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Achievement emotions of university students in on-campus and online education during the COVID-19 pandemic

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Abstract: Feelings and emotions play a prominent role in the motivation and academic performance of students. Considering this importance, this study aimed to compare the achievement emotions of students in two educational environments, traditional face-to-face classes and online classes, grown after the outbreak of the COVID-19 pandemic. To achieve this goal, 92 university students who had the experience of the two modes of education evaluated their emotions in these contexts. The findings indicated that university students had better class-related and learning-related feelings (enjoyment, hope, and pride) in traditional face-to-face education. These students also reported feeling angrier in online classes. Differences in other emotions, such as anxiety, hopelessness, boredom, and shame, were not significant. Test-related emotions of students were rather similar in these two educational contexts. Although traditional face-to-face education produced more positive emotions in students, 29.7% of the students preferred to continue their studies in online mode. Blended education can help students make optimum use of available resources. The findings can be of use to educational policymakers, curriculum planners, teachers, and students.

Keywords: COVID-19; emotions; online classes; face-to-face classes; university students.

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I. Introduction

The onset of COVID-19 in December 2019 forced the World Health Organization (WHO) to declare this disease a global pandemic. The COVID-19 pandemic caused serious difficulties and severe damage in nearly every corner of the world. Besides health problems, it has posed many social, economic, and psychological challenges to people worldwide. This infectious and refractory disease severely affected numerous industries, different sectors, and the routine lives of individuals.

This global pandemic and its ensuing consequences have also affected education. In response to this unwelcome guest, many countries closed their institutions, schools, universities, and colleges temporarily, but when they realized this pandemic was not going to go away soon, they made efforts to adjust to this tricky situation (Jirásek and Stránský 2022; König, Jaeger-Biela, and Glutsch 2020). Although universities were quick to replace traditional face-to-face classes with online and distance instruction, teachers and students found it a little challenging to adapt to the new situation (Barrot, Llenares, and del Rosario 2021). The transfer from campus-based learning to online learning forced teachers and students to get acquainted with the nuts and bolts of online education. Ministries of education and university authorities saw this type of education as the fast solution to cope with the disruption in education, and they urged instructors to “maximize online collaborative learning (OCL) opportunities for their students” (Lei and Medwell 2021, 169). However, the lack of necessary equipment for online teaching and learning, such as suitable cellphones, computers, and technical infrastructure, were significant setbacks for this marked shift. Poor and developing countries were more affected by these severe setbacks (Mathrani, Sarvesh, and Umer 2021; Zarei and Mohammadi 2021).

In addition, learners’ feelings and emotions in educational settings are essential for their health, learning, motivation, identity development, and performance (Pekrun et al. 2002). Education in the new context, imposed on teachers and students after the outbreak of COVID-19, brought about changes in the emotions students experienced in class, learning, and assessment. Moving from a typical school environment to home confinement poses a risk of emotional problems (Tannert and Gröschner 2021, 498). These emotions relate significantly to students’ learning and performance (Pekrun et al. 2011). Therefore, examining students’ emotions in these two different environments can provide helpful information for education policymakers, teachers, and even students.

The current study is going to compare the achievement emotions of students in traditional face-to-face and online classes. Most studies on

emotions have focused on just one aspect of emotions, such as test anxiety (Bieleke et al. 2021, 1). This study aims to consider the integrative nature of these emotions and assess students' feelings in these two academic contexts. In the following sections, first, the concept of achievement emotions will be discussed and elaborated. Next, a brief comparison of two educational settings (face-to-face and online) will be presented.

1.1. Achievement emotions

Achievement emotions include emotions related to achievement activities (e.g., studying and sports) or achievement outcomes produced by successes and failures (Pekrun 2006, 317). Different variables and factors determine the type and strength of these emotions. Personal competencies, cognitive appraisals of situational demands, the likelihood of success and failure, and the value assigned to these outcomes are among these contributing factors. According to Pekrun's (2006) control value theory (CVT), differences in control over performance and values appraisals lead to different achievement emotions. In other words, individuals experience different achievement emotions, considering the extent to which they feel they have control over achievement activities and the value they attribute to achievement activities and possible outcomes.

Part of Pekrun's (2006) control-value theory is demonstrated in a three-dimensional taxonomy of achievement emotions (Pekrun et al. 2007, 16–17). In this taxonomy, emotions are classified into *activity* versus *outcome* emotions with respect to the *object focus*. Activity-related emotions (e.g., enjoyment) focus on the action rather than the result of the action, which is the focus of outcome-related emotions (e.g., pride). Next, positive (i.e., pleasant) versus negative (i.e., unpleasant) emotions (e.g., hope vs. hopelessness) are distinguished in terms of the *valence* of emotions. Finally, the taxonomy has made a distinction between *activating* (e.g., anger) and *deactivating* (e.g., boredom) emotions with regard to the behavioral impact of the emotion. For instance, enjoyment can be described as a positive, activating, activity-related achievement emotion.

In educational environments, these emotions are felt by students in various achievement situations, such as learning, doing homework, participating in class, or taking exams. The emotions posited in this taxonomy influence the cognitive resources required to focus attention on achievement tasks and the motivation to do these tasks. These emotions also affect the self-regulation of learners and the use of flexible learning strategies (Pekrun et al. 2007, 27). Positive activating emotions such as enjoyment have a

positive relationship with achievement and academic performance (Pekrun et al. 2002, 92; Pekrun et al. 2011, 38), but the effect of positive deactivating emotions such as relaxation on learning and achievement is ambiguous and variable. These emotions can reduce the attention on a task, can harm the current motivation while simultaneously reinforcing the motivation to reengage with the task, and can promote superficial information processing (Pekrun 2006, 326).

Regarding the impact of negative activating emotions such as anxiety and shame on learning and achievement, the researchers have reported complex and variable effects. Although the majority of studies (e.g., Linnenbrink 2007; Pekrun et al. 2011) have reported adverse effects for these emotions, some studies (e.g., Turner and Schallert 2001; Zeidner 1998) have shown better performance for students who felt these negative activating emotions. The enhanced academic performance of students who feel shame and anxiety can be explained by the motivational effects of these emotions on students who are committed to future goals (Pekrun 2019, 152). Negative deactivating emotions such as boredom and hopelessness are expected to jeopardize the overall performance of students because they reduce cognitive resources, harm their motivation, and increase superficial information processing (Pekrun 2006, 326). Given the immediate and long-term effects of emotions on learning and achievement, it is essential that educational decision-makers and teachers should promote adaptive achievement emotions during learning and performance tasks.

Traditional studies on the role of emotions in education and learning were limited to investigating separate outcome-related emotions such as anxiety and shame (Goetz and Hall 2013, 192; Pekrun et al. 2002, 103; Pekrun and Stephens 2010, 238). During the 1990s, the role of emotions (in addition to anxiety) in human cognition and motivation attracted the attention of educational scientists (Pekrun 2005, 497). The last two decades have seen a growing interest in studying activity-related emotions (e.g., enjoyment and boredom). However, the concept of achievement emotions presented an integrative and multi-componential approach to emotions. Achievement emotions involve different types of emotions students experience in learning in different types of achievement settings (class, learning, and test) and different temporal specifications (trait, state, and course-specific emotions) (Pekrun et al. 2005, 5).

Many studies have reported a positive relation between enjoyment and achievement (e.g., Baek and Touati 2017; Pekrun et al. 2017; Ranellucci, Hall, and Goetz 2015), but a few studies (e.g., Beck 2011) have shown no relationship and even negative correlation between them. Tze et al. (2016)

explored the relationship between boredom and educational performance in a meta-analysis. They found negative correlations between boredom and academic motivation as well as between boredom and learning strategies. A moderate negative correlation was also found between boredom and overall performance. Chamaco-Morles et al. (2020) reviewed 68 studies on the relationship between activity-related emotions and educational outcomes. Their findings showed a positive relation between enjoyment and academic performance, but anger and boredom correlated negatively with academic performance. The relation between frustration and academic performance was near zero.

Stephan, Markus, and Gläser-Zikuda (2019) compared students' achievement emotions in an online and on-campus course in teacher education. Their findings showed that students who attended the online course experienced a higher level of boredom, anger, and anxiety, but less enjoyment. The difference in students' reported emotions of hope, shame, anxiety, and hopelessness was not statistically significant. They collected the data from two groups of students instructed in two different educational environments (online and on-campus). The possible individual differences between the two groups and not having the experience of the other mode of education may have affected their findings. The current study explores these emotions in students who had the experience of both modes of education.

1.2. On-campus vs. online education

Distance education is a relatively old concept. Some trace its history to the 1800s and even the 1700s. Since the late 1800s, a few significant advancements, such as the inventions of the radio and television, have shaped and pushed distance learning forward. During the 1980s, the electronics revolution and the introduction of broadband technologies helped the advance of this education. The personal computer with internet access was the next major invention that had a pivotal role in the popularity of distance education and online classes in the 1990s. The increasing advancement of distance education continues into the 21st century. Parker, Lenhart, and Moore (2011, 1) have reported that 89% of 4-year public colleges in the U.S. and 60% of private institutions offered online classes at that time.

Although distance education has proliferated due to advances in technology and changes in the lifestyle of students in the past two decades, face-to-face education is still the dominant form of education and learning worldwide. Over the past two years, the coronavirus outbreak has forced

more students and universities to employ online and distance learning courses. Due to the increasing growth of online education and the continuing popularity of face-to-face education, it is essential to assess the academic achievement of students in these educational settings and also to examine the affective factors related to both educational environments.

Electronic learning environments can be categorized into three types: synchronous, asynchronous, and blended (Salmon 2013). In synchronous learning environments, the teacher and students in the course take part in education at the same time, but from different locations. It takes place in real-time, with the instructor and learners interacting with each other. Virtual classrooms, live webinars, and video conferencing are examples of this mode of education. In asynchronous electronic learning, the teacher and the learners are not engaged in the learning process at the same time. Blogs and prerecorded webinars can be used to implement this type of education. There is no real-time interaction with other people. A blended environment combines an asynchronous set of electronic activities with synchronous education.

There are considerable differences between face-to-face traditional classes and remote online education. These differences have provided real advantages and disadvantages for the two educational settings (Gherheş et al. 2021). Among these differences, convenience, flexibility, contact hours, self-paced nature, and cost are usually cited as the main advantages of online education. Decreased student-teacher interaction and student-student interaction, giving a sense of isolation to students, placing a heavy burden on students, lack of qualified teachers for online education, and the reliability of assessments are the main drawbacks of online instruction, compared to face-to-face education.

Regarding the comparative effectiveness of face-to-face and online education, the findings of most studies (e.g., Enkin and Mejías-Bikandi 2015; Goertler and Gacs 2018; Rubio, Thomas, and Li 2018) have shown that the students' achievement in online classes was at least as good as their achievement in traditional classes. Wu (2015) reviewed 12 studies on the relative effectiveness of fully online or hybrid formats versus traditional or face-to-face environments conducted between 2013 and 2014. He found that students who participated in online and hybrid formats performed as well or better than those who attended the traditional versions of comparable courses. Of course, few studies (e.g., Brown and Leidholm 2002; Figlio, Rush, and Yin 2013; Kaupp 2012) have reported opposite findings. For instance, Kaupp (2012) examined course outcomes at California community colleges and found significantly better course grades for students in face-to-face classes than for online students. The methodological issues, such as randomization and the small sample size, are the main drawbacks of some studies conducted in this domain.

Of course, the difference between planned distance education and emergency remote education should not be neglected. Distance education relies on deliberate and advanced design, and the teachers and students in these programs expect in advance that they will have some or all courses in modes other than face-to-face education. However, emergency remote education is a temporary and abrupt shift to remote instructional delivery due to crises, such as weather, war, or health. The main objective in these circumstances is to adapt to the demands of the new situation. Teachers and students have to adopt this instruction, and most of them do not have enough training and preparation for these unexpected scenarios. Therefore, the findings of this study, which is done during online education after the outbreak of the COVID-19 pandemic, will apply to emergency remote education, and its application to usual distance education environments should be considered with caution.

In general, the majority of previous studies on students' emotions in online and on-campus settings have focused on one or two emotions, and the participants in these studies usually had the experience of one mode of education—either online or on-campus classes. The present study aims to examine the possible differences in the achievement emotions of the university students who had the experience of both educational settings.

II. Method

II.1. Participants

Ninety-two Iranian university students enrolled in 4-year programs to get a Bachelor of Arts (B. A.) degree participated in the study voluntarily. They studied humanities and social studies (e.g., psychology, translation, educational sciences) in the fifth semester. They had a minimum of two semesters of experience in on-campus education and two semesters of experience in online education. The participants were selected based on purposeful sampling, including both male (39.13%) and female (60.87%) students. Their age ranged from 20 to 45 years. Before the outbreak of coronavirus, the students attended traditional face-to-face classes, but after the outbreak of this pandemic, they had to switch to online education.

II.2. Instrumentation

The Achievement Emotions Questionnaire (AEQ) developed by Bieleke et al. (2021) was utilized to assess different emotions of university students, related to class, learning, and testing, in on-campus and online educational settings.

This questionnaire was a short version of the questionnaire developed by Pekrun et al. (2011). The Beileke et al.'s (2021) AEQ had 96 items, which assessed different emotions of students, including enjoyment, hope, pride, anger, anxiety, shame, hopelessness, boredom, and relief across different academic settings. Eight emotions are assessed in each part with 32 items (4 items for each scale). The students were asked to respond to the online questionnaires about the two modes of education (face-to-face and online) they had experienced. Therefore, each respondent had to answer 192 items. The respondents showed their evaluation of each item by selecting one of the options from "highly disagree" to "highly agree" on a 5-point Likert scale. The questionnaire was translated into Persian to make it more intelligible for the participants, and some minor changes were made in their wording to make it more suitable for the goals of the current study. Due to the closure of universities and considering the length of the questionnaire, the online version of the questionnaire was administered to the participants. The reliability index of the questionnaire was calculated using Cronbach. The obtained α was above .8 for all scales, indicating the high reliability of the questionnaire. The validity of the instrument was also established by Bieleke et al. (2021). In addition, the validity of the translated questionnaire was examined and confirmed by a panel of experts in psychology, education, and translation. Six experts (two in each field of study), who held Ph.D. and had more than ten years of experience in teaching and research in their own field, read the questionnaire carefully and approved its validity.

II.3. Procedure

Ethical guidelines for research have been observed in conducting this project. Before beginning the study, the participants filled in the informed consent form. They were not required to write their names in the questionnaires, and were assured that every effort would be made to keep their personal information confidential. The participants were informed about the aims of the study and about their freedom to accept or refuse the invitation to take part in the project. The AEQ was administered to the participants online. The questionnaire link was shared with respondents in WhatsApp groups whose members had the required characteristics for this study. Ninety-two students completed the questionnaires. The respondents were asked to reflect on the experience they had in two educational environments (on-campus and online) and show their opinion on each item by choosing one of the options from 'highly disagree' to 'highly agree'. The participants also answered a question on their preferred mode of education for the post-COVID era. They were also encouraged to write their reasons for their choice and make brief

comments on their experience in the two educational environments. The collected data were analyzed using SPSS 22 software.

III. Results

In order to analyze the collected data, first, the normality of the distributions of the data was assessed using normality tests (e.g., Kolmogorov-Smirnov and Shapiro-Wilk tests). Because the results of the tests showed that the distributions were not normal ($p < 0.05$), a non-parametric test was utilized to explore different emotions that university students experienced in on-campus and online education. When the assumptions underlying parametric tests (e.g., normality of data, sample size) are violated, non-parametric alternatives should be utilized (DePoy and Gitlin 2019, 304). Table 1 shows descriptive statistics for class-related emotions of university students in on-campus and online education.

Table 1
Descriptive statistics for class-related emotions

Emotion	Education	Mean	Std. Deviation	Median
Enjoyment	Online	2.84	1.21	2.62
	On-campus	3.77	1.00	4.00
Hope	Online	3.11	1.13	3.25
	On-campus	3.82	.98	4.00
Pride	Online	3.09	1.05	3.25
	On-campus	3.65	.90	3.75
Anger	Online	2.58	1.12	2.37
	On-campus	2.23	1.09	2.00
Anxiety	Online	2.53	1.07	2.50
	On-campus	2.39	1.03	2.25
Shame	Online	2.06	.94	2.00
	On-campus	2.36	1.13	2.00
Hopelessness	Online	2.26	1.11	2.00
	On-campus	2.09	1.09	2.00
Boredom	Online	2.65	1.09	2.62
	On-campus	2.49	1.08	2.25

To assess students' class-related emotions in two educational environments, the Wilcoxon Signed Rank Test was run. The analyses showed a significant difference in students' enjoyment ($T= 2923, Z= 4.53, p<0.05$), hope ($T=2474.50, Z=3.83, p<0.05$), pride ($T=2504, Z=3.46, p<0.05$), and anger ($T=1276.50, Z=2.27, p<0.05$). Students' anxiety ($T=1429.50, Z=1.08, p>0.05$), shame ($T=1603.50, Z=1.86, p>0.05$), hopelessness ($T=1338, Z=1.01, p>0.05$), and boredom ($T=1172.50, Z=1.33, p>0.05$) did not change significantly in online instruction and in-person classes.

The analysis of the second part of the questionnaire, learning-related emotions, indicated differences in achievement emotions of students. Table 2 summarizes means, standard deviations, and medians of students' emotions. The results of the Wilcoxon Signed Rank Tests showed a significant difference in enjoyment ($T= 1949, Z= 2.77, p<0.05$), hope ($T= 1816, Z= 2.06, p<0.05$), and pride ($T= 1478.50, Z= 2.12, p<0.05$) of university students in face-to-face and online education. There was not a significant difference in anger ($T= 1225, Z= 1.40, p>0.05$), anxiety ($T= 1208.50, Z= 1.82, p>0.05$), shame ($T= 1509.50, Z= .89, p>0.05$), hopelessness ($T= 1244, Z= .39, p>0.05$), and boredom ($T= 1035.50, Z= .03, p>0.05$) of students who had experienced the two modes of education.

Table 2
Descriptive statistics for learning-related emotions

Emotion	Education	Mean	Std. Deviation	Median
Enjoyment	Online	3.51	.89	3.50
	On-campus	3.84	.80	4.00
Hope	Online	3.62	.84	3.62
	On-campus	3.89	.80	4.00
Pride	Online	3.52	.85	3.50
	On-campus	3.79	.82	3.75
Anger	Online	2.32	1.01	2.12
	On-campus	2.19	.95	2.00
Anxiety	Online	2.63	.90	2.50
	On-campus	2.47	.90	2.50
Shame	Online	2.60	.90	2.75
	On-campus	2.57	.99	2.50

Emotion	Education	Mean	Std. Deviation	Median
Hopelessness	Online	2.20	1.00	2.00
	On-campus	2.15	.98	2.00
Boredom	Online	2.58	1.08	2.50
	On-campus	2.54	.97	2.50

Students' evaluations of their emotions in testing did not indicate a significant difference between in-person and online tests. Table 3 demonstrates the differences in means, standard deviations, and medians of the obtained data.

Table 3
Descriptive statistics for test-related emotions

Emotion	Education	Mean	Std. Deviation	Median
Enjoyment	Online	3.41	1.10	3.50
	On-campus	3.17	.96	3.25
Hope	Online	3.65	.94	4.00
	On-campus	3.47	.99	3.50
Pride	Online	3.38	.91	3.25
	On-campus	3.39	.87	3.50
Relief	Online	3.54	.83	3.75
	On-campus	3.57	.76	3.50
Anger	Online	2.64	1.00	2.75
	On-campus	2.68	.89	2.75
Anxiety	Online	2.83	.89	3.00
	On-campus	2.95	.85	3.00
Shame	Online	2.12	.92	2.00
	On-campus	2.20	.95	2.00
Hopelessness	Online	2.13	.91	2.00
	On-campus	2.30	1.01	2.25

The Wilcoxon Signed Rank Test indicated that the difference in test-related emotions was not statistically significant in enjoyment ($T= 1323$, $Z= 1.75$, $p>0.05$), hope ($T= 1423.50$, $Z= 1.28$, $p>0.05$), pride ($T= 1600.50$, $Z= .28$, $p>0.05$), relief ($T= 1292$, $Z= .51$, $p>0.05$), anger ($T= 1386.50$, $Z= .00$, $p>0.05$), anxiety ($T= 1515$, $Z= .68$, $p>0.05$), shame ($T= 1272.50$, $Z= .17$, $p>0.05$), and hopelessness ($T= 1591.50$, $Z= .88$, $p>0.05$). In other words, students' evaluations of the emotions in on-campus and online testing were rather similar. Regarding the participants' preference for post-COVID classes, 65 participants (70.7%) liked to return to their face to classes and 27 participants (29.7%) preferred to continue the online classes.

IV. Discussion

Achievement emotions play a significant role in the motivation and academic performance of students. Therefore, studying these emotions in different educational environments is essential for educational practitioners and decision-makers. Considering the rapid growth of online education in recent years (especially after the outbreak of COVID-19), this study attempted to investigate the different emotions of university students in on-campus and online education.

Our findings with respect to the class-related and learning-related emotions demonstrated a similar pattern. Students' class related emotions including, enjoyment, hope, pride, and anger, were significantly different in these two modes of education. In the first three emotions (enjoyment, hope, and pride), students reported higher emotions for on-campus education, but these students felt angrier in online classes. In learning-related emotions, the participants reported higher degrees of enjoyment, hope, and pride in the face-to-face education. The main reason for these findings, as the participants wrote in their comments, may be the lack of teacher-student and student-student interaction in online education. 62.5% of the participants who explained their reasons for choosing on-campus education and commented on their experience stated this factor as one of the main reasons. Some students (50%) also believed teachers were not qualified enough to teach in remote and online classes. Teachers' inability to make effective use of technology in online classes and their audio lectures (sometimes without visual aids) promoted negative feelings in students. Considering the fact that our participants and teachers had to adapt themselves to online education abruptly, due to the outbreak of the COVID-19 pandemic, this reason can be acceptable. In addition, the effects of the COVID-19 pandemic on the emotional state of students should not be ignored. Loneliness and lockdown

measures taken to control this threatening pandemic have increased the depressive symptoms, anxiety, indignation, and stress (e.g., Li et al. 2020). The study of Varma et al. (2021) has proved that the youth are at a greater risk of poor mental health during this pandemic.

Among class-related emotions, anxiety, shame, hopelessness, and boredom of university students were not considerably different in the two educational environments. In addition to these emotions, the university students also reported similar degrees of anger while engaged in learning in these two educational contexts. These feelings are affected by individuals' perception of their ability to cope successfully with assigned tasks as well as by the environmental demands. For instance, regarding boredom, some students commented that the lack of interaction between teacher and students and also among students created a monotonous and boring atmosphere in online classes. On the other hand, some students believed that going to university and sitting on chairs for long hours in face-to-face classes was really tedious for them.

The story is different with regard to test-related emotions. The students reported similar degrees of achievement emotions in two modes of testing. Of course, the comparison of means and medians indicated that students felt a little more enjoyment, hope, and relief but less pride and hopelessness in online tests. However, the differences were not statistically significant. These findings seem somewhat extraordinary if we know that students' scores and GPA (grade point average) have risen in the distance and online testing. Test-related emotions of students are affected by their performance and achievement in assessments and also by the testing environments. It seems that the characteristics of each test delivery mode (in-person and online) had a negligible effect on students' emotions. The positive emotions which arose from the benefit of not having been monitored by a strict teacher or invigilator during in-person exams were counterbalanced by the negative emotions caused by the time pressure, internet connection problems, power outages, and possible technical problems during online exams. This fact should also be emphasized that in some developing and even developed countries, a few students do not have the suitable equipment (e.g., internet, mobile phone, and computer) for online tests.

Overall, we can conclude that university students who were enrolled for on-campus education felt better in in-person education and preferred to pursue their education face-to-face after the end of the COVID-19 pandemic. Of course, considering the interest of some students in pursuing their studies in online classes, enough attention should be paid to this kind of education. Blended education, which integrates in-person classes with online education, can satisfy the needs, wants, and aspirations of a wide range of students.

The limitations of the current study should not be ignored. The small sample size of the participants and the somewhat unplanned nature of online education are the main shortcomings, which make generalization of the findings to other contexts rather tricky. Notwithstanding these limitations, this study extends current knowledge of achievement emotions in different educational environments. The findings can be helpful for students, teachers, educational practitioners, and policymakers. Future studies can explore achievement emotions in face-to-face, online, and blended education. Also, the relationship between these emotions and individual factors such as age, marital status, and socioeconomic status of the students can be investigated.

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