Assessing the Significance of Emotional Intelligence In E-Learning

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Abstract— **Emotional Intelligence (EI) has been viewed as a critical factor influencing work productivity, leadership, ability to work in diverse environments, business growth, academic performance and a potential to succeed in an extraordinary way. Despite this fact, relatively little research have been done to boldly demonstrate the significance of EI in e-learning settings. This research assesses the significance of EI in e-learning environments by learning lessons from Business-to-Consumer (B2C) digital marketing experiences, where EI is applied. Although there are a number of tools used to measure EI, in this research we have applied the Trait Emotional Intelligence Questionnaire (TEIQue) along with Academic Emotions Questionnaire (AEQ) to assess the significance of EI in online academic settings. The contributions of this study are (1) to assess and then help students be aware of the significance of EI in e-education (2) to recommend students with personalized information for better academic performance.**

Keywords—Digital Emotional Intelligence, e-learning, academic performance

I. INTRODUCTION

Emotional intelligence is the ability to monitor one's own and others feelings and emotions, to discriminate among them and to use this information to guide one's own thinking and action [1].

Today emotional competency and mastery of related digital tools and techniques have been shown to have a greater performance influence in education especially in understanding learner behavior and dynamic changes in student needs. In a broader sense emotional Intelligence encompasses varieties of human qualities including: empathy, decision making, the ability to convey and decipher verbal and nonverbal messages, conflict solving skills, self-awareness in coping with a variety of emotions in real time, the ability to analyze emotional functioning by identifying the emotion involved, defining and expressing it as well as understanding the actions and behaviors that might stem from it, expertise in processing the emotion by applying meta-cognition and a capacity for ethical and moral conduct and behavior. These qualities have indispensable implication both on the traditional teaching-learning setup and on the rapidly growing online education methodology.

As stated in [2], emotions underpin all human actions, even our most rational and logical decisions are influenced by our emotions be it in the digital market or digital education environments. Therefore understanding how students' emotions affect their academic performance while they are utilizing digital technologies for learning purposes is of potentially enormous value to all types and sizes of e-education services. Any kind of e-business cannot survive without a carefully designed digital marketing strategy where emotions are considered. E-learning users are in no way different when it comes to utilization of emotions [3].

In this research, we carefully study how EI is applied in various fields and propose the best of these practices for enhancing e-learning service delivery. As acknowledged by [4], owing to the speed of digital content and digital communications, digital emotional expressions are more contagious than physical emotions. On the other hand, while the global e-learning market is expected to grow continuously, the self-paced e-learning market will decline. This shows the lack of emotional interactivity between learners, learning content and teachers [5]. In this section we summarize the literature on EI as a lesson for empowering e-learning environment for students' success.

A number of researches into the brain, human behavior, educational performance and medicine have identified new findings and evidences proving cognitive intelligence (IQ) is not, in and of itself, sufficient and that in order to lead a more effective, holistic, abundant and ethical life, one needs to develop and apply an additional dimension of knowledge. This dimension of knowledge is the EI also called as emotional quotient (EQ), a dimension of life that enriches the rational one by providing emotion related information.

According the study made in [6], using EQ skills and techniques, an educator and the educational system at large will be better able to achieve their educational objectives with the students as individuals and as a group. In an attempt to investigate the psychometric aspects of students' preparedness for online learning, students' EQ has been examined in [7], as a determinant indicator. In another study conducted in [8], although not directly related to EQ, the researchers used emotion detection technologies from biophysical signals to explore how emotion evolves during learning process and how emotion feedback could be used to improve learning experiences. EQ curriculum for students in higher education has also been developed as in [9], that can be used as a therapy to emotionally challenged students by equipping them with skills to manage these emotions.

The above stated studies have done tremendous work in evaluating the implication of EQ in education in general and in academic performance in particular. However, little work has been done to investigate the significance of EQ in an e-learning settings with the purpose to provide students and teachers with personalized information to empower their emotional competency for better academic performance. Moreover, most of the EQ measurement tools used are based

on the *ability EI* model which refers to the actual abilities to attend to, process, and utilize affect-laden information. It is argued that *ability EI* model cannot be operationalized along typical cognitive ability lines because it is not possible to devise items with objectively correct responses. Also this model is not based on known scientific theory. On the other hand, *'Trait EI'*, utilized in this study, refers to a collection of emotion-related dispositions and self-perceived abilities and is assessed with self-report measures – making it more subjective and aligned to personality theory. Our approach is unique in that (1) it focuses specifically on e-learning environment; (2) we have applied a combination of the *trait EI* model and *Academic Emotions Questionnaire (AEQ)* along with students' activities and performances history obtained from self-reported scores and an e-learning service.

A. Trait Emotional Intelligence Questionnaire (TEIQue)

The TEIQue is an integral part of the academic research program on trait emotional intelligence (trait EI) [10]. Trait EI, alternatively called as trait emotional self-efficacy can be formally defined as a constellation of emotional perceptions assessed through the TEIQue instrument and rating scales. The instrument contains a number of versions including TEIQue (full form), TEIQue-SF (short form) and many other forms and translations. The TEIQue full form is a self-report inventory that covers the sampling domain of trait EI comprehensively. Individuals indicate their level of agreement on a 1-7 Likert scale (1 'disagree completely' to 7 'agree completely') with 153 unique items. The instrument measures 15 emotional traits (facets) concerning four factors (*Well-Being, Self-Control, Emotionality* and *Sociability)* and a *global trait EI* score. The TEIQue-SF is a 30-item questionnaire designed to measure global trait emotional intelligence (trait EI) used in performing short term researches. In this initial research, we have used the TEIQue-SF to get an insight on how EQ matters in the context of academic performance in an e-learning settings. In the future we have the plan to use the full form, which is reported to have better insight of emotional traits.

B. Achievement Emotions Questionnaire (AEQ)

The AEQ is a multidimensional self-report instrument designed to assess college students' achievement emotions. It is based on a program of quantitative and qualitative research that examines students' emotions experienced in academic achievement situations that is, attending class, studying, and writing tests and exams [11]. The class-related and learning-related emotion scales include 80 and 75 items respectively. Both scales measure eight emotions: *enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and boredom*. While the test-related scale include 77 items and measures eight test emotions pertaining to *enjoyment, hope, pride, anger, relief, anxiety, shame, and hopelessness*. In this study, due to time limitation, we have considered only the learning-related emotion scales ordered in three blocks of experiences which are before, during, and after learning experiences.

II. METHOD AND DESIGN

A. Study Design

This study is being done as part of a series of research studies on the implementation of Emotional Intelligence in E-Learning environment. The study has three phases. In the first phase the authors make a quick assessment of the significance of emotional intelligence in e-learning by applying emotional intelligence measurement instrument, TEIQue along with the Achievement Emotions Questionnaire (AEQ), an instrument used to measure achievement emotions. In the second phase, the authors will conduct an extended assessment by applying robust measurement instruments. In the third phase the authors will study on ways to integrate the assessment findings of two phases into the e-learning system, Moodle. Fig. 1 presents all the components and interactions of the overall study.
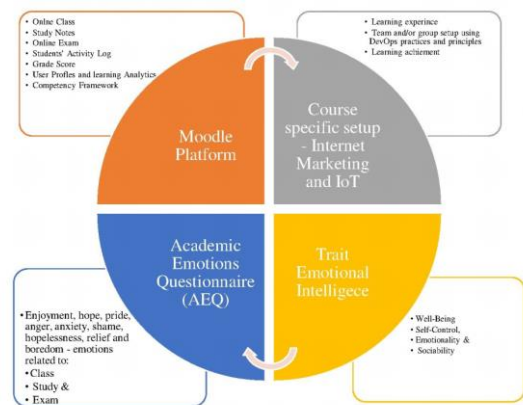

Fig. 1: Study Design - TEIQue, AEQ and Moodle E-Learning

B. Participants

In this initial phase of our study, about 100 students taking the course Internet Marketing using the e-learning platform Moodle were requested to participate in the study with their consent. Two questionnaires, based on the above measurement instruments have been designed using Microsoft Forms and shared with the students for response. The respondents comprised of 61 university students (39 female; Age range 21 to 27, M = 23.1, SD = 1.36) attending the online course Internet Marketing in the Department of E-Business, Faculty of Organizational Sciences, University of Belgrade. The teaching-learning process for the specified course was facilitated using Moodle e-learning platform and BigBlueButton, Open Source Virtual Classroom Software. A 45 minutes lecture was given to students on introductory concepts of Emotional Intelligence. After the lecture, the questionnaires were made available to students on the e-learning platform Moodle along with the lecture material of the session.

C. Instruments

Trait Emotional Intelligence Questionnaire Short Form (TEIQue-SF; Petrides, 2009*).* The TEIQue–SF consists of 30 items designed to measure global trait EI (e.g., "Expressing my emotions with words is not a problem for me."; "I often find it difficult to see things from another person's viewpoint"). This measure has been studied through Item Response Theory and has shown adequate psychometric properties as studied in [12]. The Cronbach's Alpha on our sample was 0.88. The trait emotional intelligence (trait EI) model measured by TEIQue successfully integrates and extends EI-related ideas in a general framework that

incorporates 15 specific facets which are categorized into four factors as presented in Table I. TEIQue-SF is not applicable for the measurement of facet level traits of EI. However, four factors along with Global score of trait EI can be measured using the short version of the instrument namely well-being, self-control, emotionality and sociability. The Global score gives the individual subject a snapshot of the general emotional functioning. It is an index of one's perceived ability to understand, process, and utilize emotion related information in everyday life. According to trait emotional intelligence theory, these perceptions are completely central and vital because they have a creative influence in life, in the specific sense that they create the reality one is experiencing. Changing these perceptions directly contributes to changing the reality. Each factor has corresponding facets which provides an in-depth explanation of the perceived emotional traits of the subjects.

As stated above, it is important to note that the Global score is very broad. It is made up of more focused Factor scores and much more detailed Facet scores. Factors represent a level of measurement that is broader than that of the Facets, but more detailed than that of global Trait Emotional Intelligence. The trade-off between the various levels of measurement Facet, Factor and Global concerns breadth versus depth. At the Facet level, descriptions are detailed and focused, whereas at the global level, descriptions give a broad overview. The Factor level provides a useful level of intermediate measurement and description. For instance individuals who have scored high in the well-being factor of the trait EI perceive themselves as having high self-esteem, happy life and optimists. This means, they are successful, self-confident, cheerful, satisfied with their lives and are likely to look on the bright side of life.

TABLE I.   THE SAMPLING DOMAIN (FACETS) OF TRAIT EMOTIONAL INTELLIGENCE IN ADULTS AND ADOLESCENTS

Trait EI Factors and Facets	High Scorers Perceive Themselves As:
Well-being	
Self-esteem	Successful and self-confident.
Trait happiness	Cheerful and satisfied with their lives.
Trait optimism	Confident and likely to "look on the bright side" of life.
Self-control	
Emotion control	Capable of controlling their emotions.
Stress management	Capable of withstanding pressure and regulating stress.
Impulse control	Reflective and less likely to give into their urges.
Emotionality	
Emotion perception (self and others)	Clear about their own and other people's feelings.
Emotion expression	Capable of communicating their feelings to others.
Relationships	Capable of having fulfilling personal relationships.
Trait empathy	Capable of taking someone else's perspective
Sociability	
Social awareness	Accomplished networkers with excellent social skills.
Emotion management (others)	Capable of influencing other people's feelings.
Assertiveness	Forthright, frank, and willing to stand up for their rights.
Independent facets	
Adaptability	Flexible and willing to adapt to new conditions.
Self-motivation	Driven and unlikely to give up in the face of adversity.

Whereas individuals who scored low in well-being tend to have low self-regard and to be disappointed about their life as it is at present. This factor is positively associated with extraversion, positive mood, job satisfaction, and faith in intuition and negatively associated with somatic complaints, anxiety, and depression.

Achievement Emotions Questionnaire (AEQ; Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011*).* Achievement emotions are defined as emotions that are directly linked to achievement activities or achievement outcomes. In past research, studies on achievement emotions focused on emotions related to achievement outcomes, including both prospective outcome emotions, such as hope and anxiety linked to possible success and failure, respectively, and retrospective outcome emotions like pride and shame linked to prior success and failure, respectively. The AEQ instrument measures eight class and studying related emotions which consists of enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and boredom using relevant scales and measures eight test related emotions which consists of enjoyment, hope, pride, anger, relief, anxiety, shame, and hopelessness. In addition, as with emotions more generally, achievement emotions can be grouped according to their valence and to the degree of activation implied. In terms of valence, positive emotions can be distinguished from negative emotions, such as pleasant enjoyment versus unpleasant anxiety. In terms of activation, physiologically activating emotions can be differentiated from deactivating emotions, such as activating hope versus deactivating hopelessness. The questionnaire consists of 232 items from all settings. However, in this study we applied only 75 items which are scales related to learning or studying settings.

Depending on the situational context and temporal specificity, achievement emotions occur in different academic settings, such as attending class, studying, and taking tests and exams. These settings differ in relation to their functions and social structures. By implication, emotions can vary across these settings as well. For example, enjoyment of classroom instruction may be different from enjoying the challenge of an exam. Therefore, measures of achievement emotions should distinguish between emotions experienced in these different settings.

As posited by the control value theory [13], achievement emotions are induced when the individual feels in control of, or out of control of, activities and outcomes that are subjectively important. The theory proposes that enjoyment of achievement activities is instigated when these activities are experienced as both controllable and valuable. For example, students would feel anxious before an exam if they expect that they could fail and perceive the exam as important. If they are sure to succeed or does not care, there is no need to be anxious. In another case, hopelessness is thought to be triggered when achievement seems not controllable at all, implying subjective certainty about failure. While retrospective outcome emotions such as pride and shame are induced when success and failure, respectively, are perceived to be caused by internal factors implying control, or lack of control, about these outcomes. According to the control value theory, achievement emotions can profoundly affect students' motivation, strategy use, and

regulation of learning which in turn affect students' learning and performance.

Emotions are thought to influence students' intrinsic motivation to learn which is based on interest and curiosity in learning, as well as their extrinsic motivation related to the attainment of positive outcomes or to the prevention of negative outcomes. In line with the intrinsic and extrinsic motivations, achievement emotions can be categorized as: positive activating emotions like enjoyment, hope and pride; negative deactivating emotions like hopelessness and boredom; positive deactivating emotion like relief and negative activating emotions like anger, anxiety and shame. Positive activating emotions promote both intrinsic and extrinsic motivation, facilitate use of flexible learning strategies, and support self-regulation, thus positively affecting academic performance under most conditions. Negative deactivating emotions uniformly reduce motivation and the effortful processing of information, implying negative effects on performance. On the other hand, emotions like anger, anxiety, and shame can undermine intrinsic motivation, but can induce strong extrinsic motivation to invest effort to avoid failure, implying that the effects on students' overall motivation to learn and invest effort need not be negative.

D. Academic Performance

The researcher included question to record students' academic performance using GPA score in the AEQ questionnaire and students filled their GPA score for the course Internet Marketing. The GPA at University of Belgrade is reported from 0 to 10 for each course in the departments.

E. Procedure

The Data were collected using two Microsoft forms after a brief introduction on emotional intelligence was given to students. As an incentive a bonus point was promised to students who complete both questionnaires. The short form trait EI questionnaire (TEIQue-SF) was applied first as a key indicator, followed by the Achievement Emotion Questionnaire (AEQ) as an external validation tool on emotions. Students' GPAs were collected along with the AEQ and information related to gender and age was collected along with the TEIQue for more extended analysis. One additional question was attached at the end of the TEIQue questionnaire, *"Do you think understanding your emotions and the emotions of others (that of your professors'*

and other students') have contribution to your academic achievement?" with options *"Yes, No, Maybe"* to assess students' awareness of the trait EI related emotions. And another question was attached at the end of the AEQ, *"Generally speaking, which of the following learning-related emotions have you felt more frequently while learning the course Internet Marketing?"* with to options, *"enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and boredom"* to assess students awareness of the most common achievement emotions.

III. RESULTS

The exploratory and descriptive statistics, internal consistencies of the measures, together with the intercorrelations among the study variables are presented in in this section.

A. TEIQue and AEQ Scale Statistics

Table II shows response distributions and descriptive statistics of the TEIQue-SF and AEQ scales. The findings indicate that there was sufficient variation of scores on all scales. Most of the distributions were relatively symmetrical.

B. Intercorreletions Among Variables

As presented in Table III, correlational analysis between the study variables showed that most of the trait EI factors did not significantly correlate with GPA, except with emotionality (r = 0.05), but correlated positively with all the positive achievement emotions. The highest positive correlations of the global Trait EI were with the achievement emotion *'Hope'* (r = 0.49, p < 0.001) and with the trait EI factor *'Well-being'* (r = 0.80). The lowest positive correlations were with *'Pride'* (r = 0.13, p > 0.1) which indicates no certainty in the result. The largest negative correlations of the global Trait EI were with the achievement emotion *'Shame'* (r = -0.62, p < 0.001) followed by *'Hopelessness'* (r = -0.61, p < 0.001). There is no negative correlation between the global Trait EI and trait EI factors. The lowest negative correlation was with *'Boredom'* (r = -0.33, p < 0.05) which indicates moderate certainty in the result. However, Trait EI is positively correlated with the positive activating emotions like enjoyment, hope and pride and negative correlated with the negative deactivating emotions like hopelessness and boredom as expected. In our study, none of the factors are significantly correlated with students' GPA, used as a measure of academic performance.

TABLE II.   TEIQUE AND AEQ SCALE STATISTICS (N = 61).

	Possible Range	Observed Range	Mean	SD	Skewness
1. GPA	0-10	7-9.95	7.98	0.61	0.60
2. Enjoyment	10-50	27-45	36.16	4.32	-0.04
3. Hope	6-30	15-30	22.62	3.32	-0.42
4. Pride	6-30	16-29	21.95	2.83	0.23
5. Anger	9-45	9-40	18.72	7.20	0.89
6. Anxiety	11-55	11-44	26.43	8.00	0.00
7. Shame	11-55	11-41	24.72	8.30	0.01
8. Hopelessness	11-55	11-44	21.79	8.46	0.62

9. Boredom	11-55	12-48	25.97	7.89	0.77
10. Well-Being	1-7	2.83-6.83	5.38	0.88	-0.81
11. Self-Control	1-7	2-6.67	4.55	1.00	0.00
12. Emotionality	1-7	3.25-6.5	5.09	0.85	-0.44
13. Sociability	1-7	2.67-6.67	4.90	0.93	-0.30
14. Trait EI	1-7	3.70-6.20	5.02	0.70	-0.14

TABLE III. DESCRIPTIVE STATISTICS AND INTERCORRELATIONS BETWEEN THE STUDY VARIABLES IN THE TOTAL SAMPLE (N = 61).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. GPA														
2. Enjoyment	0.15													
3. Hope	0.09	0.51												
4. Pride	0.38c	0.31	0.37											
5. Anger	0.01	-0.24	-0.49	0.10										
6. Anxiety	0.19	-0.09	-0.41	0.25	0.78									
7. Shame	0.10	-0.06	-0.44	-0.06	0.72	0.71								
8. Hopelessness	-0.14a	-0.32	-0.57	-0.09	0.77	0.66	0.76							
9. Boredom	0.12	-0.09	-0.31	0.24	0.71	0.62	0.50	0.63						
10. Well-Being	-0.12	0.19	0.33	0.14	-0.41	-0.33	-0.44	-0.37	-0.16					
11. Self-Control	-0.18	0.14	0.22	0.00	-0.30	-0.38	-0.41	-0.30	-0.16	0.46				
12. Emotionality	0.05b	0.28	0.53	0.21	-0.55	-0.43	-0.48	-0.65	-0.46	0.44	0.34			
13. Sociability	-0.11	0.21	0.33	-0.06	-0.41	-0.39	-0.45	-0.43	-0.17	0.61	0.44	0.35		
14. Trait EI	-0.11	0.27c	0.49a	0.13b	-0.59	-0.52	-0.62	-0.61	-0.33c	0.80a	0.72	0.72	0.77	

[a.] $P < 0.001$
[b.] $P > 0.1$
[c.] $P < 0.05$

IV. DISCUSSION AND CONCLUSION

In or primary assessment to investigate the significance of emotional intelligence in e-learning environment, we applied two instruments, the TEIQue to measure emotional intelligence of students and the AEQ to measure students' achievement emotions in an online settings and used as an external validation for TEIQue. Both tools are Likert-based testing instruments and students respond to the questionnaires based on their point of view. GPA was used as a measure of academic performance. In our study, we found out that there is no strong correlation between the Trait EI and GPA, but there is a moderately significant correlation between the positive activating emotions (enjoyment, hope, and pride) and GPA. We suspect that this weak correlation might be caused due to (1) the limited capability of the short version of the TEIQue, (2) the students might have find it difficult to understand the questionnaire which was prepared in English language , and (3) the difference in grading system as outlined in some researches. However, we noticed a strongly significant positive correlation between the TEIQue and the positive activating emotions related to achievements like enjoyment, hope and pride. We conclude that the short version of the Trait EI and the AEQ together might not be enough to assess the significance of emotional intelligence in e-learning settings. As such we recommend to employ the full version of the TEIQue which contains 153 items along with the short version of the AEQ (AEQ-s) which now contains 96 items. Moreover, we found out that this study has a contribution in identifying students' emotional intelligence in an online environment which will help us (1) to create the compatible student groups, and (2) to develop methods and tools that can be integrated with e-learning systems like Moodle. Our future study includes, assessing the applicability of emotional intelligence in the Moodle e-learning system by using the full version of the Trait EI and then developing modules for its seamless integration.

REFERENCES

[1] J. D. Mayer and P. Salovey, "What is emotional intelligence," *Emot. Dev. Emot. Intell. Educ. Implic.*, vol. 3, p. 31, 1997.

[2] C. Achar, J. So, N. Agrawal, and A. Duhachek, "What we feel and why we buy: The influence of emotions on consumer decision-making," *Curr. Opin. Psychol.*, vol. 10, pp. 166–170, 2016.

[3] "Digital Marketing Strategies For eLearning Companies - eLearning Industry." [Online]. Available: https://elearningindustry.com/advertise/elearning-marketing-resources/blog/digital-marketing-strategies-for-elearning-service-providers. [Accessed: 26-Jan-2021].

[4] I. M. Verma, "Experimental evidence of massive-scale emotional contagion through social networks.," *Proc. Natl. Acad. Sci. U. S. A.*, vol. 111, no. 29, p. 10779, 2014.

[5] "Top 20 eLearning Statistics For 2019 - eLearning Industry." [Online]. Available: https://elearningindustry.com/top-elearning-statistics-2019. [Accessed: 26-Jan-2021].

[6] D. Keidar, "Emotional Intelligence and Education," *Stud. Eduk.*, vol. 37, no. 37, pp. 327–348, 2015.

[7] M. A. Buzdar, A. Ali, and R. U. H. Tariq, "Emotional

intelligence as a determinant of readiness for online learning," *Int. Rev. Res. Open Distance Learn.*, vol. 17, no. 1, pp. 148–158, 2016.

[8]　L. Shen, M. Wang, R. Shen, S. Journal, and N. April, "Affective e-Learning: Using 'Emotional' Data to Improve Learning inPervasive Learning Environment," vol. 12, no. 2, 2016.

[9]　R. P Machera and P. C Machera, "Emotional Intelligence (EI) A Therapy for Higher Education Students," *Univers. J. Educ. Res.*, vol. 5, no. 3, pp. 461–471, 2017.

[10]　B. R. Palmer, C. Stough, R. Harmer, and G. Gignac, "Psychometric Properties of the Trait EmotionalIntelligence Questionnaire (TEIQue)," pp. 103–117, 2009.

[11]　R. Pekrun, T. Goetz, W. Titz, and R. P. Perry, "Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research," *Educ. Psychol.*, vol. 37, no. 2, pp. 91–105, 2002.

[12]　A. Cooper and K. Petrides, "A Psychometric Analysis of the Trait Emotional Intelligence Questionnaire–Short Form (TEIQue–SF) Using Item Response Theory," *J. Pers. Assess.*, vol. 92, pp. 449–457, Sep. 2010.

[13]　R. Pekrun, "The Control-Value Theory of Achievement Emotions: Assumptions, Corollaries, and Implications for Educational Research and Practice," *Educ. Psychol. Rev.*, vol. 18, no. 4, pp. 315–341, 2006.