervention did not change the place and condition students studied to prepare for an assessment. In contrast, Johnson et al.[40] reported that, in a histology course, American dental students when compared to medical students were more inclined to work together rather than alone. As pointed out by Putnam et al.[14] studying in groups favours retrieval practice, so far as they stay focus.

On the contrary, the intervention started to show significant changes in the condition students studied. This is important as it has been reported that the study strategies students use may be more important than how long they study[7]. In our investigation, there was a significant (*p* 0.023) reduction in the number of students who studied, challenging their focused attention[41] by checking for messages; down from 30% before to 19% after the intervention. Likewise, those who studied without access to social networks increased from 45% to 52% (*p* 0.046) before and after the study, respectively. Interestingly, psychology students performed worse on exams when they studied with music and television on, responded to emails, or when they had friends around.[7] Yet, a study on second-year dental students reported that more than 88% of them studied focused on watching pre-recorded lectures without 'doing something else'.[38]

Additional to the impact of the study, four notable changes could be noticed on the learning methods used by the students. Firstly, the number of them who used to highlight and/or underline their notes while studying went down from 26% to 9% (*p* 0.001) before and after the intervention, respectively. Secondly, the latter was coupled with a significant increase (*p* < 0.0001) in the number of students who started to write notes or words in the margins of texts from 5% before to 15% at the study end; matrix notes can help students to encode what they read into their long-term memory.[42] Thirdly, interleaving was not recorded in the baseline SSQ by any student, while by the end of the intervention 3% of them (though not statistically significant) started to study switching between related subjects or ideas in the same session. This strategy has been shown to help students transfer information to different contexts.[20] Fourthly, practising recall techniques grew from 6% to 16% (*p* > 0.0001) before and after the intervention, respectively, although this is much less than the 80% of respondents who had used self-testing in a study of second-year dental students.[6] As mentioned above, practice testing is one the most

effective learning strategies,[8] and has been shown to greatly improve learning among dental students,[9] as well as long-term retention of clinical topics in first-year medical students.[43] This technique not only helps to encode associations between contents but also the process to retrieve those contents, practising the very same activity they will use for the assessment.[44] Interestingly, previous studies have reported that high performing students used self-testing instead of highlighting and/or underlining, whereas lower performers used the latter techniques.[6] Further, another study found that retrieval practice benefits during learning were greater for those students with lower working memory abilities when compared to restudy.[45] Once again, while self-testing and even better if students do this in a distributed manner (spacing effect), they are creating associations between items favouring the retrieval of that information,[1, 44] whereas traditional re-reading is not.[9]

Study habits also showed significant changes. The number of students who started to study just the day before an assessment decreased from 24% before the study to 11% after the study ($p > 0.0001$), which reflects the increase (from 66% before to 75% after the intervention) in the number of them who studied a couple of days before ($p > 0.036$). This is similar to a study where 71% of dental students reported to have spaced or distributed their studying.[6] Further, previous studies have shown that low-performing students were more likely than high performers to engage in late-night studying and that those who cram use fewer study strategies.[12] This is also true for dental students who often operate in crisis mode focusing on due assignments.[9] More so, Gurung[7] reported that the number of studied hours positively correlated to exam scores in psychology students.

Coming back to our study, those who studied regularly (distributed practice), so they did not need to do so shortly before the assessment, stayed very similar (10% and 8% before and after the study, respectively). Some students (6%) also mentioned that they used other learning methods such as commenting on the content with classmates, writing mnemonics at the margins of their notes, using their visual memory with colours in their notes, teaching what they were studying, reading aloud, and making a schedule to organise their week of study.

Finally, this study had some drawbacks. Firstly, and because of its anonymity, it was not possible to determine whether high- or low-performing students used which study strategy. Secondly, we could not determine any impact of the studied protocol on the end of the semester course marks, meaning that it was not possible to assess the effect of the reported changes in students study habits. Thirdly, we cannot be sure about the degree to which students' study strategies really changed as they answered a self-reported questionnaire.

CONCLUSIONS

The effects of a one-semester long module to promote study strategies on first-year dental students can have a significant impact to increase some practices that, according to the literature, can improve their

academic achievements and learning, and so the results of the current study provide a detailed picture of how dental students approach their studying. Among these practices, such a protocol can help to increase the number of students that study without access to social networks, write notes or words in texts' margins, practice recall techniques (self-testing), and start studying a couple of days before an exam. Additionally, the protocol can help to significantly reduce the number of students who study checking for messages on their smartphone, highlight and/or underline notes or textbooks, and study the day before.

According to our results, it looks advisable to teach first-year dental students about evidence-based study techniques that have been demonstrated to help them improve their academic achievement.

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Table 1

The Study Strategies Questionnaires (n. 146) with its three sections, and its results before (beginning of the semester) and after (end of the semester) the intervention

	Beginning of Semester (n. 75)	End of Semester (n. 71)	*Statistically significant difference $p \leq 0.05$
1) How do you prepare yourself before the teaching and learning activity?			
I prepare it reviewing notes or similar			
☐ Always	23%	24%	-
☐ Sometimes	63%	65%	-
☐ Never	14%	11%	-
I prepare it reviewing the recommended textbooks for the subject			
☐ Always	12%	11%	-
☐ Sometimes	57%	61%	-
☐ Never	31%	28%	-
Other (please specify): 0%		0%	
2) What do you do during the activity?			
☐ I take notes on a notebook	37%	34%	-
☐ I take notes on a computer or tablet	11%	11%	-
☐ I complete PowerPoint® handouts	26%	32%	* 0.036

☐ I pay attention without taking notes	16%	11%	-
☐ I record the audio of the activity to listen or transcribe it	5%	6%	-
Other (please specify):	5%	6%	-
	I do summaries	I do summaries	
	I do drawings and concept maps	I complete notes from previous years	
	I take photos to slides and classmates' notes	I take photos to slides and then complete my notes	

3) How do you study after the learning activity to prepare for the assessment?

3.1) With whom do I study?

☐ Alone	70%	71%	-
☐ In groups of two or three	26%	24%	-
☐ In groups of four or more	4%	5%	-

3.2) Where do you study?

☐ In a quiet and silent room	97%	96%	-
☐ In a noisy public place	3%	4%	-

3.3) In what conditions do you study?

☐ Listening to music	24%	27%	-
☐ Checking for messages on my smartphone	30%	19%	* 0.023
☐ With the television turn on	1%	2%	-
☐ Without access to social networks	45%	52%	* 0.046

3.4) What are the two most common learning methods you use?

☐ Reviewing notes or textbooks	20%	18%	-
☐ Rewriting / summarising notes or textbooks	19%	16%	-
☐ Highlighting and/or underlining in notes or textbooks	26%	9%	* 0.001
☐ Writing notes or words in a margin of texts	5%	15%	* <0.0001
☐ Thinking of mnemonics (acronyms, rhymes, etc.)	3%	4%	-
☐ Making concept maps	3%	4%	-
☐ Practising recall techniques (self-testing)	6%	16%	* <0.0001
☐ Thinking of real-life examples and applications	8%	6%	-
☐ Memorising through repetition	10%	9%	-
☐ Interleaving similar topics	0%	3%	-

3.5) According to your study habits, when do you start studying before an exam?

☐ Study the day before	24%	11%	* <0.0001
☐ Study a couple of days before	66%	75%	* 0.036
☐ Study regularly so I don't need to study a lot shortly before (distributed practice)	10%	8%	-
Other (please specify):	0%	6%	* 0.009
		I comment content in a group	
		I write mnemonics at the margin of my notes	
		I use lots of colours (visual memory)	
		I read aloud	

I teach what I am studying

I make a weekly schedule to study

Figure 1

Students' perceptions of the learning how to learn protocol at the intervention (n. 71)

The protocol about learning how to learn helped me to improve my study strategies:
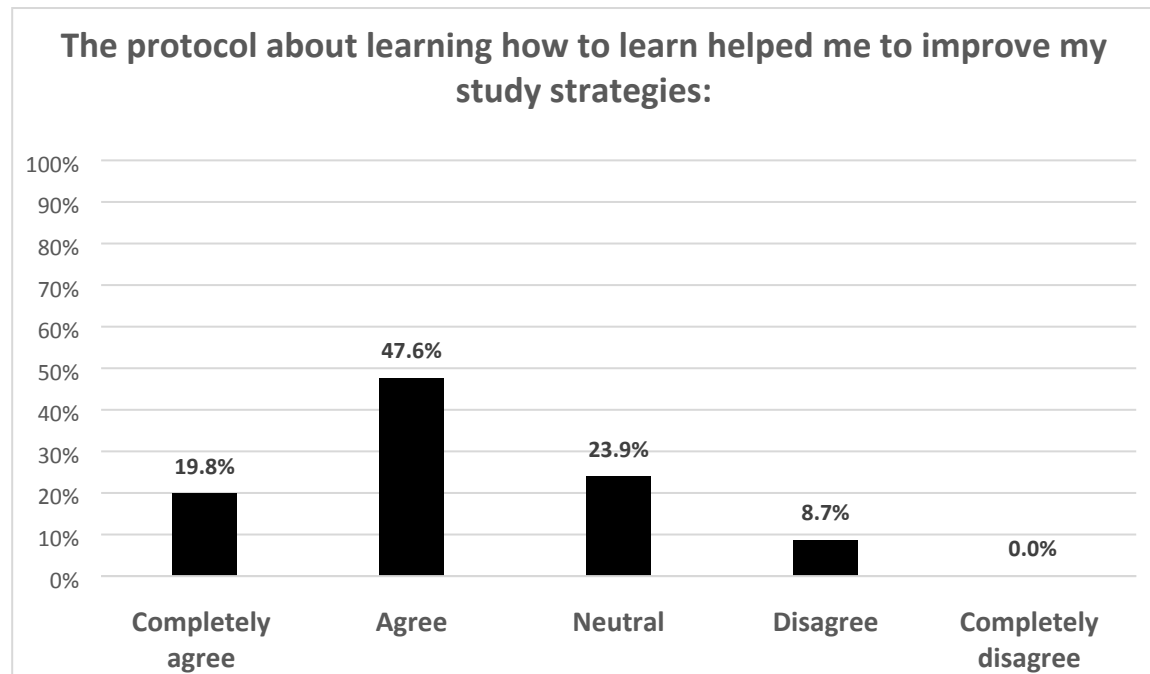
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The protocol about learning how to learn helped me to improve my study strategies:

	Completely agree	Agree	Neutral	Disagree	Completely disagree
	19.8%	47.6%	23.9%	8.7%	0.0%