



LEARNING STRATEGIES, AN ADDITIONAL PINCH TO LEARNING

A Study of the use of learning strategies by high school students in Mexico

Estrategias de aprendizaje, una pizca adicional para aprender

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KEYWORDS

*Strategies
Learning
Confinement
Learners
Self-study
Practice
Organization*

ABSTRACT

This research presents an analysis of the learning strategies employed by students during confinement due to Covid-19 in the year 2021. The study sample consisted of 200 students from the Licenciado Benito Juárez García high school of the morning shift of the Benemérita Universidad Autónoma de Puebla. A survey was applied to measure the degree of satisfaction in relation to their use and impact on the acquisition of knowledge, allowing them to be more self-taught. The results show that the hypothesis was partially fulfilled, since practice and organization are the learning strategies that most supported them in learning.

PALABRAS CLAVE

*Estrategias
Aprendizaje
Alumnos
Confinamiento
Autodidáctica
Práctica
Organización*

RESUMEN

Esta investigación presenta un análisis sobre las estrategias de aprendizaje empleadas por los estudiantes durante el confinamiento por Covid-19, en el año 2021. La muestra de estudio fueron 200 alumnos de la preparatoria Licenciado Benito Juárez García del turno matutino de la Benemérita Universidad Autónoma de Puebla. Se aplicó una encuesta, para medir el grado de satisfacción, con relación a su uso e impacto en la adquisición de conocimientos, permitiéndoles ser más autodidactas. Los resultados muestran que la hipótesis se cumplió parcialmente, ya que la práctica y organización son las estrategias de aprendizaje que más los apoyaron para aprender.

Recibido: 02/ 10 / 2022

Aceptado: 17/ 12 / 2022

1. Introduction

The purpose of this research is to identify the aspects that students considered during the COVID-19 pandemic, in order to establish a self-educational position by choosing the best learning strategies and improve academic performance both inside and outside the classroom.

Authors like Mercado, *et al.*, (2019), Calderón Garrido *et al.*, (2019), Agüero Pérez *et al.*, (2019) and Norzagaray, *et al.* (2021) have studied the relationship between learning strategies and the academic performance of high school and college students, concluding that, despite the fact that students know and employ learning strategies, there is no significant difference with those who do and those who do not.

On the other hand, Mendoza (2020) affirms that “doing to deliver and doing to learn” refer to the fact that there are different contents that require different ways of approaching them; hence, completing tasks and activities does not relate to learning in a meaningful way. Additionally, Norzagaray, *et al.* (2021) provide the following three classifications for learning strategies:

- Cognitive strategies that involve fusing newly learned information with prior understanding to the integration. These are methods for learning, encoding, comprehending, and remembering data in support of learning goals.
- Metacognitive strategies which are techniques that focus on their current knowledge involve planning, control, and evaluation by students of their own cognition. They reflect on their existing knowledge and recognize errors in their thinking or what they still need to learn. These strategies allow the knowledge of mental processes such as the control and regulation of these to achieve certain learning goals.
- Resource Management or Environmental Control strategies consider the smart use of available tools in the external context. These include skills like time management, creating a conducive environment for learning, asking for academic support, and knowing where to go for more information.

Nevertheless, Gargallo, *et al.*, (2016); Gutiérrez, (2015); Ning, *et al.*, (2015), and Koivuniemi, (2017) claimed that personal factors associated with their ability to regulate the learning processes become of vital importance for achieving educational goals. In this sense, extensive research has been conducted on students' conception of their efficacy for learning as well as self-regulated learning. They have concluded that to achieve self-regulated learning students should be using or applying cognitive and metacognitive learning strategies.

Regarding Strategic Learning helps in the development of skills and abilities that promote meaningful learning to contextualize the process, make sense of what is learned, facilitate interaction, and seek self-regulation of the learner as long as the activity that materializes the strategy has a clear and relevant purpose for the achievement of the learning objective or competence. In fact, Hotmart (2021) lists twenty effective learning strategies:

1. Memorization involves recording the content as it is presented. It's the process of learning by heart. This is most effective for short or concise content.
2. Association is extremely helpful when new and complex material needs to be learned, since it must be connected to previously taught content.
3. Motivation. In contrast to the content, a person's attitude and mood have a greater impact on motivation. These techniques commonly referred to as support approaches rely on the learner's emotional side.
4. Practice is learning by doing; it is an excellent learning strategy for people who learn best through concrete examples but may be applied to a range of contents.
5. Cooperative learning strategy refers to learning where two or more people comment on the contents and assist one another. This is helpful when dealing with subjects or materials that both people handle or are studying.
6. Competence involves collaborative learning and is effective for individuals who are competitive by nature.
7. Instructions. Although following Instructions is often practiced, it is not considered as a learning strategy. In addition, it is not believed that learning will be more difficult if they are not followed.
8. Repetition includes memorization techniques for learning. However, it stops being meaningful if it is only employed to get by.
9. Review indicates that it is important to examine or see again evaluations because they provide an opportunity for learning and help to consolidate what has already being learnt
10. Essays. For those who learn by writing, they are means for developing material, and they are also a great learning strategy because writing helps people to internalize the knowledge.
11. Organization. It is a way of learning that entails arranging the material in the sequence that works best for the students For instance, if they have a lot of materials to learn, they can either start with the easier content and go on to the harder ones or it can be done in the other way around.
12. Regulation. You may achieve the best outcomes using this method since you have control over the stimuli and the learning process. Since you have control over the stimulus and the learning process using this method, you may get the best possible results.
13. Debate. Sharing thoughts and opinions on a certain subject with an additional person or individuals enables this tactic to effectively develop the theme and broaden the perspectives of those engaged.

14. Analysis. In this strategy reflection is used to enhance learning and comprehension of the material, either individually or in a group.
15. Map composition is employed particularly when the content is complex on many levels and enables visual learning by connecting ideas.
16. Structuring. This is quite similar to the organizational strategy, which enables the organization and promotes easier learning.
17. Interleaved questions are employed to keep students' attention focus.
18. Summaries are considered very effective when learning new information. Many people use them for recalling specific information that needs to be stored in long term-memory.
19. Simulation. It is an open and creative strategy and introduces the portrayal of roles that are not often accepted.
20. Inverted learning. This is a pedagogical paradigm where the students serve as the protagonists and conduct prior study on ideas that the teacher has assigned and that are subsequently applied in class.

Nowadays, recent research has focused on learning strategies. In fact, according to a study by Mercado *et al.*, (2019) with nursing students at the Universidad Santo Tomás Temuco Chile, reveals the following:

“The majority of the strategies primarily use by students are social support (support), repetition and rereading (acquisition). Men and women employ different selection, organization (coding), elaboration (coding), and highlighting (acquisition) strategies. Women employ more strategies than men do. There were no significant correlations between the usage of strategies and academic achievement” (Mercado, *et al.* 2019, pp. 25-26).

As is evident, there are many different learning strategies. The majority of the studies that have been reviewed in higher education demonstrate that not all learning strategies are employed. Indeed, there is no connection between the use of learning strategies and academic performance.

1.1. Problem statement

It has been observed a decrease in students' knowledge acquisition in the year 2021, where many students feel unsatisfied and unsure about taking an entrance exam. Therefore, this study attempts to identify which are the most effective learning strategies for remote learning, according to the students from the high school Licenciado Benito Juárez García.

1.2. Study limitations

The limitations that were identified in this research were:

- Partial lack of knowledge about the social context of the students.
- Lack of knowledge about the student's aptitudes to use learning strategies.

It is important to mention that the educational and social benefits of this research provide information on the use of study techniques and strategies by the students during their confinement due to the COVID-19 pandemic in the year 2021 to determine their effectiveness in the students' academic performance, under the circumstances of a non-face-to-face education that they were required to attend.

1.3 Objectives

The main goal is to identify the strategies used by students from the Lic. Benito Juárez High School at the BUAP in order to take online classes and learn during the Covid-19 pandemic in the year 2021.

The specific objectives of this research are:

- To identify the kinds of strategies used by students.
- To analyze the factors that were taken into consideration for the strategies selection.
- To compare the academic performance of the students who used learning strategies with those students who did not.
- To identify the most popular study strategy during the Covid-19 pandemic, in the year 2021.

1.4 Hypothesis

It was hypothesized that the strategies employed by the students from the Lic. Benito Juárez High School at the BUAP for taking online classes and learning in the year 2021 during the Covid-19 pandemic would depend on the school subject and the type of student, as well as the tools that they have learned to use up until that moment, where the most prevalent were summaries, graphic organizers and reading techniques.

2. Methodology

2.1 Study design

The study was conducted in a public high school. This study uses a mixed method research methodology and is a descriptive cross-sectional study. Both quantitative and qualitative data analysis was done on the gathered information. Additionally, the main technique is the survey that was employed as the instrument and examines the data collected. There were 2000 students in the study universe. 200 students were randomly selected to produce a sample of probability from the high school „Lic. Benito Juárez García“ at the Benemérita Universidad Autónoma de Puebla.

The survey research has ten questions; six of them employed Likert scales, and the rest were multiple choice. At the same time, the items were developed to identify and analyze specific learning strategies used by the school community. Then, on February 26th, 2022, the survey was developed on the Microsoft Forms platform. After that, the questionnaire was sent and the participants' responses were submitted. Once the participants' answers were received, the information collected was analyzed.

2.2. Instrument

In this section the instrument to collect the data from the participants is presented. The questions were developed in order to identify the students' learning strategies employed.

Figure 1. Learning Survey during Confinement by Covid-19

Instructions: Choose the option that best answers the question.

Gender: Male ___ Female ___

Grade: 2nd Semester ___ 4th Semester ___ 6th Semester ___

Note: The survey was only applied to the 2nd, 4th, and 6th semester students.

1. According to the following options, which best describes learning strategies?

- a. They are tools that a learner can use to facilitate learning in understanding a text.
- b. A procedure that a learner intentionally acquires and employs as a flexible tool for learning.
- c. A series of methods applied at the time of studying, to facilitate the student's concentration in the learning process.

2. Did you use any learning strategies to improve your academic performance?

- a. Yes
- b. No

3. In case your answer is "No", how would you evaluate your academic performance according to the following scale?

OPTIONS	Excellent	Good	Regular	Deficient
Academic performance				

*NOTE: You can choose more than one answer to each of the following three questions.

4. Which study techniques improved your ability to understand the different subjects when you were studying them? Scale 1 not at all, 2 a little, 3 regular, 4 a lot, 5 quite a lot.

OPTIONS	1	2	3	4	5
a. Graphic organizers					
b. Research study sheets					
c. Summaries					
d. Others					
e. I don't use					

5. Provide an idea of the strategy's level of performance regarding your academic success. While numbers 1 inefficient, 2 is a little efficient, 3 is efficient, 4 is very efficient and 5 is quite efficient.

OPTIONS	1	2	3	4	5
a. Memorization or Repetition					
b. Association of examples					
c. Practice of exercises or theory					
d. Peer cooperation					
e. Organization of academic work					
f. Map composition					
g. Summaries					

6. In terms of your academic success, how satisfied are you with the learning strategies employed during confinement?

Scale 1 Not at all-2 A little- 3 Regular- 4 A lot -5 Quite a lot.

OPTIONS	1	2	3	4	5
Degree of satisfaction with the use or learning strategies					

7. To what extent, have the learning strategies allowed you to be self-taught? Scale: 1 Not at all - 2 A little - 3 Regular - 4 A lot - 5 Quite a lot.

OPTIONS	1	2	3	4	5
The extent to which the use of learning strategies allows you to be self-taught					

8. What is your dominant learning style?

* Note: If you have multiple learning styles, please list them in the option "other".

a. Visual____ b. Auditory____ c. Kinesthetic____ d. Multimodal____ e. Other____

9. Rank on a scale from 1 to 5 the reason that affected your decision from choosing one or more learning strategies: 1 is not at all; 2 is a little; 3 regular; 4 is a lot; 5 is quite a lot.

OPTIONS	1	2	3	4	5
Time					
Lack of attention					
The character of evaluation in the subject					
Type of learning (theoretical or practical)					
The importance of learning for the future					

10. From the following options choose the one that best reflects the connection between your grades and your knowledge by highlighting it from the list below.

- a. My grades improved, although my knowledge was poor.
- b. My grades decrease although my knowledge was enriched.
- c. Both my grades and knowledge decreased.
- d. Both my grades and knowledge benefited.

Source. Own elaboration, 2022

2.3. Context and population

The study was carried out at the high school Licenciado Benito Juárez García, from the Benemérita Universidad Autónoma de Puebla, which is in Puebla, Mexico. First, second, and third graders from the morning shift who have a current and functional Microsoft account at the time the survey was administered were included. The research included a sample of 200 students or 10% of the population from the morning shift. The students were chosen because they had at least one experience with online classwork during the pandemic in 2021, whether learning strategies were employed or not.

This research was conducted using the random probability or non-probability sampling method, and it was carried out by quotas since this type of sampling provided the possibility of forming an adequate sample. For the academic year 2021-2022, people who worked the afternoon shift or were not students at the school were discarded.

2.4. Materials and Variables

A survey with 10 multiple-choice questions was used to gather information for the study and the participants were asked to choose the response they felt most identified with. The results were gathered and graphed using different apps such as Microsoft Teams, Word, Forms, Excel, Google Chrome and WhatsApp. These data were evaluated quantitatively for determining precise behavioral patterns in this group.

The research was descriptive and cross-sectional to analyze data on variables that were collected over a period on a sample population or predefined subset. The research methodologies considered in the study were identified as independent variables whereas the different answers provided by the participants on the platform were recognized as dependent variables. In the first case, the strategies that could have been used to study during the confinement were presented as options; consequently, the dependent variables were the reasons, causes, and outcomes.

On the other hand, strange variables were found which were derived from the external participants' answers. Through equalization, the variables were regulated so that the dependent variable would result from a variety of possible values for the independent variable.

2.5. Data Collection Methods

The data gathering was done through a survey and was applied to 200 high school students in order to obtain quantitative results to determine the academic performance of students who used learning strategies and those who did not, as well as to identify the types of strategies used by the students.

A non-representative sample of 10 teachers revised the instrument before using it on participants to ensure that the questions were well designed and understandable. Since the sample believed that the survey's questions allowed for the gathering of all required data for later analysis, there were no changes made in response to their favorable comments. After this, the survey was submitted via social networks and with the aid of a link that the platform itself provides. Therefore, there was no physical contact to keep a healthy distance. This fact was useful because it facilitated the collection of data.

2.6. Statistical analysis

The survey's design took into account six groups of questions, which increased reliability for a more accurate interpretation of the findings. These groups are:

- A question to determine if they identify what a learning strategy is.
- Two questions regarding the application of learning strategies.
- Four questions about the learning strategies that helped them in their academic self-training and those that did not.
- A question on how their academic performance has been affected by the pandemic.
- A question about their learning style.
- A question regarding the elements that influenced their knowledge acquisition.

The results obtained were analyzed in tables of values, which allowed us to illustrate the results graphically. Excel was used to enter the data collected (pie charts and bar charts were obtained from the platform provided by Microsoft Forms). The results were color-coded to make them easy to identify and interpret.

3. Results

After the data were collected, a quantitative analysis was carried out and the answers to each question were presented in tables. Moreover, the qualitative analysis will be presented in the discussion section.

Table 1. Definition of learning strategy.

OPTIONS	Absolute Value	Relative Value	Accumulated Value
They are tools that a learner can use to facilitate learning in understanding a text.	110	55%	132
A procedure that a learner intentionally acquires and employs as a flexible tool for learning	64	32%	175
A series of methods applied at the time of studying, to facilitate the student's concentration in the learning process	26	13%	200

Source. Own elaboration, 2022.

Table 2. Their use of learning strategy to improve academic performance.

OPTIONS	Absolute Value	Relative Value	Accumulated Value
Yes	178	89%	178
No	22	11%	200

Source. Own elaboration, 2022.

Table 3. Academic performance of the students who do not use learning strategies.

OPTIONS	Absolute Value	Relative Value	Accumulated Value
Excellent	5	22.8%	5
Good	7	31.8%	12
Regular	6	27.3%	18
Deficient	4	18.1%	22

Source. Own elaboration, 2022.

Table 4. Study techniques that improved the ability to understand different subjects.

For this chart only the criteria “a lot” and “quite a lot” were taken into account.

OPTIONS (More than 1 option was selected)	Absolute Value	Relative Value	Accumulated Value
a. Graphic organizers	124	62%	124
b. Research study sheets	65	32.5%	189
c. Summaries	70	35%	259
d. Others	50	25%	309
e. I don't use	22	11%	331

Source. Own elaboration, 2022.

Table 5. Strategy's level performance regarding academic success.

(Only “very efficient” and “quite efficient” values were considered).

OPTIONS (More than 1 option was selected)	Absolute Value	Relative Value	Accumulated Value
a. Memorization or Repetition	115	57.5%	115
b. Association of examples	55	27.5%	170
c. Practice of exercises or theory	127	63.5%	297
d. Peer cooperation	57	28.5%	354
e. Organization of academic work	137	68.5%	495
f. Map composition	113	56.5%	608
g. Summaries	112	56%	720

Source. Own elaboration, 2022.

Table 6. Degree of satisfaction between the use of learning strategies and their academic performance.

(Only 178 students used learning strategies).

OPTIONS	Absolute Value	Relative Value	Accumulated Value
Quite a lot	71	40%	71
A lot	35	20%	106
Regular	33	19%	139
A little	30	16%	169
Not at all	9	5%	178

Source. Own elaboration, 2022.

Table 7. Degree of self-learning based on the use or non-use of learning strategies.

OPTIONS	Absolute Value	Relative Value	Accumulated Value
Quite a lot	74	37%	74
A lot	38	19%	112
Regular	55	27.2%	167

A little	23	11.5%	190
Not at all	10	5%	200

Source. Own elaboration, 2022.

Table 8. Dominant learning style.

OPTIONS	Absolute Value	Relative Value	Accumulated Value
Visual	72	36%	72
Auditory	29	14.5%	101
Kinesthetic	74	37%	175
Multimodal	25	12.5%	200

Source. Own elaboration, 2022.

Table 9. Factors that affected the decision to choose one or more learning strategies.

OPTIONS	Absolute Value	Relative Value	Accumulated Value
Time	54	27%	54
Lack of attention	46	23%	100
The character of evaluation in the subject	60	30%	160
Type of learning (theoretical or practical)	30	15%	190
The importance of learning for the future	10	5%	200

Source. Own elaboration, 2022.

Table 10. Connection between grades and knowledge acquired by the students.

OPTIONS	Absolute Value	Relative Value	Accumulated Value
My grades improved, although my knowledge was poor	126	63%	126
My grades decrease although my knowledge was enriched	2	1%	128
Both my grades and knowledge decreased	24	12%	152
Both my grades and knowledge were benefited	48	24%	200

Source. Own elaboration, 2022

3.1 Discussion

The findings support what was suggested by Mercado and colleagues in his article “Relation between learning strategies and academic performance: nursing students,” which states in his conclusion that “A significant number of strategies are known and can be used to improve academic performance” (Mercado *et al.*, 2019). In this sense, the results showed that more than three-quarters of the population from the Lic. Benito Juárez García high school used one or more learning strategies to improve their academic performance.

In terms of students’ understanding of what a learning strategy is it was found that fewer students than expected indicated the correct answer, and more female students had a clearer understanding of the concept. In the article named “Learning Strategies and Academic Achievement: The Psychology Student Perspective,”

Norzagaray, Sevillano, and Valenzuela (2021) concluded that most students do not have a proper conception of what learning strategies are.

In this research it was found that the most popular study method, graphic organizers, as well as two of the most frequently used strategies, constant practice of mathematical and/or theoretical exercises, homework organization and activities, were found to be related to the most popular learning styles that were chosen, such as the kinesthetic style, followed by the visual style. The majority of participants agreed that using learning strategies had helped them become more self-taught. The conclusions in Salazar and Heredia's article "Learning strategies and academic accomplishment in medical students" from 2019 are supported by the present research.

However, it is important to point out that there were factors that did not let them to select the ideal technique or strategy for the acquisition of knowledge. These factors were the character of the evaluation of the subject, where there are certain parameters and requirements set by the teacher to pass the subject, followed by the time they had to learn, because sometimes the program of a subject is extensive and, with the desire to cover it, the topics are taught so fast, which leads to use techniques and learning strategies lightly. This result may be a very important reason, why they did not benefit from the use of these academic tools.

Even though a large percentage mentioned that they used techniques and learning strategies, 63% mentioned that, although their grades had improved, the knowledge they had gained was still insufficient. Only a little more than half of students rated the usage of learning techniques as favoring their academic performance, while 40% said they benefited only slightly, which makes us believe that they either applied the strategy incorrectly or that it was the wrong one for what they needed to learn. According to Mercado, Illesca and Hernández (2019), this strategy failed to adhere to the students' expectations as a result.

A very interesting finding about those students who used strategies and those who did not, indicate that they have an academic performance ranging from good to excellent, with a minimal percentage difference of ten percent. The students that employed the learning strategies are at 60% and the others that did not employ them are at 50%. This may have different nuances for instance: the way in which the students were evaluated, due to the fact that some of the suggestions made to the teachers were not to apply exams and only evaluate the course with activities. Another key point is the self-taught nature of student learning, which makes them methodical in the use of strategies, and also the capacity of some students to learn by simply paying attention in class, comprehending the topics or doing mathematical exercises, which leads them to acquire the knowledge.

It is important to highlight that there were a number of issues that prevented them from choosing the best method or plan for learning. These factors were the nature of the subject's evaluation, where there are specific guidelines and standards set by the teacher to pass the subject, followed by the amount of time they had to learn because, occasionally, a subject's program is extensive and the topics are taught at such a rapid pace in an effort to cover it all, which results in the use of techniques and learning strategies sloppily. This outcome might be a crucial factor in why they did not gain anything from using these academic resources.

To finish this section, it will be very important to apply the survey again, now that they are returning to face-to-face classes, for verifying if there is a relevant difference with the non-face-to-face classes that they had to attend due to the confinement by Covid-19.

4. Conclusions

From this research, it can be said that eighty-nine percent used one or more learning strategies to acquire knowledge in their online lessons since they abruptly changed from a face-to-face educational model to remote learning, due to the mandatory confinement that began in March 2020. The results have shown that what made the students come out about their academic achievement, was the use of learning strategies such as the organization of tasks and activities, as well as the continuous practice of mathematical exercises and theoretical development. Despite this, the academic performance and the quality of the knowledge acquired by the student were not completely satisfactory.

In regards to the hypothesis stated at the beginning of the research, this is partially correct, since the findings show that the learning strategies used by the students from the Preparatoria Licenciado Benito Juárez at BUAP to take online classes and succeed in learning during the Covid-19 pandemic, in the year 2021, depend on the school subject and the type of student. However, organization and practice were the most employed by the students. As stated in the hypothesis, summaries, organizers, and reading strategies are also utilized as study approaches, in addition to graphic organizers.

Consequently, this coincides with a study conducted on students by researchers Brown, Roediger III, McDaniel (2014) of Harvard University, where they placed among the most successful study techniques the practice of exercises, quizzes, etcetera. Therefore, if they choose to repeat the problems they do in class or similar practical activities, according to this study, it is said that they learn better in the long term since the knowledge is connected with real applicability.

Nevertheless, in another study conducted with nursing students at the University of Santo Tomás Temuco-Chile, by Mercado, *et al.*, (2019) was observed that especially the strategies of repetition and rereading (acquisition) as well as those of social support are the most employed.

Finally, the specific and general objectives were successfully achieved. According to the analyzed answers, the students employed memorization, repetition, association, practice, cooperative learning, organization, map composition, and summaries. The factors that most intervened in the inadequate selection of strategies were time and the nature of the evaluation of the subject. Focusing on the academic performance of the students who used learning strategies with those who did not, it was not significantly higher since it was not considerably affected by the study strategy most employed during the pandemic by Covid-19 in the year 2021; this correlates with what Mercado, *et al.* (2019) stated; he found no consistent relations between the use of strategies and academic achievement.

After all, it is proposed to deepen on the causes to identify why there is no difference between those who use learning strategies and those who did not, or if there were other external conditions that intervened for the students to pass the subjects. In relation to this, it is suggested to implement again the evaluation of learning because it was suspended in this case due to the pandemic. The evaluation of learning is considered as a reference for both the student and the teacher because it contains information about the academic achievement of the learner. Then, by incorporating the student to the integral and/or authentic evaluation, it can be verified if there is a real correspondence between their grades and what they have really learned.

At this point, it is also recommended to implement training programs on learning strategies for teachers and students to promote the correct use of these. In that way, the students can efficiently organize the management of their learning, and this will lead them to become more self-taught.

5. Acknowledgements

This text arises from the Institutional Development Plan of the Benemérita Universidad Autónoma de Puebla (2021), where the “application of learning strategies” by students is an essential element for the mobility of knowledge that guides the development of skills.

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