

Achievement Emotions and Academic Performance: On the Computer-based Learning Environments

Siyuan Wang^{1,a,†}, Haolin Xie^{2,b,*†}

¹*Psychological research and counselling centre, Southwest Jiaotong University, Chengdu, 610031, China*

²*School of Humanities and Social Sciences, Xi'an Jiaotong-Liverpool University, Suzhou, 215123, China*

a. 1065022707@qq.com, b. haolin.Xie21@Student.xjtlu.edu.cn.com

**corresponding author*

†These authors contributed equally.

Abstracts: The purpose of this study is to investigate the association between academic success and achievement feelings in a computer-based environment. The majority of studies have demonstrated how feelings of success affect academic performance. According to some academics, pleasant emotions result in positive outcomes whereas negative emotions produce negative effects. On the other hand, some academics think the two are unconnected or have the opposite effect. Researchers are beginning to focus more on the emotions that students experience in computer-based learning environments (CBLEs) when they succeed. Additionally, CBLEs have a big impact on a lot of emotions. For example, they can influence pupils' moods with specific designs. This research attempts to offer an overview of the several articles that have already looked into the subjects of the earlier studies mentioned above. This article also acknowledges a possible loophole that has not been addressed by other studies and suggests that arousal level is also important as the emotional arousal in determining the influence on students' grades.

Keywords: CBLEs, Achievement emotions, Academic Performances

1. Introduction

The usage of computer-based learning environments (CBLEs) in the classroom is continually growing, and they have been shown to be effective in assisting students in learning difficult material. [1] Meantime, emotions are increasingly being measured in computer-based learning systems. A growing corpus of research demonstrates that how students experienced achievement emotions in computer-based learning environments matters in influencing their academic performance and learning outcomes. (teachers can help students manage their emotions) Although there are more and more methods for measuring emotions both inside and between modalities, they are all at varying stages of development.[2]

Negative emotions can prevent information retrieval and lead attention to be diverted to thoughts irrelevant to the job at hand, whilst positive emotions can aid in knowledge retrieval and preserve cognitive resources.[3] Emotions therefore significantly affect academic performance. People who experience strong sentiments of happiness are more inclined to exert more mental effort (or perhaps

should be said as "psychological resources"), which may lead to a longer-lasting positive feeling of wellbeing and future good outcomes. [4] In a longitudinal study involving university students, Ouweeneel et al. also found that positive emotions predicted effectiveness, hope, and optimism, which in turn predicted the elements of academic engagement. Students can enhance and elevate their academic outcomes by experiencing positive emotions (such as delight and hope) and gaining these emotions through experiences and personal sensations.[5]

Negative feelings have been proven in several research to affect academic performance. It has a strong scientific base according to several investigations. As an illustration, negative feelings, for instance, rage, anxiety, guilt, boredom, and hopelessness) adversely predicted both success and these emotions. [6] Furthermore, not all negative emotions have a same impact on academic performance. Test anxiety, a negative feeling, revealed a marginally negative connection with exam GPA that was statistically significant. Only anxiety, out of all the negative emotions addressed, has a discernible predictive relationship with academic achievement; stress and depression have no such relationship. [6] The majority of the current research on the effects of various negative emotions has concentrated on the link between anxiety and academic performance. Additionally, variables like learning burnout also have an impact on the majority of unpleasant feelings.

At the same time, some scholars have raised objections. Some scholars found that positive (negative) emotions are not significantly correlated with academic performance, while others revealed that the relationship between the two is inversely proportional. At present, most of the research focuses on the dimension of the valence of emotions, and there are relatively few parts on emotional arousal. Thus, from an alternate perspective, the link between the two may become clear from the effect of accomplishment feelings' level of arousal on academic performance.

2. Achievement Emotions

2.1. Definition of emotion

Pekrun defined emotions as : emotions are perceived as a complex, harmonized network of psychological components comprising affectional, cognitive, motivational, expressive, and peripheral physiological processes [3]. At the same time, he also proposed a relevant definition of achievement emotions: Emotions related to achievement, such as academic, work, or sports activities, as well as the outcomes of success and failure, are known as achievement emotions [7]. Consequently, subsequent studies have gained an initial foundation into the emotions associated with accomplishment.

2.2. Generation of achievement emotions

In a broader sense, achievement emotions can be understood as fleeting instances within a specific context at a designated moment (such as anxiety experienced prior to an examination). On the other hand, individuals often experience recurring emotions related to achievement activities and results, such as anxiety related to trait tests [8]. The distinguishing characteristic that sets traits apart from emotions related to state achievement is their ability to be applied in a broader context rather than being limited to a particular situation, considering that emotions related to trait achievement can also differ based on the circumstances

(e. g, trait mathematics emotions pertain to the emotional emotions that are commonly experienced in situations involving mathematics [8]. In general, the emotion of achievement is generated by the individual during the achievement activity. For example, the process of learning is also an achievement activity.

2.3. Pekrun's Control-Value Theory

Previous papers have some categorization of what emotions contain. Or maybe this paper also called it "different dimensions" of emotion: Valence, arousal (also known as activation), and approach-avoidance are the dimensions that are commonly assumed. Of course, scientists have also made explanations for these dimensions: In the valence dimension, there is a distinction between states of pleasure (e.g., happy) and states of displeasure (e.g., sad), whereas the arousal dimension distinguishes between states of low arousal (e.g., quiet) and states of high arousal (e.g., surprised). Approach motivation is characterized by a tendency to engage with stimuli (for example, possible help from excitement), while avoidance motivation is defined as a tendency to evade stimuli (for example, possible help from anxiety) [9]. But in general, the two most important dimensions of emotions that people propose more are valence and arousal.

3. Academic performance

The variables affecting pupils' academic grades have long piqued the interest of researchers and educators. Academic achievement is determined by multiple variables, such as parents' educational and socioeconomic position, knowledge pertaining to a particular subject matter of teachers, absenteeism, accessibility and availability of textbooks, libraries, practical labs, lunch availability, and many other factors. For instance, it has been demonstrated that the home environment has a major impact on academic performance. Children from low-income families could experience fewer engaging environments and educational opportunities. The definitions of the phrase "academic achievement" over time have revealed a variety of elements that compose it, notwithstanding the external circumstances that may have an impact on a student's academic achievement [10]. Academic performance, reaching learning objectives, gaining desirable abilities, perseverance, happiness, and post-college performance are all taken into account [10]. There is a variety of literature on the variables that affect academic achievement, such associations between enjoyment and college students' risk-taking conduct and low-risk behaviour in adolescents [11].

Despite the external factors, the internal emotions is also important for the student's performance. For example, when you receive feedback that you succeeded, you might feel happy, proud, and ready to succeed once again the following time; whereas, when you receive feedback that you failed, you might be upset, ashamed, and worried that you might fail once more. Studies using between-person designs have looked into these impacts of feedback. The results demonstrate that, when compared to the feelings of other students, success relative to others is associated with increased positive emotions and decreased negative emotions. The results also indicate that these feelings, in turn, result in improved performance in comparison to other students' performances [3]. Here the exemplification of Exam Anxiety substantiate the Negative emotions explains the negative continuous consequences probably brought by the negative emotions. Exam Anxiety, is a state of mind or mood that students go through while taking an exam. It is brought on by the anxiety of failing the exam or of getting unsatisfactory results for oneself and other people [12]. However, due to the fact that any test or examination may determine a person's fate and have an impact on a specific aspect of his life, such as success in the classroom, admission to a particular job, and others, this emotional state may impair mental functions like paying attention, concentrating, thinking, and remembering, causing him to feel anxious and fail to perform at the required level [13].

4. The Relationship between Emotions and Academic Success

4.1. Valence: Postive Emotions and Negative Emotions

This essay also distinguishes between good and negative emotions when referring to the valence of emotions. Emotions have an impact on learning-related variables like memory, attention, and other outcomes. Previous studies have shown that while good emotions can enhance memory and retain cognitive abilities, negative emotions can impair memory and lead attention to be redirected to other issues. [3] Currently, research on the association between academic performance, accomplishment feelings, and emotional valence mostly examines the relationship between positive and negative emotions. Numerous studies have shown that feelings of happiness and pride have a direct impact on future academic performance, including math year-end performance and test results. This is true even when taking into account factors like students' gender, intelligence, and socioeconomic background. Negative emotions, such as wrath, anxiety, embarrassment, boredom, and hopelessness, exhibited a negative link with achievement, while achievement had a positive correlation with these feelings.[6] Academic performance and the sense of accomplishment are connected. Emotions have an impact on both academic performance (or academic achievement) and academic attainment. Traditional research has claimed that happy emotions are associated with academic success and unhappy emotions are associated with subpar academic performance, however other academics have expressed scepticism.

The aforementioned claims have been refuted by various scholarly findings, and some studies have revealed weak or even negative correlations between the two. Thus, it is unclear if pleasant feelings connected to exercise, like pleasure, have an advantageous effect on student performance. However, it is also unknown whether unpleasant feelings associated with exercise, such as annoyance, rage, and boredom, have an adverse effect.

4.2. Degree of Arousal

For the arousal of emotions, in general, one of the more widely accepted principles of human behavior is that children who are interested in learning something are more likely to behave better than children who are not interested. But according to some scholars, the evidence seems to suggest that high emotional arousal interferes with the efficiency of certain activities and some researchers have explored that the relationship between emotional arousal and performance is very complex and does not seem to follow a straight line. So, in some cases, emotional arousal will bring a clear advantage to performance, while in other cases, the stimulated person will be hindered.

Generally speaking, "neutral mood" is understood literally as an emotional state that is neither distinctly positive nor distinctly negative. But in previous studies, there has rarely been an accurate definition of "neutral mood". Regarding what have said previously, several academics have differing perspectives on the link between achievement emotions and academic performance. For positive emotions and negative emotions, the computer-based environment, the numerical fluctuations of physiological measurements and other results will be relatively large (whether positive fluctuations or negative fluctuations). Therefore, it is more reasonable to define "neutral emotion" as an emotion with a small value on physiological measurements on a computer-based environment. According to the concept which proposed by Deckert, arousal is defined as the degree of excitement or motivational activation. In order to quantify the degree, it possibly could be defined it here as the size of the physiological measurement value.[14] According to the criteria provided above, there is currently limited research on the connection between neutral accomplishment emotions and academic performance, and our current study of the association between academic performance and emotional arousal truly needs to be expanded. Assumption that suspect the impact on academic achievement and even

other events may change based on the degree of emotional arousal is proposed, regardless of whether those feelings are favorable or bad or what valence they have. In other words, the amount of the degree of emotional arousal is what matters, not the valence of the emotions.

5. Importance of Student's Emotions in computer-based learning environments (CBLEs)

The capacity to discern student emotions in computer-based learning environments (CBLEs) is of utmost importance in formulating pedagogical interventions that address students' emotional needs throughout their educational voyage. Brave and Nass highlighted the crucial role of a wide range of emotions in any computer-related scenario.[15] Negative emotions necessitate cognitive or behavioral adaptation, while positive emotions compel students to delve into the digital realm and guide their actions within it. Based on the theory that argues the outcome of achievement is decided by the effects of emotions was proposed by Pekrun et al, certainly that is why detecting student's emotions because is considerably crucial in student's following development of their academic success. [6] CBLEs can be utilized to satisfy students' emotional requirements and improve educational and performance results. The ability of CBLEs to cultivate adaptive emotionality is due to their emphasis on the factors that come before emotional reactions, such as individual evaluations of control and value. CBLEs may be used to create educational activities that are authentic by simulating real-world applications (such as making medical decisions in a medical context) and relevant to their learning (such as diagnostic reasoning) for a specific group of learners (e.g., medical students).[16] Emotions play a vital role in shaping one's identity, well-being, and health, making them essential developmental outcomes. Academic achievement is unquestionably a most important aspect because both academic successes and failures may have an impact on students' academic success and emotional development, suggesting that academics and practitioners should pay attention to the causes of students' emotions.[6]

6. Conclusion

In conclusion, this essay explores the interplay between students' feelings and academic achievement in computer-based learning settings from a variety of angles. In the beginning, this essay gives a thorough explanation of the concepts of arousal and valence and how these two success emotions impact our academic performance. Academic accomplishment was introduced after the explanation of students' feelings was finished. This essay underscore how internal aspects, such as a student's own emotions, are coherently tied to the student's grades and performance in school, which is also why it is crucial to stress the impact on a student's emotion. Then, the detail about how important it is to identify students' emotions in computer-based learning settings since doing so can help forecast students' future growth and help teachers create more individualized and effective teaching strategies for each student was elucidated. At the end of the article, this essay audaciously suggested the supposition that, when the relationship between academic performance and students' emotions, the degree of arousal was explored, rather than the emotional arousal, matters more. Finding the right measurement technique to support the main hypothesis described in the article will be the focus of future research, and using the findings, researchers will work to enhance and support students' academic performance.

References

- [1] Graesser A C, McNamara D S, VanLehn K. *Scaffolding deep comprehension strategies through Point&Query, AutoTutor, and iSTART[J]. Educational psychologist, 2005, 40(4): 225-234.*
- [2] Harley, Jason M., et al. "Comparing virtual and location-based augmented reality mobile learning: emotions and learning outcomes." *Educational Technology Research and Development* 64 (2016): 359-388.

- [3] Pekrun R, Perry R P. *Control-value theory of achievement emotions*[J]. *International handbook of emotions in education*, 2014, 1: 130-151.
- [4] Fredrickson B L. *Positive emotions broaden and build*[M]//*Advances in experimental social psychology*. Academic Press, 2013, 47: 1-53.
- [5] Ouweneel E, Le Blanc P M, Schaufeli W B. *Flourishing students: A longitudinal study on positive emotions, personal resources, and study engagement*[J]. *The journal of positive psychology*, 2011, 6(2): 142-153.
- [6] Pekrun R, Lichtenfeld S, Marsh H W, et al. *Achievement emotions and academic performance: Longitudinal models of reciprocal effects*[J]. *Child development*, 2017, 88(5): 1653-1670.
- [7] Camacho-Morles J, Slemp G R, Pekrun R, et al. *Activity achievement emotions and academic performance: A meta-analysis*[J]. *Educational Psychology Review*, 2021, 33(3): 1051-1095.
- [8] Mauss I B, Robinson M D. *Measures of emotion: A review*[J]. *Cognition and emotion*, 2009, 23(2): 209-237.
- [9] Spielberger C D, Anton W D, Bedell J. *The nature and treatment of test anxiety*[J]. *Emotions and anxiety: New concepts, methods and applications*. Hillsdale, NJ: Lawrence Erlbaum, 1976.
- [10] Kuh G D, Kinzie J L, Buckley J A, et al. *What matters to student success: A review of the literature*[M]. Washington, DC: National Postsecondary Education Cooperative, 2006.
- [11] Flynn D M, MacLeod S. *Determinants of happiness in undergraduate university students*[J]. *College Student Journal*, 2015, 49(3): 452-460.
- [12] Roseman I J. *Rejecting the unworthy: The causes, components, and consequences of contempt*[J]. *The moral psychology of contempt*, 2018: 107-130.
- [13] Al-Zoubi S M, Younes M A B. *Low academic achievement: causes and results*[J]. *Theory and Practice in Language Studies*, 2015, 5(11): 2262.
- [14] Deckert M, Schmoeger M, Auff E, et al. *Subjective emotional arousal: an explorative study on the role of gender, age, intensity, emotion regulation difficulties, depression and anxiety symptoms, and meta-emotion*[J]. *Psychological Research*, 2020, 84: 1857-1876.
- [15] Brave S, Nass C, Hutchinson K. *Computers that care: investigating the effects of orientation of emotion exhibited by an embodied computer agent*[J]. *International journal of human-computer studies*, 2005, 62(2): 161-178.
- [16] Jarrell A, Harley J M, Lajoie S P. *The link between achievement emotions, appraisals, and task performance: Pedagogical considerations for emotions in CBLEs*[J]. *Journal of Computers in Education*, 2016, 3: 289-307.