Achievement Emotions in Online vs. In-Person Lectures:
The Case of Egyptian Undergraduates During the COVID-19 Pandemic

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ABSTRACT

This study compared the achievement emotions of Egyptian undergraduates in online versus in-person classes. A sample of 147 students completed an adapted version of the achievement emotions questionnaire concerning class-related matters. Additionally, 50 students completed written interviews regarding their emotional reactions. The results showed that students experienced higher levels of positive emotions and lower levels of negative emotions in in-person classes as compared to online classes. In terms of in-person classes, students appreciated having direct contact with teachers and other students and enjoyed better understanding of the lectures. However, they did not feel comfortable about asking/answering questions or taking sudden tests/quizzes. In terms of online classes, students appreciated feeling comfortable at home, saving time/effort as they did not commute to the university, and having more accessible learning resources. However, they faced several technical problems and did not manage well with the lack of direct interaction with teachers and other students.

KEYWORDS

INTRODUCTION

Achievement emotions, such as enjoyment, pride, hopefulness, boredom, anxiety, and shame, are the academic emotions directly linked to learning activities or learning outcomes, which means that achievement emotions relate to not only the process of learning but also to the outcomes of learning (Pekrun, Goetz, Franzel, Barchfeld & Perry, 2011). According to Pekrun (2006), achievement emotions influence learning and achievement in academic settings. From a cognitive perspective, achievement emotions influence several processes that are crucial to learning,

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including storage, processing, and retrieval of information, memory, attention perception and use of learning strategies (Pekrun, 2011; Phelps, 2006). In terms of motivation, achievement emotions influence students' intrinsic and extrinsic learning motivation (Pekrun, 1992), which impacts students' learning and achievement (Hascher, 2010). Due to the significance of achievement emotions, several researchers have attempted to examine their influence in various educational settings around the world, whether in traditional classes (e.g., Hansen & Mendzheritskaya, 2017; Kim & Hodges, 2012; Reilly & Rosas, 2019) or, to a much lesser extent, in computer-based/ online classes (e.g., Jarell, Harley, Lajoie, 2016; Jarrell, Harley, Lajoie & Naismith, 2017; Liu, Xing, Zeng & Wu, 2021). Only recently have few attempts been made to compare students' achievement emotions in traditional versus online classes to provide a better understanding of the influence of the two forms of teaching/learning on students.

Therefore, the rationale of the present study is twofold: (1) to contribute to filling this gap in the literature through comparing the achievement emotions of Egyptian undergraduate students in in-person classes (traditional classes) versus online classes during the COVID-19 pandemic with reference to class-related emotions, and (2) to learn more about how online learning, in comparison to in-person learning, affects students' emotions and well-being at a time when online learning has mushroomed in the post-COVID-19 era. It is worth noting that this study was conducted in Egypt which is at the heart of the Arab World. This adds to the significance of the present study since the Arab World is relatively underrepresented in achievement emotions research.

To situate our study in the relevant context, the next section will provide a brief overview of the control-value theory of achievement emotions. This will be followed by a survey of earlier studies on the achievement emotions among university students.

THEORETICAL FRAMEWORK

The control-value theory of achievement emotions provides an integrative framework for analyzing antecedents and effects of achievement emotions in learning (Pekrun, 2006). According to this theory, achievement emotions rely on two important antecedents: (1) the subjective control over learning, and (2) the subjective value for learning. Subjective control refers to the perceived controllability of achievement-related actions and outcomes while subjective value refers to the subjective importance attached to these achievement activities and outcomes (Pekrun & Stephens, 2010).

The control-value theory classifies achievement emotions based on two dimensions: valence and activation. The dimension of valence distinguishes between positive and negative emotions whereas the dimension of activation differentiates between activating and deactivating emotions (Pekrun et al., 2011). Positive activating emotions include enjoyment, hope, and pride and are thought to support interest, intrinsic motivation, and deep learning (Pekrun, Lichtenfeld, Marsh, Murayama & Goetz, 2017). Negative deactivating emotions, including boredom, are thought to undermine motivation and information processing (Pekrun, Lichtenfeld, Marsh, Murayama & Goetz, 2017). Positive deactivating emotions, such as relaxation and relief, trigger positive attitudes towards learning, but do not involve much effort and time. Negative activating emotions, including shame and anxiety, may cause negative attitudes towards learning, but focus on investing effort and time (Xing, Tang, & Pei, 2019).

Based on this theory, the achievement emotions questionnaire (AEQ) (Pekrun, Goetz & Perry, 2005; Pekrun, Goetz, Franzel, Barchfeld & Perry, 2011) was devised with the aim of assessing the achievement emotions of college students. The current study made use of the AEQ to compare university students' emotions in on-line versus in-person lectures. The results will inform the learning process particularly with the increasing reliance on online learning in the post-COVID-19 era. Further details about the AEQ will be explained under the methodology section below.

LITERATURE REVIEW

Several studies have been conducted on students' achievement emotions at schools (e.g., Balaž, Marković & Braijša-Žganec, 2021; Lam, Chen, Zhang & Liang, 2015; Meyer & Schlesier, 2021; Peixoto Sanches Mata & Monteiro, 2017; Raccanello & Hall, 2020). However, our focus in this section will be on the studies that have examined achievement emotions among university students due to their relevance to our study context. Some studies on achievement emotions aimed to examine the types of emotions university students experience. For example, Kassab, Hassan, Abdel Raoof, Elaraby, Fawzy and Radwan (2018) investigated the achievement emotions of Egyptian medical students during problem-based learning (PBL) tutorial sessions. A total of 287 first- and second-year students completed the Achievement Emotion Questionnaire (AEQ). The results showed that pride, hope, and enjoyment were the most perceived emotions among students during PBL tutorials. The results also showed statistically significant differences between the first- and second-year students regarding several emotions. For instance, first-year students experienced higher levels of pride, enjoyment, and anxiety.

Another sample study was conducted by Reilly and Rosas (2019) who examined university students' reports of achievement emotions during their English as a Foreign Language (EFL) classes in Mexico. A total of 412 undergraduate students voluntarily completed an online Spanish version of the AEQ. The results indicated that the emotions reported at the highest levels were enjoyment, hope, and pride. As for the negative emotions, the emotions of anger, shame and boredom were rated as highly as anxiety. Interestingly, no gender differences were found in the target emotions. However, it was noted that low-achievers and students in higher semesters experience more negative emotions than higher-achievers and students in the first year, respectively.

While some studies examined the students' emotions, other studies attempted to explore the factors that influence these emotions. For example, Hansen and Mendzheritskaya (2017) investigated whether the cultural-educational contexts in Russia, Germany, and the USA affect university students' emotions after receiving negative achievement feedback from their lecturers. Significant differences across culturally different contexts were noted. For instance, the German and American participants reported stronger emotions in response to the negative feedback as compared to the Russian participants. Additionally, the results lent support to a culturally universal effect of emotion transmission since the participants believed that lecturers' emotions (e.g., anger) get transmitted to their students. Another sample study was conducted by Jacob et al. (2019) who tested the influence of a student-oriented versus a teacher-centered approach on students' achievement emotions. The results showed a generally higher level of students' positive achievement emotions. However, the teaching approach did not lead to significant differences in the emotions students experienced.

Examining the factors influencing students' achievement emotions was not confined to the traditional classroom. Other studies also attempted to examine the emotions students experienced in computer-based and online classrooms. For example, Kim and Hodges (2012) investigated the effect of an emotion control treatment that they designed and developed on American college students' achievement emotions in an online remedial mathematics course. The treatment group, who watched the emotion control videos, showed more positive emotions of enjoyment and pride than the control group. The study thus provided recommendations about the design and development of intervention of a system regarding students' emotion control. Another relevant study is Daniels and Gierl's (2017) which examined the impact of immediate test score reporting on university students' achievement emotions in the context of computer-based multiple-choice exams. A quasi-experimental pretest-posttest design showed that the notion of exam scores presented immediately after the treatment has significant positive effects on relief, pride, and hope and negative effects on anxiety and shame. However, no impact of examination score was noted for the emotion of anger.

Another research direction in the study of achievement emotions aimed to examine the relationship between these emotions and other variables, such as academic achievement and learning.

For example, Postareff, Mattson, Lindblom-Yläne, and Hailikari (2017) examined the relationship between emotions, approaches to learning, study success and study progress during the first year at university in Finland. Three emotion clusters were identified: (1) quickly progressing successful students experiencing positive emotions, (2) quickly progressing successful students expressing negative emotions, and (3) slowly progressing students experiencing negative emotions. The results highlighted the need to promote students' positive emotions and well-being while supporting their successful learning. Similarly, Allaire (2019) examined the relationship between first-year university students' achievement emotions and their motivation and success in the US higher education system. The findings revealed increases in feelings of hope, hopelessness, and boredom as well as decreases in enjoyment throughout students' first-year experience. Additionally, the students' positive and negative emotions impacted their perceptions of both their classes and instructors and affected their motivation, on-task behaviour, and academic success.

The relationship between achievement emotions and other variables was also examined in computer-based learning environments. For example, Jarrell, Harley, Lajoie, and Naismith (2017) examined the relationship between medical students' outcome emotion profiles and their performance on a diagnostic reasoning task in a computer-based learning environment. The findings classified the participants into three emotion profiles: a positive emotion cluster, a negative emotion cluster, and a low intensity emotion cluster. Interestingly, the positive emotion cluster had the highest performance; those classified in the negative emotion cluster had the lowest performance; and the low intensity cluster had performance outcomes that fell between the other two. In the same vein, Liu, Xing, Zang, and Wu (2021) examined the influence of achievement emotions on student learning in Massive Open Online Courses (MOOCs). The results showed that different achievement emotions influenced students' learning differently. Based on these results, it was suggested that tracking and monitoring student achievement emotions can help MOOC platforms and instructors provide related emotional feedback to students.

As it should be noted, studies on achievement emotions were conducted in traditional as well as computer-based/online classes. However, the direct comparison between the two learning environments was rarely examined. Two relevant studies were conducted in the Netherlands and in Germany. In a business and economics school in the Netherlands, Tempelaar, Niculescu, Rienties, Gijselaers, and Giesbers (2012) investigated the impact that individual differences in achievement emotions had on students' learning choices, in terms of the intensity of using the online learning mode versus the face-to-face mode. The results showed that achievement emotions had a moderately strong effect on students' preference for online learning. Online, in comparison to face-to-face, learning demanded learners who were particularly self-motivated and self-regulated and exhibited positive achievement emotions. Negative achievement emotions appeared to form significant obstacles for online learning. In an education school at a German university, Stephan, Markus, and Gläser-Zikuda (2019) analyzed students' technology acceptance and achievement emotions after participating in an online course, in comparison to an on-campus course, in teacher education. Students who attended the online course reported a higher level of boredom, anxiety, and anger, but less enjoyment. Online students also reported significantly higher levels of achievement task value and technology control. However, no systematic differences were found between the two learning environments for the achievement emotions of hope, shame, and hopelessness.

The survey of earlier studies clearly shows that achievement emotions play a significant role in students' learning, whether in traditional or online classrooms. The question that has not received enough attention though is: Do students experience different achievement emotions in these two learning environments? Few studies have attempted to address this question, and they mostly relied on comparing two different groups of students who enrolled in a particular course either in an online or an in-person mode. The current study aims to address this gap in the literature through examining the achievement emotions of university students who were

studying in a blended format (i.e., online and in-person simultaneously). We aim to explore how the students' emotions differ in the two learning environments and what factors contribute to these differences, if any.

Research Questions

The current study addresses these two research questions:

1. Are there differences in students' emotions during online versus in-person classes?
2. What factors influence students' emotions in online and in-person classes?

METHODOLOGY

Participants

A total of 147 Egyptian undergraduate students took part in the study. The participants, who ranged in age from 18 to 22 (*M*= 19.36; *SD*= .98), were students at the first and second years of the College of Pharmacy at a private Egyptian university. All the courses in this college were taught using English as a medium of instruction, which explains why we did not have to translate the study surveys from English into Arabic. At the time of data collection (Weeks 10-12 of the academic semester), all courses were delivered in a blended teaching mode. That is, students were having both online and in-person lectures for their courses as a precautionary measure for the COVID-19 pandemic. The students participated in the study voluntarily and submitted the consent forms before completing the study survey/written interview.

Instruments

Two instruments were used for the current study: (1) the Achievement Emotions Questionnaire (AEQ), and (2) a written interview. These instruments were selected for data collection for two reasons. First, the AEQ has already been validated and is widely used in the literature (e.g., Kassab et al., 2018; Reilly & Rosas, 2019). This adds to the validity of our results and facilitated cross-study comparisons. Second, we opted to complement the AEQ results with written interviews to get a more in-depth understanding of the participants' perspectives and allow them to share their experience. It should be noted that a written format of the interviews was preferred to allow for data collection at a larger scale (50 participants in the current study).

THE ACHIEVEMENT EMOTIONS QUESTIONNAIRE

The AEQ (Pekrun, Goetz & Perry, 2005; Perry, Goetz, Franzel, Barchfeld & Perry, 2011), based on the control-value theory of emotion (Pekrun, 2006), is a theoretically-grounded, multidimensional self-report instrument designed to assess college students' emotions experienced in academic achievement situations. The AEQ measures a number of discrete emotions in relation to three main categories of academic achievement situations, namely, attending class, studying, and taking tests. All items are assessed on a 5-point Likert scale, ranging from 1 strongly disagree and 5 strongly agree.

Since our focus in the present study was only on students' class-related emotions, we administered only the AEQ section that includes the class-related emotion scales. These scales included 80 items divided into before, during, and after class, and measured the following eight emotions: class-related enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and boredom. To compare students' emotions in online versus in-person lectures, our survey repeated each AEQ item twice, once to ask about students' emotions in online classes and another time to enquire about their emotions in in-person classes.

Example:

I am looking forward to learning a lot in in-person classes.
I am looking forward to learning a lot in online classes.

To obviate any potential effect for the order of items, we prepared two versions of the AEQ that were counterbalanced. That is, half the participants read the "in-person" items first while the other half read the "online" items first.

Two main criteria led to our selection of the AEQ in this study. First, the AEQ allows students to self-report on a substantial range of both emotions and academic situations. The survey considers students' emotion reactions to different situations while catering to the fact that the students can experience different emotions in different situations (Allaire, 2019). Second, the AEQ has been rigorously used and validated multi-nationally and has proven effective while measuring emotions in single courses, specific situations, or specific points in time (Frenzel, Thrash, Pekrun, & Goetz, 2007; Peixoto, Mata, Monteiro, Sanches, & Pekrun, 2015; Pekrun, Elliot, & Maier, 2009; Raker, Gibbons, & Cruz-Ramırez de Arellano, 2019).

WRITTEN INTERVIEW

The second instrument in the present study was a written interview which was designed to help us better understand the students' responses to the AEQ and make us learn more about the factors that influenced students' emotion reactions. The written interview asked students what triggered the eight target emotions in the AEQ, whether in online or in in-person lectures.

Example:

What do you enjoy in in-person classes?
What do you enjoy in online classes?

Again, the interviews, which consisted of 16 questions about the 8 target emotions, were counterbalanced. Students saw items in different orders, whether in terms of online versus in-person lectures or in terms of which emotion appeared first.

Regarding the coding of the students' responses, two of the researchers read the students' responses to the written interviews independently and inserted them into an excel sheet. The responses to each question were inserted into a separate tab and classified into categories as listed in the students' responses (e.g., feeling comfortable at home, having direct interaction with the lecturer, being with friends, facing technical/internet problems, etc.). The classification of the two researchers was then compared and showed an agreement over 95%. Hence, the classification of one of the researchers is reported here.

PROCEDURE

The AEQ was shared with the target participants through a google form during weeks 10 and 11 of the academic semester which consists of 15 study weeks. A total of 147 participants completed the survey at their convenient times. One week later, specifically during week 12 of the semester, 50 students from the original pool of participants volunteered to complete the written interviews which were also shared through Google forms. Before responding to the questionnaire, the participants were asked to read and sign a consent form to participate.

Results

To provide answers to the research questions, multiple analyses, such as Chronbach's alpha reliability, descriptive statistics, paired samples t-tests, and qualitative examination were conducted on the data.

First, the reliability of the class-related emotions questionnaire was examined. Results are summarized in Table 1. Reliability indices of the entire questionnaire and sub-emotion scales were all excellent, above .90 (Taber, 2018).

RQ1: Are there differences in students' emotions through online versus in-person classes?

To answer the first research question, descriptive statistics and paired samples t-test analyses were performed. The class-related emotion questionnaire encompasses eight emotion categories. Data for each category were examined to find out how the students express emotions toward online and in-person classes and whether there is a difference between the two modes of teaching.

Class-Related Enjoyment

Table 2 displays the descriptive statistics of the class-related enjoyment emotions. The results show that the students appear to enjoy more the classes that are delivered in-person than those conducted online. To examine whether there is a difference in their level of enjoyment in both online and in-person classes, a paired samples t-test was conducted. The results of the t-test indicated that the students significantly enjoy in person classes over online delivered classes, showing a small effect size ($t(146) = 4.53, p < .001, d = .37$).

Class-Related Hope

Similar to the class-related enjoyment, results in Table 3 indicate a higher-level hope in favor of in-person delivered classes. The t-test results showed that the difference in the class-related hope between the two class modes is statistically significant, with a small effect size, in favor of in-person class-related hope ($t(146) = 3.09, p < 001, d = .26$).

Class-Related Pride

Results in Table 4 indicate that the students appear to have more class-related pride in the in-person classes than online classes. The difference in their class-related pride, as computed with a t-test, was statistically significant ($t(146) = 2.59, p < .01, d = .21$).

Class-Related Anger

Different from the above three class-related emotions, the results displayed in Table 5 signify that the students seem to express greater class-related anger in online delivered classes than in-person classes. The t-test scores confirm that the difference is statistically significant ($t(146) = 2.20, p < .01, d = .18$).

Table 1. Cronbach's alpha reliability indices

Emotion	Number of items	Alpha score
Class-related enjoyment	10	.91
Class-related hope	8	.93
Class-related pride	9	.94
Class-related anger	9	.92
Class-related anxiety	12	.92
Class-related shame	11	.94
Class-related hopelessness	10	.93
Class-related boredom	11	.96
All emotions scale	80	.93

Table 2. Descriptive statistics of class-related enjoyment in online class vs. in person class

Item no.	Statement	Condition	In person-class		Online-class	
			M	**SD**	**M**	**SD**
1	I get excited about going to class.	B	3.32	1.36	2.36	1.36
5	I am looking forward to learning a lot in this class.	B	3.41	1.33	2.59	1.36
11	I am motivated to go to this class because it's exciting.	B	3.30	1.35	2.67	1.38
24	I enjoy being in class.	D	3.48	1.40	2.54	1.47
32	My enjoyment of this class makes me want to participate.	D	3.34	1.38	2.82	1.30
41	It's so exciting that I could sit in class for hours listening to the professor.	D	3.10	1.54	2.65	1.28
49	I enjoy participating so much that I get energized.	D	3.15	1.44	2.83	1.28
67	After class I start looking forward to the next class.	A	3.26	1.37	2.86	1.33
71	I am happy that I understood the material.	A	3.51	1.34	3.01	1.25
76	I am glad that it paid off to go to class.	A	3.36	1.31	3.01	1.28
In person class-related enjoyment scale ($M = 3.32$; $SD = 1.03$) Online class-related enjoyment scale ($M = 2.73$; $SD = 1.02$)						

Note. B = Before class; D = During class; A = After class.

Table 3. Descriptive statistics of class-related hope in online class vs. in person class

Item no.	Statement	Condition	In person-class		Online-class	
			M	**SD**	**M**	**SD**
7	I am confident when I go to class.	B	3.36	1.36	3.04	1.39
9	I am full of hope.	B	3.35	1.33	2.76	1.41
20	I am optimistic that I will be able to keep up with the material.	B	3.23	1.31	2.96	1.35
23	I am hopeful that I will make good contributions in class.	B	3.41	1.34	2.90	1.37
37	I am confident because I understand the material.	D	3.37	1.23	3.01	1.30
4	Being confident that I will understand the material motivates me.	B	3.58	1.29	2.98	1.34
13	My confidence motivates me to prepare for class.	B	3.14	1.31	2.91	1.44
16	My hopes that I will be successful motivate me to invest a lot of effort.	B	3.45	1.26	3.12	1.28
In person class-related hope scale ($M = 3.36$; $SD = 1.03$) Online class-related hope scale ($M = 2.96$; $SD = 1.10$)						

Class-Related Anxiety

Results provided in Table 6 show that the level of class-related anxiety is higher in the online classes than the in-person classes. Paired samples t-test scores showed that the difference between the students' anxiety in the in-person class and online class is statistically significant ($t(146) = 1.95$, $p < .05$, $d = .16$), confirming that the students feel more anxious in the online delivered classes.

Table 4. Descriptive statistics of class-related pride in online class vs. in-person class

Item no.	Statement	Condition	In person-class		Online-class	
			M	SD	M	SD
70	I am proud of myself.	A	3.27	1.26	2.93	1.36
30	I take pride in being able to keep up with the material.	D	3.31	1.20	2.89	1.25
40	I am proud that I do better than the others in this course.	D	3.31	1.22	2.88	1.34
74	I think that I can be proud of what I know about this subject.	A	3.44	1.31	3.22	1.31
53	I am proud of the contributions I have made in class.	A	3.30	1.25	3.16	1.29
46	When I make good contributions in class, I get even more motivated.	D	3.37	1.22	3.16	1.20
77	Because I take pride in my accomplishments in this course, I am motivated to continue.	A	3.35	1.28	2.89	1.30
80	I would like to tell my friends about how well I did in this course.	A	3.12	1.33	2.89	1.34
60	When I do well in class, my heart throbs with pride.	D	3.33	1.15	3.26	1.19
In person class-related pride scale ($M = 3.33$; $SD = .96$) Online class-related pride scale ($M = 3.03$; $SD = .94$)						

Table 5. Descriptive statistics of class-related anger in online class vs. in-person class

Item no.	Statement	Condition	In person-class		Online-class	
			M	SD	M	SD
28	I feel frustrated in class.	D	2.88	1.34	3.13	1.30
73	I am angry.	A	2.88	1.42	3.12	1.38
44	Thinking about the poor quality of the course makes me angry.	D	2.90	1.30	3.23	1.29
59	Thinking about all the useless things I have to learn makes me irritated.	D	3.05	1.31	3.17	1.33
78	When I think of the time I waste in class I get aggravated.	A	3.01	1.42	3.18	1.42
8	I wish I didn't have to attend class because it makes me angry.	B	2.59	1.22	3.16	1.32
69	I wish I could tell the teachers off.	A	2.94	1.26	3.28	1.31
39	I feel anger welling up in me.	D	2.87	1.34	3.07	1.37
54	Because I'm angry I get restless in class.	D	2.89	1.32	3.18	1.03
In person class-related anger scale ($M = 2.89$; $SD = 1.32$) Online class-related anger scale ($M = 3.17$; $SD = 1.03$)						

Class-Related Shame

Descriptive statistics reported in Table 7 indicate that there is no notable difference in the students' class-related shame in both class modes. Although less class-related shame was observed in in-person class mode than online class, the results from the t-test analysis confirm that the difference was not statistically significant ($t(146) = .70$, $p = .24$, $d = .06$).

Table 6. Descriptive statistics of class-related anxiety in online class vs. in person class

Item no.	Statement	Condition	In person-class		Online-class	
			M	SD	M	SD
17	Thinking about class makes me feel uneasy.	B	2.77	1.37	3.24	1.37
21	I feel scared.	B	2.68	1.35	3.03	1.44
50	I feel nervous in class.	D	2.95	1.32	3.15	1.38
3	Even before class, I worry whether I will be able to understand the material.	B	3.01	1.43	3.10	1.36
12	I worry whether I'm sufficiently prepared for the lesson.	B	3.01	1.28	3.10	1.42
15	I worry whether the demands might be too great.	B	3.00	1.24	3.28	1.33
25	I worry the others will understand more than me.	D	2.76	1.36	3.14	1.39
6	Because I'm so nervous I would rather skip the class.	B	2.59	1.44	2.76	1.41
56	I get scared that I might say something wrong, so I'd rather not say anything.	D	3.14	1.29	3.13	1.37
19	When I think about class, I get queasy.	B	2.86	1.40	3.16	1.40
35	I get tense in class.	D	2.81	1.25	3.31	1.33
65	When I don't understand something important in class, my heart races.	D	3.05	1.28	3.01	1.27

In person class-related anxiety scale ($M = 2.89$; $SD = .92$)
Online class-related anxiety scale ($M = 3.12$; $SD = .95$)

Table 7. Descriptive statistics of class-related shame in online class vs. in person class

Item no.	Statement	Condition	In person-class		Online-class	
			M	SD	M	SD
43	I get embarrassed.	D	2.93	1.24	3.01	1.28
58	I am ashamed.	D	2.86	1.29	2.86	1.30
64	If the others knew that I don't understand the material I would be embarrassed.	D	3.04	1.27	3.01	1.24
34	When I say anything in class I feel like I am making a fool of myself.	D	2.95	1.38	3.10	1.41
47	I'm embarrassed that I can't express myself well.	D	2.74	1.26	3.23	1.30
68	I am ashamed because others understood more of the lecture than I did.	A	2.99	1.35	2.95	1.31
38	After I have said something in class I wish I could crawl into a hole and hide.	D	2.88	1.35	2.97	1.41
72	I'd rather not tell anyone when I don't understand something in class.	A	3.14	1.37	3.12	1.39
27	When I say something in class I feel like I turn red.	D	3.05	1.34	3.14	1.31
52	Because I get embarrassed, I become tense and inhibited.	D	3.05	1.33	3.08	1.34
62	When I talk in class I start stuttering.	D	2.92	1.28	3.01	1.31

In person class-related shame scale ($M = 2.96$; $SD = 1.00$)
Online class-related shame scale ($M = 3.04$; $SD = 1.01$)

Class-Related Hopelessness

Results from Table 8 show less class-related hopelessness in favor of in-person classes. T-test results display that the difference between the students' hopelessness in online classes and in person classes was statistically significant ($t(146) = 3.58$, $p < .001$, $d = .30$), suggesting that the students appear to experience a higher level of hopelessness during online classes.

Class-Related Boredom

Results reported in Table 9 indicate that the level of boredom is greater in the online delivered classes than the in-person classes. The result of the t-test scores confirms that the difference is statistically significant ($t(146) = 3.07$, $p < 01$, $d = .25$).

To summarize, the results of the first research question generally suggest that the students show a positive attitude towards the in-person conducted classes. Factors that might influence their class-related emotions are further examined under the second research question. Further elaboration on the results is later reported in the discussion section.

RQ2: What factors influence students' emotions in online and in-person classes?

In in-person lecturers, students explained their positive emotion reactions mainly by referring to their direct interaction with their teachers and friends and their feeling that they could understand the content better. As for their negative emotions, they did not like that some teachers delivered longer lectures than scheduled. The students also seemed to have concerns about questions during classes. Some felt embarrassed asking questions while others were worried about having to answer too many questions or take sudden tests/quizzes. Few students expressed their negative reactions to being dismissed from class and the lack of engaging activities. Notably, several students wrote "none"

Table 8. Descriptive statistics of class-related hopelessness in online class vs. in person class

Item no.	Statement	Condition	In person-class		Online-class	
			M	SD	M	SD
14	The thought of this class makes me feel hopeless.	B	2.63	1.42	3.34	1.37
48	I feel hopeless.	D	2.83	1.39	3.27	1.34
10	Even before class, I am resigned to the fact that I won't understand the material.	B	2.63	1.38	3.16	1.31
55	I have lost all hope in understanding this class.	D	2.73	1.36	3.05	1.33
79	I feel hopeless continuing in this program of studies.	A	3.01	1.35	3.20	1.35
18	Because I've given up, I don't have energy to go to class.	B	2.80	1.42	3.33	1.35
22	I'd rather not go to class since there is no hope of understanding the material anyway.	B	2.54	1.36	3.11	1.41
2	It's pointless to prepare for class since I don't understand the material anyway.	B	2.61	1.46	3.10	1.42
31	Because I don't understand the material I look disconnected and resigned.	D	2.81	1.32	3.19	1.24
75	I feel so hopeless all my energy is depleted.	A	2.93	1.34	3.29	1.39
In person class-related hopelessness scale ($M = 2.75$; $SD = 1.03$) Online class-related hopelessness scale ($M = 3.20$; $SD = .99$)						

Table 9. Descriptive statistics of class-related hopelessness in online class vs. in person class

Item no.	Statement	Condition	In person-class		Online-class	
			M	**SD**	**M**	**SD**
36	I get bored.	D	2.90	1.38	3.54	1.35
63	I find this class fairly dull.	D	2.90	1.29	3.39	1.24
51	The lecture bores me.	D	3.01	1.33	3.46	1.28
61	Because I get bored my mind begins to wander.	D	3.07	1.24	3.35	1.26
26	I'm tempted to walk out of the lecture because it is so boring.	D	2.79	1.42	3.28	1.40
66	I think about what else I might be doing rather than sitting in this boring class.	D	2.89	1.31	3.44	1.26
29	Because the time drags I frequently look at my watch.	D	3.12	1.32	3.46	1.34
42	I get so bored I have problems staying alert.	D	3.01	1.27	3.42	1.33
33	I get restless because I can't wait for the class to end.	D	3.02	1.34	3.22	1.37
57	During class I feel like I could sink into my chair.	D	3.02	1.26	3.12	1.34
45	I start yawning in class because I'm so bored.	D	3.01	1.28	3.44	1.24
In person class-related boredom scale ($M = 2.98$; $SD = 1.02$) Online class-related boredom scale ($M = 3.37$; $SD = 1.03$)						

when asked about what triggered negative emotions in in-person classes. A summary of the students' responses regarding in-person classes is presented in Table 10.

In online lectures, several students wrote "none" in response to what triggered their positive emotions. As for the students who shared reasons for their positive emotions, they mainly referred to feeling comfortable while staying at home and saving time/effort not commuting. Some students also seemed to like having more accessible teaching resources (e.g., recorded lectures and additional materials uploaded to the learning management system) and feeling less embarrassed when asking questions. In contrast, more students shared reasons for their negative emotions in online classes. Two main reasons were having technical/internet problems and missing the direct interaction with teachers/friends. Fewer students commented on teachers providing less input, taking too long to explain the same concept, not using interactive teaching materials and asking too many questions. Table 11 summarized the students' responses to the written interview regarding online classes.

DISCUSSION

It is widely acknowledged that achievement emotions relate not only to the process of learning but also to the outcomes of learning (Pekrun, Goetz, Franzel, Barchfeld & Perry, 2011). In fact, several studies have shown that students' achievement emotions influence their academic achievement and learning (e.g., Allaire, 2019; Jarrell, Harley, Lajoie & Naismith, 2017). Due to this significance of achievement emotions, the current study aimed to compare the Egyptian undergraduate students' emotions in online versus in in-person classes during the blended learning mode imposed by the precautionary measures of the COVID-19 pandemic. The results of the AEQ, which was completed by 147 students, revealed that students experienced much higher levels of positive emotions and lower levels of negative emotions in in-person classes. That is, the students experienced more enjoyment, pride, and hopefulness in in-person classes and stronger feelings of anger, boredom, hopelessness, and anxiety in online classes. The only emotion that did not show a statistical difference was the

Table 10. Factors influencing students' emotions in in-person classes

Emotion	Factors (number*)
Enjoyment	Being with friends (26) Having direct contact with the lecturer (20) Having better concentration (6)
Hope	Having direct contact with the lecturer (28) Being with friends (17) Having better understanding (14)
Pride	Answering questions correctly (14) Having better understanding (11) Having direct contact with the lecturer (10) Being with friends (8)
Anger	Lectures taking longer than scheduled (11) None (9) Feeling embarrassed when asking questions (5) Students' side talks (5)
Anxiety	Having to take sudden tests/quizzes (8) None (6) Having to answer too many questions (5)
Shame	Not being able to answer some questions (13) None (12) Feeling embarrassed when asking questions (10) Being dismissed from class (6)
Hopelessness	None (12) Not being able to understand (7) Lectures taking longer than scheduled (7)
Boredom	Lectures taking longer than scheduled (22) None (6) Lack of engaging activities (5)

*The numbers indicate the number of students who commented on the factor in the written interview. The tables report the factors shared by at least 5 students (10% or above of the 50 participants).

feeling of shame, which was experienced almost equally in the two learning modes and was mainly associated with not being able to answer questions.

The results of the AEQ are in line with the findings of Stephan, Markus, and Gläser-Zikuda (2019) who found that the education students at a German university who attended an online course reported a higher level of boredom, anxiety, and anger, but less enjoyment, than the ones who attended the course in an in-person mode. The results also align with the emphasis of Templaar, Niculescu, Rienties, Gijselaers and Giesbers (2012) that online learning places high demands on learners, especially in terms of being positive, self-motivated, and self-regulated. Since these demands may not be common among the participants in the present study, particularly at a time of crisis, it is understandable that the students could have experienced several difficulties with online learning. It must also be noted that the results in the current study partially match the findings of Kassab, Hassan, Abdel Raoof, Elaraby, Fawzy and Radwan (2018) who examined the achievement emotions of medical students in Egypt. Similar to the results from the current study, the students experienced high levels of pride, hope, and enjoyment in the practical classes in relation to their specialization. Likewise, the participants in the current study are students of Pharmacy and could have shown special preference for in-person classes due the specific practical nature of their courses. Further research is, therefore recommended with students who have more classes that are theoretical in nature than practical.

Table 11. Factors influencing students' emotions in online classes

Emotion	Factors (number*)
Enjoyment	None (12) Feeling comfortable at home (9) Saving time/effort – not commuting (8) Having accessible teaching resources (7) Not feeling embarrassed while asking questions (5)
Hope	Saving time/effort – not commuting (16) None (11) Having accessible teaching resources (5)
Pride	Answering questions correctly (10) None (7) Feeling comfortable at home (5) Saving time/effort – not commuting (5)
Anger	Facing technical/internet problems (12) Lack of direct interaction with lecturer/friends (8) Less input by the lecturers (5)
Anxiety	Facing technical/internet problems (17) Opening cameras/microphones by mistake (11) Having to answer too many random questions (9)
Shame	Opening cameras/microphones by mistake (20) Not being able to answer some questions (7) None (5) Technical/internet problems (5)
Hopelessness	Not being able to understand (12) Lack of direct interaction with lecturer/friends (8) Technical/internet problems (7)
Boredom	Lecturers take longer time to explain the same concept (18) Lack of direct interaction with lecturer/friends (15) Technical/internet problems (9) Lack of interactive teaching materials (6)

*The numbers indicate the number of students who commented on the factor in the written interview. The tables report the factors shared by at least 5 students (10% or above of the 50 participants).

In addition to the AEQ, 50 participants completed follow-up written interviews. The results of the interviews came in line with the quantitative results since the participants again expressed higher levels of positive emotions in in-person classes while their emotion reactions to online classes were more at the negative end of the scale. The area that the students appreciated most in in-person classes, while they missed most in online classes, was having direct interaction with teachers and students. So, it seems that direct interaction and socialization with classmates constitute a major need for students in their tertiary education. This finding aligns with earlier research that highlighted the importance of classroom interaction to support/promote learning (e.g., Duffy, Warren & Walsh, 2001; Englehart, 2009), particularly in contexts where English is used as a medium of instruction (e.g., An, Macaro & Childs, 2021; Lo & Macaro, 2012), as is the case in the present study. Another possible interpretation that should not be neglected is that the students' emotions towards the online classes may have been affected by their lack of choice at the time of the crisis. Had they been allowed to choose their preferred mode of learning, they might not have developed such negative feelings towards online classes.

In addition to the direct interaction with teachers and students, other factors enhanced students' positive emotions. In in-person classes, students expressed that they understood the content better. This could be again related to their direct interaction with teachers. In online classes, the students

appreciated feeling comfortable at home and saving time and effort as they did not have to commute. This is particularly understandable in the study context since Alexandria, the city where the study took place, suffers from congested traffic. One more matter that students commended in online classes is that their teachers made several teaching resources available online (e.g., recorded lectures), particularly through the learning management system (LMS). In fact, good learning management systems have become an integral part of higher education (Dias & Diniz, 2014; Gomez, 2015; Schoonenboom, 2014; Stone & Zheng, 2014; Tumbleson & Burke, 2014) and have proven to support effective learning environments (e.g., Beckford & Mugisa, 2014; Washington, 2019). Hence, it is recommended to make learning resources available for students on the LMS in both modes of learning.

As for students' negative reactions, they were triggered by other variables. In in-person classes, students did not like that some lectures took longer than scheduled, some students were dismissed from class or some teachers did not use enough engaging activities. These items could easily be addressed if teachers are made aware of their impact on students' emotions. Another important trigger of negative reactions was related to questions and tests. Some students faced difficulties handling questions and sudden tests/quizzes. Some students felt embarrassed while asking or answering questions while others were stressed out by sudden tests/quizzes or too many questions in class. Needless to say, using questions is an age-old practice and has been a cornerstone of education for centuries (Christenbury & Kelly, 1983). Teachers' questions stimulate the recall of prior knowledge, promote comprehension, and build critical thinking while student-initiated questions increase higher-order learning by requiring students to analyse information, connect concepts, and articulate their thoughts (Tofade, Elsner & Haines, 2013). Effective questions should support student learning while enhancing their confidence and maintaining a psychologically safe environment (Gose, 2009). Hence, this is an area that requires teacher training since handling questions effectively at the appropriate times is not an innate skill (Lorsch & Ronkowski, 1982).

As for online classes, negative emotions were mainly triggered by lack of readiness for the transition into online classes. First, most students faced several technical/internet problems. It was clear that the internet infrastructure was not prepared for the sudden increased use of the network for education. Additionally, students may not have been prepared to handle recurrent technical problems that may arise during lectures. Second, students expressed concerns about some teaching practices, including not using interactive materials, spending long time explaining certain concepts, and providing less input in online than in in-person classes. Additionally, although university professors were encouraged to use online teaching models (Cheng, 2020), they failed to do so due to the COVID-19 emergency management approach. University professors largely implemented the same teaching approaches and models that are common in traditional in-person classes. This was expectedly ineffective because online classes require different techniques and expertise to meet the students' needs. These are areas that again require special teacher training. The sudden transition to online learning due to the COVID-19 pandemic may not have allowed for sufficient professional development programs to prepare teachers to handle online learning effectively. In fact, moving from face-to-face to an online teaching environment requires the development of unique online pedagogies for online teaching (Kreber & Kanuka, 2006; Natriello, 2005). Hence, there is a real need for professional development programs for online teachers to promote effective online teaching practices and address teachers' new roles in online learning environments (Baran, 2018).

In summary, online learning and teaching will likely become a necessity in our future due to increased demand for education and training in the digital age (Oncu & Cakir, 2011). However, our experience with its implementation during the COVID-19 pandemic may not do it justice. In the present study, undergraduate students experienced much more positive emotions in in-person classes than in online classes. Looking deeper into the contributing factors though revealed that lack of adequate preparedness for the sudden transition may have greatly triggered students' negative emotions. It is necessary to provide a reliable online infrastructure (e.g., internet connection, online learning platform, etc.) and effective professional development programs for teachers to ensure a smooth transition into

online teaching. It may also be necessary to carefully consider when and how to offer online courses. In-person classes seem to have special merits and may, thus, stay in much more demand, at least to ensure students' positive emotions and well-being.

Although the findings from the present study provide clear insights about the undergraduate students' emotions in in-person versus online classes, the findings must be interpreted with some caution for two reasons. First, the study was conducted in a specific situation (i.e., COVID1-19 pandemic) which may have affected the students' emotions. Different findings could have emerged under more normal circumstances. Second, other factors that are beyond the ones examined in the current study may have contributed to the students' affective states. Further research which makes use of multiple instruments could shed light on other contributing factors.

CONCLUSION

The current study compared undergraduate students' achievement emotions in online versus in-person classes at an Egyptian university during the COVID-19 pandemic. The results favoured in-person classes since they generally triggered more positive emotions and fewer negative emotions than online classes. Several contributing factors were identified. Students particularly appreciated having direct interaction with teachers and other students in in-person classes. They also managed to understand the content of the lectures better. As for online classes, the students faced difficulties handling several technical/internet problems. They also had concerns about some of the teachers' practices in online teaching, such as not using sufficient interactive materials or spending long times explaining certain concepts. Although students felt more positive in in-person classes and more negative in online classes, they still experienced some difficulties with in-person classes while they appreciated some practices in online classes. Most importantly, asking and answering questions in in-person classes caused embarrassment to students. As for online classes, students enjoyed the accessibility of several online learning resources, particularly through the LMS.

Based on the results of this study, we can make some pedagogical recommendations and suggest directions for future research. In terms of pedagogical recommendations, it is important to ensure the preparedness of educational institutions to transition to online learning before the transition is made. Preparedness should include having a reliable online infrastructure as well as well-trained online teaching staff. Making the transition without being ready risks students' learning and well-being. Additionally, teacher professional development programs could greatly benefit from students' feedback. The findings of the present study, for example, shed light on the need for further teacher-training on classroom management, use of interactive materials, design of engaging activities and enhancing rapport with students. However, it should be noted that the findings of the study are limited to undergraduate pharmaceutical education in a specific private Egyptian university. Hence, the scope of future research should be expanded. Future studies can extend our work to other educational programs other than Pharmacy, other educational institutions, such as different types of schools, and other learning contexts in different parts of the world. In these attempts, we strongly recommend adopting a mixed methods approach, as is the case in the present study, because the mixture of quantitative and qualitative measures provides a more comprehensive picture of the context under study. It will be intriguing to compare the results of similar studies with those using sentiment analysis, which involves the use of natural language processing and computational measures for the study of affective states, to gain a comprehensive understanding of the emotional impact of in-person versus online classes on undergraduate students.

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