What causes the emotional intelligence suffered by students at universities and colleges of technology?

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ABSTRACT: The purpose of this study was to examine the causes of the emotional intelligence suffered by students at universities and colleges of technology using the early literature and a questionnaire survey. This research administered 400 pre-test questionnaires and collected 259 completed and valid responses. The data analysis methods included literature analysis, content validity, factor analysis, Pearson correlation, *t*-test and reliability analysis. The Emotional Intelligence (EI) comprised eight factors, i.e. emotional awareness, facilitating thought, emotion management, emotion handling, emotion concern, emotion perception, emotion encouragement and emotion control. These eight factors explained 70.03% of variance in overall emotional intelligence. The Cronbach's α value for the overall emotional intelligence underlying selection factors inventory was 0.94. This showed that the reliability of the various factors of the pre-test questionnaire was acceptable.

INTRODUCTION

Chen, Lin and Tu considered that teenage students not only play the most important roles in society, but are also the most powerful source of the future development of the country. They face dramatic physical and mental change during adolescence. School education puts more emphasis on knowledge learning rather than on students' frame of mind. Students feel nervous, anxious, frustrated, depressed and abased when their instructors ignore their emotions. If students cannot receive timely guidance from school authorities, teachers, parents, or their peers or siblings, their unstable emotions can result in a behavioural disorder [1].

Some studies indicated that Emotional Intelligence (EI) and work pressures are significantly related. People with high EI show more tolerance to work-related pressures, frustrations, depression, difficulties, anxiety and weariness compared to people with lower EI [2-6]. Studies also proved that EI can be promoted and developed through proper educational trainings [7][8]. These studies indicated that EI could be developed and promoted by training. Since the promotion of EI can significantly help regulate pressures, this issue has become a topic worth exploring.

In 2010, Chisholm indicated that a starting point in establishing emotional competencies would be to understand and measure emotional intelligence in the lecture room. He considers emotional intelligence as a skill, an essential core that supports the development of sustainable emotional competence in the context of a global information society where social responsibility, social justice and ethics are key components needed to address the formation of the global professional engineer [9].

In his study, Bandura found that constructive and positive emotions reflect a person's confidence, and they can be used to predict a person's future success [10]. The study of Bar-On verified that EI could be used to predict a person's academic performance and future success [11][12]. Therefore, EI is quite important for students' future development. Although students at universities and colleges are still adolescents, they are in the critical period of growing into adulthood, and are already becoming the backbone of our society. Thus, this study tried to address all factors related to EI to effectively help educational institutions understand current college and university students' sources of EI, assist schools in preventing students from having negative emotions and doing things harmful to the body and mind, as well as develop school policies to guard against students' negative and destructive actions.

On the other hand, this study can also serve as a guide for students' self-examination, for measuring correctly students' emotional condition, or for facilitating educators to co-ordinate, and provide guidance and assistance to students. Furthermore, the study can review whether current education is appropriate and whether such education can truly help students' development. The study can also serve as the basis for future curricula and design-related projects in order to breed students with outstanding talents and with healthy bodies and minds.

Hence, in view of these motivations, this study has its own value and importance.

LITERATURE REVIEW

In 1920, Thorndike presented the theory of social intelligence and defined it as the ability to monitor one's own and other's feelings and emotions, and to make the most appropriate presentations based on this information [13][14]. In the middle of 1960, the term emotional intelligence was not valued very much [15].

Salovey and Mayer defined EI as the subset of social intelligence that involves the ability to monitor one's own and other's feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions [14]. In 1997, Mayer and Salovey redefined EI as an ability developed including perceiving emotions, for the sensing, utilisation and production of emotions to help in thought, understanding emotions and the development of knowledge that can reflectively adjust emotions to help develop emotions and intelligence [16].

Cherniss and Adler said that EI reflects the ability to control one's own and comprehend other's emotional responses [17]. Bar-On thought that EI is a non-cognitive ability, skill and art; it affects a person's ability to successfully adapt to meet the needs of the environment and pressure [18]. Matthews, Zeidner and Roberts thought EI is the ability to express, comprehend, identify with others, and regulate positive and negative emotions [19].

Van Rooy and Viswesvaran thought it was a talent (written language and non-written language), which makes a person produce, admit, express, comprehend, and evaluate his own and other's emotions and, then, take actions to cope successfully with environmental needs and pressures [20]. EI helps a person to understand his/her attitudes while in contact with others, as well as to understand and manage personal emotional thoughts and influences brought by his/her behaviours [21].

Salovey and Mayer proposed EI's theoretical framework and contents include the following [14]:

- The appraisal and expression of emotions: Individuals can accurately appraise and express their feelings through verbal or non-verbal action. Not only that, they can observe other individuals' non-verbal actions, such as body language and facial expressions, to understand other people's feelings, comprehend their emotions, and feel indebted to a person for generating empathy.
- Emotional regulation: The self-regulating system of an individual can perceive, assess and take action to change emotions, and the result is called meta-experience. For example, if you feel happy while dancing, you would feel like dancing, when you want to be happy again later. Emotional intelligence also includes the ability to adjust and change others' emotions. For example, a speaker with high EI can attract an audience's strong response.
- Utilisation of emotions: Individuals with high EI are good at utilising emotions to promote thinking, solve problems and enhance social adaptation.

Goleman expanded emotional intelligence and categorised it into five groups: i.e. 1) Knowing one's emotions; 2) Well-managed emotions evolve based on self-awareness; 3) Self-motivation also involves self-control over emotions; 4) Knowing others' emotions; and 5) The management of interpersonal relationship [22]. Davies, Stankov and Roberts presented definitions of EI's four factors, which are assessment of self emotions, assessment of others' emotions, utilisation of self emotions and emotions management [23]. Mayer, Caruso and Salovey viewed EI in terms of perceiving emotion, facilitating thought, understanding emotion and managing emotion [24][25].

Goleman developed a model for EI with two factors of *self-other* and *recognition-regulation* and divided 20 types of EI into four groups [26]:

1. Self-Awareness includes self-awareness of emotions, accurate self-assessment and confidence.
2. Self-Management includes self-control of emotions, trust, and intuitive ability to know right or wrong, adaptability, achievement drive and activeness.
3. Social Awareness includes empathy, service-orientation and organisational perceptivity.
4. Relationship Management includes the aspects of developing others, influential power, negotiation, conflict management, farsighted leadership, catalytic change, link building and teamwork.

Law, Wong and Song's study used the framework of Mayer and Salovey to develop an EI Scale in Chinese culture. The scale measures four parts of EI [27]:

1. Self-emotional appraisal, SEA, is the ability of an individual to understand his/her own emotions and naturally express these emotions.
2. Others' emotional appraisal, OEA, is the ability to perceive personal feelings and understand others' emotions.
3. Regulation of emotion, ROE, is the ability of an individual to regulate his own emotions in order to quickly recover from psychological distress.

4. Use of emotion, UOE, is the ability of an individual to use his emotions to increase his own constructive activities and personal performance.

According to Chen et al, the emotional intelligence inventory aims to measure the following six factors of EI among Taiwanese adolescents [28]:

1. Facilitating thought involves the ability to perceive emotions in order to think, to choose, to plan, to solve problems, to inspire and to self-mature.
2. Emotion management is the ability to use some strategies, improve intensity of emotion, solve uncomfortable emotions or maintain positive emotion.
3. Emotion perception is the ability to identify and understand others' emotions and true feelings, and conceive of possible status to make correct decisions.
4. Emotional awareness is the ability to be open to, and understand, the true nature of feelings, as well as to be aware of others' emotion.
5. Emotional concern involves the ability to actively praise others' achievement and comfort lost friends. It also involves sharing self-happiness and sadness with others.
6. Emotion control involves controlling self-impulses when facing interpersonal conflict and anger.

RESEARCH METHODOLOGY

The purpose of this study was to understand the key factors that influence students at universities and colleges of technology when choosing emotional intelligence options. In addition to using the data from relevant research and literature as the theoretical basis, this study also engaged students from Taiwan's universities and colleges of technology as the research participants and administered questionnaires to collect the data. Those sample data included a fine and applied arts college, business and management college, service trades college and engineering college. They were surveyed as the basis of the reliability measurement. Therefore, this research could identify factors that cause the emotional intelligence suffered by students at universities and colleges of technology.

Pre-questionnaire Implementation

This research was limited by time, manpower and funds, and was conducted only among Taiwanese metropolitan and non-metropolitan male/female students attending national and private universities and colleges of technology.

Guadagnoli and Velicer recommended that the relationship of sample size of 150 to the stability of component patterns requires a component size greater than 4.0 and the absolute value of factor loadings greater than 0.40 [29]. Gorsuch suggested that the necessary sample size should have at least five times as many variables as factors, and the minimum total number of test samples should not be less than 100 persons [30].

This research administered 400 pre-test questionnaires. Overall, 365 completed questionnaires were returned. Because there is a r everse direction in the design of the pre-test questionnaires, after strict selection and elimination of ineffective questionnaires, the remaining sample size was 259, with a return rate of 64.8%. Therefore, these samples can be stable when used in statistical analysis, as they conformed to the views of Gorsuch [30], and Guadagnoli and Velicer [29].

RESEARCH PROCESS

The content of the questionnaires and the process of coding the variables of this study are explained as follows:

Coding of pre-test contents of questionnaires and scoring: The pre-test questionnaires comprised 35 items divided into six factors based on Chen et al, measuring facilitating thought, emotional management, emotional interpretation, emotional awareness, emotional care and emotional control [28]. According to Kaiser-Meyer-Olkin (KMO), Bartlett method test and the principal factor analysis, the results showed that Kaiser-Meyer Chi-Square Test assessing sampling adequacy was 0.893 in EI. The reliability analysis was conducted using Cronbach's internal consistency test. These six factors could explain 53.8 % of the total variance. Cronbach's alpha for the questionnaire was 0.89. The correlation coefficients ranged from $r = +0.265$ to $r = +0.806$ in the emotional intelligence inventory.

In order to appropriately investigate university students' EI, the words in this questionnaire were embellished and revised. The items of the questionnaires were measured on a five-point Likert scale ranging from 1 *not at all agree* to 5 *completely agree* [31]. A reverse item, that did not receive a score, was used in this research to filter invalid questionnaires and no points were given for them.

Pre-questionnaire Statistical Analysis: The statistical data of the pre-test inventories used the software, Statistical Package for the Social Sciences (SPSS for Window XP) to carry out the exploratory factor analysis, after deleting the items based on elimination standards and testing the reliability and validity of the questionnaires. The explanations are as follows:

1. Item analysis: This research used the Wolman standards for the critical ratio [32][33]. Therefore, the Pearson product-moment value of the various items and total points did not reach the 0.05 level of significance, and the coefficient of correlation was below 0.30, showing that it should be eliminated.
2. Content validity: After drafting the pre-test questionnaires, experts were requested to assist in evaluating the diction and content of the pre-test questionnaires, upon which the correction and retouching were carried out.
3. Factor analysis: The results of exploratory factor analysis indicated a few questions that must be considered, such as:

   - The values of the Bartlett's test and the Chi-square were similar, which was 5785.1, with 595 degrees of freedom, which indicated that the questionnaire obtained the statistically significant level, $p<0.000$. After statistical calculations, the value for the KMO measure of sampling adequacy was 0.888, conforming to the determining principle of the KMO statistical scale [34]. These findings supported the appropriateness to carry out factor analysis.
   - This exploratory factor analysis method used the research of Kaiser, Bryman and Cramer, while the varimax of the orthogonal rotations method was used in the SPSS statistical software [35][36]. Based on Hakstian, Rogers and Cattel, and Kaiser's statement, this research retained the factors with the eigenvalues greater than 1 [37][34][35]. This research chose to use principal component analysis to estimate factor loadings. According to Cattell and Jaspers, Browne, and Linn, with the number of items less or equal to 40, the commonality should be greater than 0.40 [38-40].
   - From the emotional intelligence factors of the pre-test questionnaires, eight factors were extracted through rotating sums of squared loadings. These factors explained 70.03% of the total variance in EI, showing that this questionnaire conformed to the determination standards of Tabachnick and Fidell. Therefore, the components matrix of the rotation of each item is very good [41].

4. Reliability analysis: This research used Cronbach's alpha to assess the reliability of the questionnaire [42]. The reliabilities were 0.85 for Factor 1, 0.87 for Factor 2, 0.81 for Factor 3, 0.84 for Factor 4, 0.87 for Factor 5, 0.84 for Factor 6, 0.89 for Factor 7 and 0.87 for Factor 8. The α value for the overall emotional intelligence inventory was 0.94. This showed that the reliability of the various factors of the pre-test questionnaire conformed to the estimation standards of George and Mallery [43]. According to Camines and Zeller, Gay, and Loo, an outstanding education test should have reliability coefficient of at least 0.80; therefore, the result in this study indicates that the reliability of this measurement is very good [44-46]. Finally, three professionals reviewed and renamed every factor, as shown in Table 1.
5. Product-moment correlation: To avoid over-reliance on a single Cronbach's α coefficient, this research added an item-total correlation as a test of reliability of the official test using Pearson's product-moment correlation. The correlation coefficients ranged from 0.336 to 0.809 and showed significant relationships between various factors, as well as a significant item-total correlation of the questionnaires.

Table 1: The abstract of the factors and items of the emotional intelligence.

Items No	Item Analysis		Components Matrix by Rotation Method	The Factors and Items of the EI
	Critical Ratio	Coefficient of Correlation		
				Factor 1, Emotional Awareness
1	6.33	0.50*	0.78	While I am angry or sad, I can clearly identify the feelings, and not have to bore down into my mind.
2	8.84	0.66*	0.72	When I need help, I will actively ask someone's help.
3	10.33	0.66*	0.71	I can always freely express my feelings to others.
4	8.71	0.61*	0.71	I can speak my mind out clearly.
5	9.99	0.63*	0.69	When I feel anxious, I can exactly identify the anxiety.
6	8.53	0.50*	0.59	When I am angry, I can exactly identify the cause of anger.
7	7.65	0.54*	0.43	I can distinguish the priorities of matters, and am not tense or find them confusing.
				Factor 2, Facilitating Thought
8	6.76	0.57*	0.81	Whenever I experience setbacks, I always experience growth.
9	7.67	0.54*	0.80	Life has setbacks, but I will persevere.
10	11.28	0.57*	0.78	When I feel bad, I change my perspective by thinking carefully.
11	10.77	0.73*	0.57	When frustrated, I try thinking on the bright side and encourage myself to try again.
12	9.45	0.54*	0.48	Sorrow makes me stronger.
				Factor 3, Emotion Management
13	13.38	0.75*	0.70	When I feel depressed, I am always thinking about life's pleasures.
14	11.39	0.74*	0.66	I will solve some important things if in a better mood (inverted).

15	13.99	0.69*	0.64	I allow myself to be self-confident, having the ability to control my mood.
16	11.33	0.64*	0.60	In difficult times, I always cheer myself, not give up.
				Factor 4, Emotion Handling
17	10.96	0.68*	0.77	I can reflect on my feelings and help myself grow.
18	6.45	0.53*	0.77	When I encounter difficulties, I focus on what I can solve.
19	7.69	0.57*	0.76	Facing the unknown future, I always think about the bright side.
20	9.56	0.61*	0.74	When facing challenges, I always encourage myself to do the best.
				Factor 5, Emotion Concern
21	8.56	0.52*	0.78	When my friends feel lost, I console them.
22	8.54	0.50*	0.72	When I feel joy, I actively share my pleasure with others.
23	9.19	0.60*	0.72	When my classmates achieve, I praise them.
24	9.26	0.58*	0.69	When my friends feel depressed, they always look for me to disembroil their gloomy mood.
				Factor 6, Emotion Perception
25	12.14	0.57*	0.76	I can feel when people have a bad mood.
26	7.91	0.50*	0.75	I could sense others' true inner feelings that they try to conceal.
27	7.48	0.49*	0.70	I recognise the attitude of others and understand their current mood.
28	8.22	0.53*	0.69	While in a group, I can identify the team's atmosphere easily.
29	7.77	0.57*	0.50	I can clearly understand my inner emotions.
30	7.07	0.55*	0.43	I can imagine myself being in the situation that allows me to make a choice.
				Factor 7, Emotion Encouragement
31	9.72	0.64*	0.63	I arrange for some leisure activities to maintain a pleasant mood.
32	11.13	0.69*	0.61	When I feel the pressure, I take a rest and then start again.
33	8.64	0.63*	0.61	I reward myself when I accomplish a goal.
				Factor 8, Emotion Control
34	3.03	0.29*	0.91	If I am infuriated, I do not counterattack.
35	4.54	0.35*	0.88	I can control self-emotion when I am in conflict with others.

CONCLUSIONS

This study developed the EI scale with excellent reliability and validity to measure EI among college and university students. In this study, EI of university and college students comprised eight dimensions described below and shown in Table 1. Therefore, the researchers draw the following conclusions:

1. Emotional awareness involves being able to recognise one's emotions, understand the cause of true feelings, and perceive others' emotions, and understand others' internal feelings.
2. Facilitating thought can utilise emotional messages to think, select, plan or solve problems to obtain inspiration from experiences and promote individual growth.
3. Emotion management uses managing strategies to improve the intensity of the emotional state in order to relieve uncomfortable feelings or maintain positive feelings.
4. Emotion handling can confront important or resolvable issues in positive situations.
5. Emotion concern involves actively praising others' good performance and soothing friends when they feel left behind. Such a person can also actively share his/her own joyfulness or sadness with others.
6. Emotion perception involves understanding one's anger, grief, joy and happiness, and observing others' attitudes to understand and feel their mood and true internal feelings.
7. Emotion encouragement involves the ability to arrange some leisure activities and rewards by relaxing, taking a break and keeping joyous moods.
8. Emotion control is the ability to control emotional impulses when facing interpersonal conflicts, anger and frustrations.

SUGGESTIONS

The study results showed a significant positive correlation among eight factors of EI, meaning that if college and university students could develop EI, they would be able to identify their own and others' emotions and respond appropriately. Therefore, the authors make the following suggestions:

First, students' EI ability should be emphasised. Educators should support emotions management for college and university students. They need to assist college and university students in developing the ability to understand and manage their emotions. People can handle and regulate their negative emotions, regardless of whether they resulted from life or learning, only with good emotional abilities. Although EI is not observable, it will gradually form during a student's development. Therefore, educators should place importance on EI and promote it. Second, EI should be included in the monitoring programme. Schools should consider adding EI-related tests to school curricula at the appropriate time. Especially, when considering the eight factors in this study, it could help students enhance stress-

management ability, teach them to use appropriate methods to relieve pressure, reduce unhappy emotions and enhance EI performance.

Third, organisations should develop supportive learning environments. In order to build a supportive environment, organisations should focus on the support and stimulation at the emotional and learning level. It is suggested that educators develop abilities necessary for diversified learning environments in order to construct a happy learning climate, or to assist in planning diversified learning activities, among others.

Fourth, student emotions assistance programmes should be promoted. If schools can promote emotions assistance programmes and guide students to confront related problems with positive and constructive attitudes, they could not only help solve students' learning or non-learning problems, but also provide consultation and guidance to promote employees' psychological and physiological health. Thus, educators should participate in education training, faculty development, or free professional psychological doctor consultation sessions, among others.

Lastly, EI-related curricula should be stressed. Teachers should focus on EI curricula, strengthen the identification, thought and application of self-emotions and others' motions, and encourage students to express their emotions correctly. Therefore, teachers could not only apply educational opportunities to daily life and class activities, but also provide more chances and channels for interpersonal interactions and communications in classes.

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