



Students after the Pandemic: What Are the Differences in their Achievement Motivation and Metacognitive Skills?

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Abstract

The return to in-person work in educational institutions and in particular in universities has highlighted the impact of the pandemic on many aspects of the students' profile. The changes observed are very diverse and involve aspects related to behavior, social skills, learning skills, the use of technology, among others. This has motivated the development of research that seeks to identify and quantify the impact of the pandemic on students. However, the results are very variable, since they depend on the geographical, social, and educational contexts where the research has been carried out. The review of pedagogical strategies to work with students who begin their training at the university implies knowing their main characteristics and, in that sense, two variables that are fundamental in the academic performance of students are academic motivation and metacognitive skills. In this sense, the purpose of this work was to compare the profile of two groups of students in terms of these two variables. For this, the Modified Achievement Motivation Scale (EAML-M) and the Metacognitive Awareness Inventory (MAI) were applied. Both groups included students who were beginning their studies in Science and Engineering careers at a Peruvian university. One of the groups included students from a semester prior to the pandemic, and the second group included students who began their studies in the return semester after the pandemic. The results showed significant differences in favor of pre-pandemic students in metacognitive skills that are related to the regulation of cognition, that is, with the activities that help control the learning process. These results constitute a contribution to the planning of pedagogical strategies with students who are beginning their university studies.

Keywords: *Achievement motivation, metacognitive skills, pandemic, higher education*

1. Introduction

2020 was a year that marked a period of drastic transformations in the lives of people globally, due to the health emergency caused by the COVID pandemic. It can be said that in this context, education has been one of the areas that had to adapt very quickly to the new situation to continue with the training processes at all levels. Furthermore, the educational context became one of the most pertinent scenarios to evaluate the impact of the pandemic situation and its implications on young students, mainly in the emotional aspect since this undoubtedly has a direct effect on their academic performance [1]. The problems of depression, difficulty in social interaction, loneliness, and resilience have been identified in different studies carried out with university students during the pandemic and must be considered when planning post-pandemic education [2].

The transformation of educational processes to remote modality was assumed in a variety of ways depending on factors such as: accessibility to technology, teacher training, management of digital resources, internet connectivity, among others. Based on these factors, teachers had to design the remote learning context for their students. It is assumed that the scope for meeting goals and learning achievements has been very heterogeneous and this would imply that students who join their university education precisely when the post-pandemic stage begins also show differences in terms of their academic profiles.

The impact of remote education in times of pandemic on students is being investigated from various perspectives and the results are showing that the findings are dependent on the geographical, social, and educational context in which the research is developed [3], [4]. However, a very relevant framework is being built for the rethinking of post-pandemic pedagogical models.

Complementarily, metacognition influences the way in which the student adapts his cognitive activity according to the learning context, the demand of the task, his background and personal characteristics and the application of strategies that will allow him to face the problem [5]. Along these lines, the purpose of this study was aimed at comparing the characteristics of the metacognitive profile and the motivational profile, from an attributional perspective, of students who began their university education before the pandemic with those of a group of students who began their studies in the semester of



return to face-to-face mode post-pandemic. Both groups included first-year students studying Science and Engineering at a Peruvian university.

2. Methodology

2.1 Participants

The participants in this study were two cohorts of first year students of Science and Engineering from a Peruvian university. They were enrolled in a General Chemistry course.

- Pre-pandemic group: 34 students who began their university studies in a semester prior to the pandemic. They were aged 17 – 22 years, 70,6% was male and 29,4% was female.
- Post-pandemic group: 34 students who began their university studies in the return semester after the pandemic. They were aged 17 – 20 years, 67,6% was male and 32,4% was female.

2.2 Instruments

- Attributional Achievement Motivation Modified Scale (EAML-M) [6]: consists of 30 semantic differential items, which are valued on a gradient of 1 to 6 points, the items are presented in counterbalanced scores, increasing, and decreasing sense, to avoid bias. The items are configured in six dimensions: Interest and effort, interaction with faculty, task / ability, influence of peers on learning skills, exams, and collaborative interaction with peers. Maximum score per subject is 180 and minimum 30. Cronbach's alpha value is 0,9026.
- The Metacognitive Awareness Inventory (MAI) consists of 52 items distributed in two categories, knowledge of cognition and regulation of cognition, which, in turn, are divided into other more specific categories. The components of the category knowledge of cognition are declarative knowledge, procedural knowledge, and conditional knowledge. The components of the category regulation of cognition are planning, organization, monitoring, debugging and evaluation. The test is characterized by being self-report and its response options are on a Likert scale with the following statements: 1. Completely disagree, 2. Disagree, 3. Neither disagree nor agree, 4. Agree and 5. Completely agree. In this study, the validated version of the instrument in Spanish was used [7], the Cronbach's alpha in this case was 0.94. The Cronbach's alpha values for the categories ranged from 0.61 to 0.77.

2.3 Procedure

Students in both groups were informed of the purpose of the study and then invited to respond voluntarily and anonymously to the two instruments during the first two weeks of the semester.

2.4 Analysis of data

The data were analysed using Statistical Package for the Social Sciences (SPSS) 29 software ®. Level alpha was established a priori in 0,05. A descriptive analysis of the instruments scores, expressed as percentage, was performed. The t test was used to verify differences between the participant groups, considering as dependent variables the corresponding instruments scores.

3. Results

Table 1 shows the descriptive statistics for the six dimensions and total score of EAML-M (all expressed as percentage) for the two participants groups.

In both groups the dimensions with the highest scores were Interest and effort, Interaction with faculty and Task/ability, while the dimensions related to Collaborative interaction with peers and the Influence of peers on learning skills had the lowest scores. Both profiles orient their attributions of academic success towards the deployment of the own effort and interest in academic work with a strong expectation of the teacher's role as part of the process and the challenge of the task as a stimulus for learning.

The comparison of the total and dimensions scores obtained by the two groups in EAML-M, applying the t-test for independent samples, showed significant differences only in the dimension "Exams" ($t(66) = -5,934$, $p < 0,001$). The post-pandemic group placed a high weight on test scores as an important factor in their academic expectations. No significant differences were found for the total test score between the groups. These results indicate that a similar level of motivation was achieved with both groups.



Table 1. Descriptive statistics for EAML-M scores

Dimension	M		SD	
	Pre-pandemic group (N = 34)	Post-pandemic group (N = 34)	Pre-pandemic group (N = 34)	Post-pandemic group (N = 34)
Interest and effort	82,68	81,71	9,289	11,353
Interaction with faculty	77,94	81,12	10,012	13,862
Task/ability	74,26	76,68	8,945	9,831
Influence of peers on learning skills	55,44	56,29	16,808	19,402
Exams	54,29	73,79	11,232	15,523
Collaborative interaction with peers	64,24	66,06	13,714	18,289
EAML-M	71,19	74,84	6,480	9,351

Table 2 shows the descriptive statistics for the eight categories and total score of MAI (all expressed as percentage) for the two participants groups.

Table 2. Descriptive statistics for MAI scores.

Category	M		SD	
	Pre-pandemic group (N = 32)	Post-pandemic group (N = 32)	Pre-pandemic group (N = 32)	Post-pandemic group (N = 32)
Declarative knowledge	77,188	76,250	9,520	8,707
Procedural knowledge	77,500	73,906	9,333	13,544
Conditional knowledge	79,000	76,375	9,531	12,664
Planning	74,107	68,392	10,054	12,694
Information Management strategies	76,188	71,000	9,163	10,374
Comprehension monitoring	76,785	68,571	8,072	11,880
Debugging strategies	77,875	77,000	10,703	10,848
Evaluation	75,832	68,229	9,617	12,062
MAI	76,634	72,128	7,796	9,124



The Knowledge of Cognition category involves the student's declarative knowledge about himself as a person who learns and the factors that can influence his learning, as well as the strategies and resources used to achieve it. It also includes procedural knowledge that is related to the correct execution of strategies and resources in the learning process. Conditional knowledge is the third component of this dimension and is related to the conscious application of a cognitive action. No significant differences were found in the comparison of these categories between the participating groups.

The regulation of cognition category is related to metacognitive activities that allow learning to be controlled. These include planning activities that involve establishing goals, times, selecting strategies and resources for learning. During the execution of the process, monitoring activities are applied that are linked to supervision during its development and, eventually, the identification of weaknesses that can be adjusted to achieve the learning goals. Finally, the evaluation component is related to the analysis of the effectiveness of all the strategies applied. In this category, significant differences were found between the participating groups, with the pre-pandemic group having the best results in the following components: Planning ($t(62) = 1,997, p < 0,05$), Information Management Strategies ($t(62) = 2,12, p < 0,05$), Comprehension Monitoring ($t(62) = 3,235, p < 0,05$), Evaluation ($t(62) = 2,788, p < 0,05$).

3. Conclusions

The return to face-to-face activities post-pandemic gave rise to strong expectations and uncertainty regarding what should be the best pedagogical strategies to promote the learning of students entering higher education. It was clear that a return to usual practices was unlikely since both teachers and students already had previous experience that had strongly incorporated the use of technology in pedagogical models. However, unpleasant experiences are frequently reported in this process and therefore, it was necessary to identify the different variables that could be influencing, either positively or negatively, the development of the learning processes of the new university students.

The results obtained in this study mainly show that, in this case, the students' previous experience did not promote the use and development of metacognitive skills related to the regulation of the cognitive process, although it was assumed that one of the benefits of remote teaching during the pandemic had been the development of skills for autonomous learning. As noted previously, the way in which each teacher and each educational institution faced remote teaching during the pandemic has been very heterogeneous and this has undoubtedly had an impact on the academic profile of new university students.

It is important to take these research reports into account because, although they come from different experiences, they are forming a relevant frame of reference for the review and rethinking of the pedagogical models and practices of this post-pandemic time.

References

- [1] Camacho-Zuñiga, C., Pego, L., Escamilla, J., Hosseini, S. "The impact of the COVID-19 pandemic on students' feelings at high school, undergraduate, and postgraduate levels", *Heliyon*, 2021, 7(3), e06465. <https://doi.org/10.1016/j.heliyon.2021.e06465>.
- [2] Kiltz, L., Fokkens-Bruinsma, M., Jansen, E. P. W. A. "Investigating how students' learning environment, social and physical well-being influence their resilience and feelings of depression and loneliness during the COVID-19 pandemic in the Netherlands", *Higher Education Research & Development*, 2023, 42(8), 1970-1985.
- [3] Nizzolino, S. "Pandemic and Post-Pandemic Effects on University Students' Behavioral Traits: How Community of Inquiry Can Support Instructional Design During Times of Changing Cognitive Habits", *International Journal of e-Collaboration*, 2023, (19) 1, 1-19.
- [4] Zheng, Y., Zheng, S. "Exploring educational impacts among pre, during and post COVID-19 lockdowns from students with different personality traits", *International Journal of Educational Technology in Higher Education*, 2023, (20) 1, 1-20.
- [5] Ugartetxea, J. "Motivación y metacognición, más que una relación", *RELIEVE – Revista Electrónica de Investigación y Evaluación Educativa*, 2014, 7(2). <https://doi.org/10.7203/relieve.7.2.4442>.
- [6] Morales Bueno, P., Gómez, V. "Adaptación de la Escala Atribucional de Motivación de Logro de Manassero y Vázquez: incorporación de dimensiones relacionadas al aprendizaje colaborativo". *Educación y Educadores*, 2009, (12) 3, 33-52.



- [7] Huertas Bustos, A. P., Vesga Bravo, G. J., Galindo León, M. "Validación del instrumento inventario de habilidades metacognitivas (MAI) con estudiantes colombianos", 2014, Praxis & Saber, (5) 10, 55-74.