



# The Investigation of Meta-Affective Differences Between Gender in Vocational High Schools During Learning Science

Lilit Rusyati<sup>1\*</sup>, Nuryani Y. Rustaman<sup>1</sup>, Ari Widodo<sup>1</sup>, Minsu Ha<sup>2</sup>

<sup>1</sup>Universitas Pendidikan Indonesia,  
 Jl. Dr. Setiabudhi No. 229, Bandung, West Java, 40154, INDONESIA

<sup>2</sup>Kangwon National University,  
 Kangwondaehak-gill, Chuncheon-si, Gangwon-do, 24341, REPUBLIC OF KOREA

\*Corresponding Author

DOI: <https://doi.org/10.30880/jtet.2022.14.02.012>

Received 8<sup>th</sup> July 2022; Accepted 16<sup>th</sup> August 2022; Available online 30<sup>th</sup> September 2022

**Abstract:** The presence of feelings has an impact on science learning, which involves not only studying theory but also practicing. Making groups in learning sometimes do not pay attention to the ability to recognize and regulate the feelings of male and female students. This survey research is to investigate meta-affective based on students' experiences in learning science. The research instrument is a questionnaire compiled based on the Awareness Dimension (10 statements) and Regulation Dimension (7 statements) with the level of response, namely frequency (scale 1-6). The research subjects involved were 160 students in Vocational High Schools, with 80 males and 80 females. The results show a comparison between male and female students based on average responses. Students who were female had higher average response scores than students who were male in both the tests of affective awareness and affective control. With the exception of one item, both versions have the same score. The items are MATS-12 "If I get angry with myself when I do not understand a topic, I notice that feeling" on affective awareness and MATS-10 "If I feel angry when I am not successful, I try to control it". These results conclude that noticing angry feelings and controlling them is the same ability between male and female students. This suggests that, except for rage, which can be recognized and managed by both sexes of students, female students are better able to recognize and manage their emotions.

**Keywords:** Gender, meta-affective, vocational high schools, science

## 1. Introduction

Students' thoughts and feelings about their learning are intertwined. Meta-cognitive or meta-affective refers to the process of thinking, whereas feel or emotion refers to meta-cognitive. The ability to monitor and control one's thinking and learning is increased by metacognition, while the ability to monitor and control one's emotional responses is increased by meta-affective dimension (Chick et al., 2009). The student's meta-affective learning was crucial to his or her understanding of physics during science class (Radoff et al., 2019). Students who are studying for their classes can use the Meta-Affective Trait Scale (MATS) to gauge their meta-affective inclinations (Uzuntiryaki - Kondakci & Kirbulut, 2016). The association between meta-conceptual regulation and affective regulation and scientific accomplishment was partially mediated by science self-efficacy (Kirbulut & Uzuntiryaki-Kondakci, 2019). The difference between boys and girls was that for girls, the cognitive component had a substantial correlation with behavioural intention. There is major implication for educational practice in relation to affective and behavioural components, namely in technology education, girls should have a deeper understanding of technology (Svenningsson et al., 2022). When controlling for gender in the three groups, the variance of test performance on the university admission exam was not significantly explained by the

cognitive and emotional components of test anxiety. However, only the high achiever group showed negative significant but weak associations between test performance and the cognitive and emotional components of test anxiety (Kültür & Özcan, 2022).

Academic results include getting good marks or passing an exam, social goals include interacting with others, and emotional outcomes include emotional self-awareness or regulation. These results correspond to the level of engagement a student displays. For instance, emotionally involved students respond to their peers or teachers in the classroom, either positively or negatively. These feelings could make you happy, sad, or anxious (Fredricks et al., 2004). Then, as a result of this interaction, the students' knowledge of those sentiments emerges, reflecting meta-affect. The effective learning outcomes are correlated with student engagement (Johnson & Sinatra, 2013), which is influenced by metacognitive and regulatory skills (Azevedo, 2015). So, meta-affect might likewise be used to describe participation. The phrase "emotions about feelings," or "meta-affect," to refer to the several layers of meaning and emotion that are applied to affective experiences. Meta-affect is what makes it possible to enjoy emotions that would otherwise be unpleasant (DeBellis & Goldin, 2006). Using mathematics, identifying mathematics with itself, relating mathematics with daily life, and associating with different fields all increased, while mathematical connection self-efficacy belief issues of the students decreased. While the gender variable and mathematical connection self-efficacy did not differ considerably from one another, it was discovered that mathematical achievement did (Kaya, 2020).

Students' inspiration to consider a problem further after learning that they "wasn't really happy" with their approach. The displeasure did not discourage them; it motivated them to keep looking for another approach. Both of these incidents are part of a bigger investigation into what occurs when students are engaged in science-related activities (Phillips, Watkins, & Hammer, 2017). As they attempted to persuade their classmates of an inconsistency, students displayed dissatisfaction. Added to this aggravation at the same time were indicators of satisfaction, such a smile and laughter. There is evidence of students experiencing "epistemic vexation" everywhere. In these situations, the annoyance caused by vexation also encouraged students' engagement (Jaber & Hammer, 2016). Even if men and women both only returned to pre-college levels in terms of active emotional coping and self-esteem. Although their self-esteem improves towards the end of college, women's initial psychological functioning is worse (they suffer more discomfort and have lower self-esteem). Men demonstrate worse active emotional coping and friend support, as well as a tendency of deteriorating avoidant emotional coping during the course of college (Conley et al., 2020).

The journey is guided by women who view the archive as a fragmented, experimental environment intertwined with the historian's daily rhythms. Affective histories haunt the pages of the student housing kitchen logbooks, which stand out like holy grails. A universe of seriousness and senselessness, bullying and joy, hatred and affection, camaraderie and humiliation can be unlocked through affective techniques (de Coninck-Smith, 2020). Cynicism and autistic features, which lower the capacity for effective communication, may also hinder empathy. However, unless a person obsesses over their autonomic arousal sensations, hyper-arousal states (such worry or emotional tiredness) may not always reduce empathy (Bohler et al., 2021). Regarding the affective states examined, it was discovered that individuals had high self-efficacy beliefs and favourable opinions toward graphs. Gender did not significantly affect the dependent variables (graph skills, self-efficacy beliefs about graphs, attitudes toward graphs, and personal perceptions of graph literacy); however, grade level and graph type variables did affect students' graph skills, attitudes toward graphs, and personal perceptions of their own graph literacy (Bursal Yetis, 2020).

In Physics, boys tend to feel better about their accomplishments than girls do, whereas girls displayed higher levels of worry and boredom. The use of the portfolio has somewhat narrowed the gaps between boys and girls in terms of how well they were doing in physics lessons prior to the intervention. As predicted, major factors impacting students' achievement feelings include self-concept and curiosity (Limprecht et al., 2018). The 9–12 age group of kids and preteens scored worse on the emotional management skills than the 13–16 age group. When it came to using emotional regulation techniques to deal with feelings of melancholy, anxiety, and anger as well as the general average of regulation in relation to these particular emotions, girls outperformed boys. Girls typically scored lower than boys when they were older and higher than boys when they were younger. These findings might be useful in developing prevention and intervention programs for teenagers and people of various ages (Sanchis-Sanchis et al., 2020).

## 2. Methodology

A survey of Vocational High School students in science learning was used as the research approach. This study enlisted the participation of 160 students, with 80 males and 80 females. The research instrument used is the Meta-Affective Trait Scale (MATS) questionnaire which was adapted from previous research (Kirbulut & Uzuntiryaki-Kondakci, 2019). Meta-affective is divided into two dimensions, namely Affective Awareness Dimension and Affective Regulation Dimension with level of frequency (scale 1-6). The blue print of MATS questionnaire is presenting in table 1.

**Table 1 - The meta-affective trait scale (MATS) questionnaire**

Dimension	Statement Code		
Affective Awareness	MATS-2	MATS-4	MATS-5
Dimension	MATS-7	MATS-9	MATS-11

	MATS-12	MATS-15	MATS-16
	MATS-17		
Affective Regulation	MATS-1	MATS-3	MATS-6
Dimension	MATS-8	MATS-10	MATS-13
	MATS-14		

The statements on the questionnaire are inputted into the Google Form. The sample identity contains gender, class, city/district, and vocational program. Furthermore, the online questionnaire link is distributed to Vocational High School students. After the data was collected, the student responses from the online questionnaire were averaged per statement. This mean score was compared between male and female students. Finally, it is converted to a bar graph so that it can be seen that the comparison of male and female student scores on the aspect of affective awareness affects the regulation dimension.

### 3. Results and Discussion

#### 3.1. Affective Awareness

There are 10 statements on the affective awareness. The affective awareness dimension measured a student's propensity to be aware of his or her emotions when studying for a test. Both positive and negative emotional items were present in equal amounts. Students are asked to explain whether they comprehend the distinction between feeling something and being aware of it. The items were understood as intended, according to the students' statements (Kirbulut & Uzuntiryaki-Kondakci, 2019). table 1 describes the statistical test results of differences between male and female students on affective awareness.

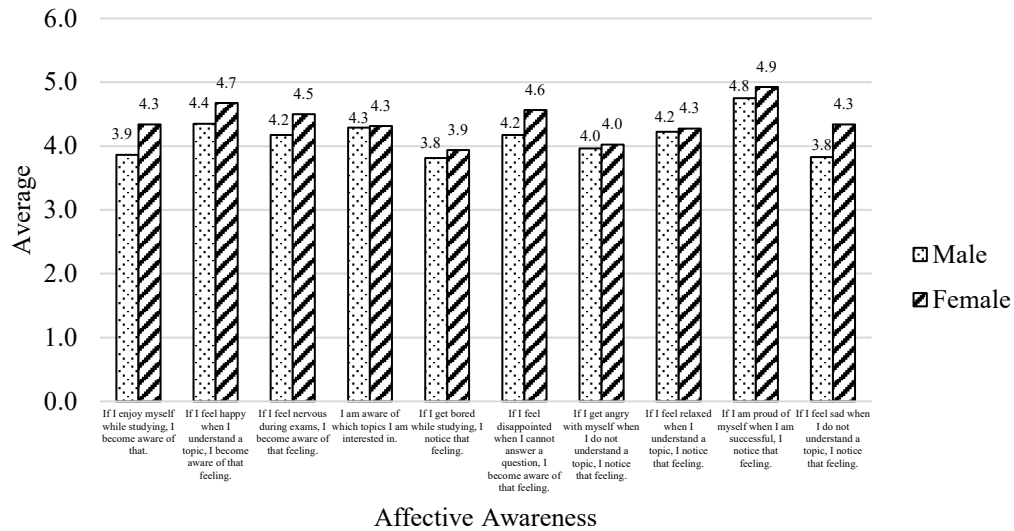
**Table 1 - The statistical test of differences between male and female students on affective awareness**

Data	Male Students	Female Students
Student Number (N)	80	80
Minimum Score	2.10	2.30
Maximum Score	5.90	6.00
Average Score (Mean)	4.14	4.39
Standard Deviation	0.91	0.88
Test of Normality (Shapiro-Wilk)	0.43 (Normal)	0.16 (Normal)
Test of Homogeneity of Variances (Levene's Tests)	0.52 (Homogeneous)	
Independent-Samples T Test	0.08 (Not Significant difference)	

\*Sig. > 0.05: Normal (Shapiro-Wilk); Sig. > 0.05: Homogeneous (Levene's Tests); Sig. (2-tailed) > 0.05:  $H_0$  accepted,  $H_1$  rejected (Independent-Samples T Test).

Based on table 1, gender did not have a significantly different impact on students' affective awareness in vocational high schools during learning science. These results indicate that both male and female students have the ability to recognize emotions during learning science. This condition is different from previous research. Male and female students receive different character education, with female students receiving more character education, which includes moral knowledge, moral emotion, and moral action, which is better than male students. Students that are female process information more quickly. Female think more ethically than male do. Additionally, female are more empathic than male. Female respondents also reported better moral elements than male respondents, and they also had socializing abilities that were quicker and more familiar than those of male (Izzati, et al., 2019).

Although the association between authoritative parenting and child adjustment was not moderated by cultural values, a higher emphasis on tradition lessened the beneficial effects of authoritative parenting on child outcomes (Haslam, et al., 2020). Future generations can adopt good conservation habits by receiving a good education. Altered to more appropriate ecological terminology from human adjectives in females and verbs in males can increasing knowledge and empathy in educational initiatives (McCabe & Nekaris, 2019). Therapy that focuses on emotion was less successful in reducing aggressive conduct than therapy that promotes forgiveness. Therapy for forgiveness might help people alter their negative logic. Therapy for forgiveness might help you rebuild a good connection, self-support, or make improvements (Suhron, et al., 2020). The average student responses present in figure 1.



**Fig. 1 - The differences in response average between male and female students on affective awareness**

Female students have higher affective awareness than male students. But when it comes to recognizing anger when studying science, male and female students have the same ability (see Fig.1). Teaching students about forgiveness in schools can be a significant way to lessen resentment and racial bias. Classroom teachers provided forgiveness instruction to the experimental group. The findings showed that as compared to the control group, the experimental group had higher forgiveness and lower levels of ethnic prejudice, state anger, trait anger, and anger expression. In the follow-up phase, this difference was statistically significant (Ghobari et al., 2021). Self-enhancing humour was linked to a stronger capacity to tame furious emotions and prevent outward displays of wrath. Greater propensity to show anger against other people and greater propensity to engage in anger suppression were both associated with higher scores on maladaptive humour styles, such as aggressive and self-defeating humour, respectively (Torres-Marín et al., 2018).

Image emotion is the sentiment that a certain image hides or conveys. A deep network for accurate emotion recognition and a network for binary classification of emotions as positive or negative (He & Zhang, 2018). Since emotion can be either positive or negative, it was vital to choose the appropriate strategy or point of view to show that a positive emotion was truly produced (Gasah et al., 2020). Emotion differentiation, or the ability to experience and recognize emotions in detail, has been linked to wellbeing. Although it has been postulated, little research has been done on the relationship between effective emotion control and emotion distinction. There aren't many links between differentiation and the choice to employ ostensibly adaptive or maladaptive methods. Think about the relationships between differentiation and ways to predict unpleasant emotion (Kalokerinos et al., 2019). The link between organizational commitment, emotional intelligence, and work attitudes is very positive. Stakeholders can utilize this study as a roadmap to effectively manage vocational institutions, teachers, and organizations (Ahad et al., 2021).

Specifically the effect on affective awareness. The effect of insight on outcome was significantly reduced as a result of an indirect influence via affect tolerance. Greater insight and affect awareness seem to be the mechanisms for the long-term effects of transference practice (Høglend & Hagtvet, 2019). The "Our Journey" platform can allow students to express their emotions in relation to learning events, which can help them concentrate on important areas of their education and personal development. Important queries about the portrayal of emotion and how to control the ownership and privacy of these depictions of emotional experiences for the benefit of students were also highlighted (Coughlan et al., 2021). Students' emotional reactions and subsequent participation in cooperative learning of scientific topics appeared to be influenced by the types of groups and activities that they participated in (e.g. if competitive). The importance of establishing interest-related emotions and cultivating joy-related emotions is emphasized in cooperative science learning (Volet et al., 2019). Students' knowledge was positively impacted by video learning medium, which was promising for the distant learning process. Additional experimental demonstration, however, in the form of video learning material, increased students' interest in specific subjects and inspired them to study more about the subject being taught, leading to a new innovation in the remote learning process (Nandiyanto et al., 2022).

Emotions affect how information is encoded, stored, and retrieved even before a person is aware of the content. By enlarging or contracting cognitive resources as well as through mechanisms like mood-dependent and mood-congruent processing, these emotions can also have an immediate effect on memory. The extent to which emotion may affect intrinsic cognitive burden. Emotion influences motivation and subsequent mental effort expenditure (Plass & Kalyuga, 2019). Enhancing students' abilities and skills in stress management is a major objective for change (Pascoe et al., 2020). Although they were occasionally considered as beneficial, negative emotions were typically thought to be bad for

learning, performance, and motivation. The significance of social functional strategies for a better comprehension of the varied roles played by negative emotions in learning and success (Rowe & Fitness, 2018). Students can utilize simulation to examine their emotional responses, get feedback, and develop self-awareness, which is necessary for creating effective coping mechanisms (Sewell et al., 2021).

### 3.2. Affective Regulation

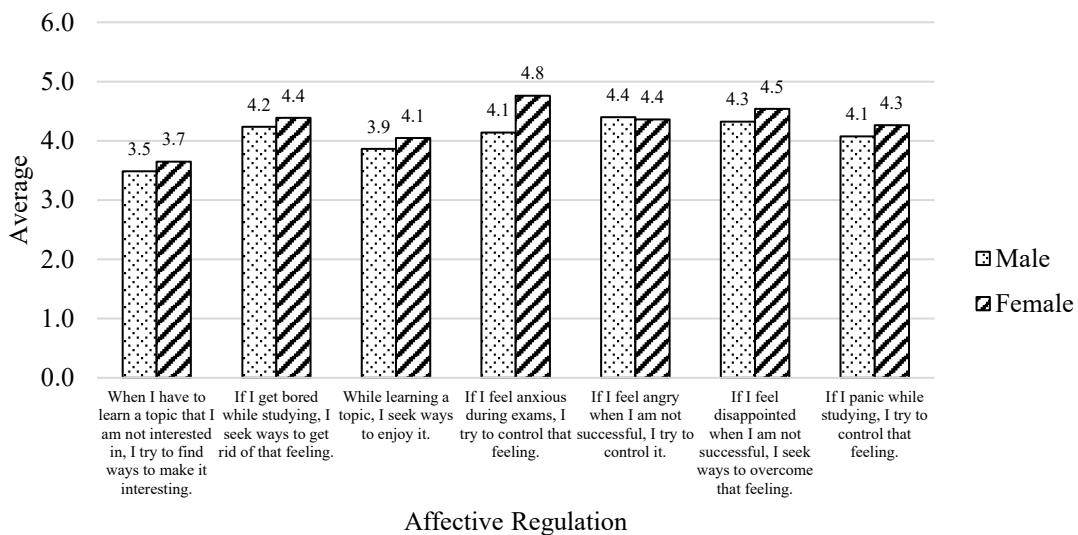
There are 7 statements on the affective awareness. Monitoring, regulating, and evaluating feelings were all part of the affective regulation. The ability of a student to monitor, regulate, analyse, and adapt their emotions while studying was described by the affective regulation dimension. In this dimension, there were two things that dealt with positive emotions and five items that dealt with negative emotions (Kirbulut & Uzuntiryaki-Kondakci, 2019). table 2 depicts the statistical test results of differences between male and female students on affective regulation.

**Table 2 - The statistical test of differences between male and female students on affective regulation**

Data	Male Students	Female Students
Student Number (N)	80	80
Minimum Score	1.86	2.14
Maximum Score	6.00	6.00
Average Score (Mean)	4.08	4.29
Standard Deviation	0.93	0.91
Test of Normality (Shapiro-Wilk)	0.61 (Normal)	0.20 (Normal)
Test of Homogeneity of Variances (Levene's Tests)	0.91 (Homogeneous)	
Independent-Samples T Test	0.15 (Not Significant difference)	

\*Sig. > 0.05: Normal (Shapiro-Wilk); Sig. > 0.05: Homogeneous (Levene's Tests); Sig. (2-tailed) > 0.05:  $H_0$  accepted,  $H_1$  rejected (Independent-Samples T Test).

Based on table 1, gender did not have a significantly different impact on students' affective regulation in vocational high schools during learning science. These results indicate that both male and female students have the ability to regulate emotions during learning science. Teenage males and females experience loneliness differently from one another overall, emotionally, and socially. In terms of general, emotional, and social characteristics, female adolescents scored significantly higher on loneliness than did male adolescents (Wedaloka & Turnip, 2019). Both gender and ethnicity have significant main effects on emotional intelligence abilities, as well as an interaction effect (Dewi et al., 2018). Only when emotion regulation was used as a mediator in the connection did self-esteem function as a predictor of cyberbullying tendency. Both directly and through empathy, friendship quality was found to be a predictor of cyberbullying propensity (Adiyanti et al., 2020). The average student responses present in figure 2.



**Fig. 2 - The differences in response average between male and female students on affective regulation**

Female students have higher affective regulation than male students. But when it comes to control anger when studying science, male and female students have the same ability (see Fig.2). Social skills training considerably increased self-esteem, and gender had no difference in how much it increased self-esteem (Seema & Kumar, 2018). Directly and indirectly, self-compassion was linked to forgiveness through reducing rumination and anger. Rumination was also indirectly linked to forgiveness through anger. To cultivate forgiveness, it is important and interventive to increase self-compassion, lessen ruminating, and calm wrath (Wu et al., 2019). Early teenage use of low levels of internal- and external-functional strategies and high levels of internal- and external-dysfunctional strategies seemed to strengthen the association between trait anger and loneliness (Karababa, 2020).

Emotion regulation-based training had a substantial effect on academic burnout, social acceptance, and emotional control that maintained throughout the follow-up period (Dehghani et al., 2018). Academic emotions are regarded to be a crucial component of learning and should be explicit learning objectives alongside intellectual behavioral-cognitive goals. In an emotional learning cycle, greater affective tendencies, or the expectation to experience particular affect or emotion, determine the relationships between feelings and self-regulated emotions that occur throughout a learning event (Ben-Eliyahu, 2019). Task-related aspects were more likely to result in physiological activity when the group level valence was neutral. By combining various process data modalities that disclose the various components of affect, it may be able to track emotionally significant events that have an impact on the course of the collaborative learning process (Törmänen et al., 2021). Students' meta-affective and meta-cognitive abilities, as well as their meta-cognitive abilities and achievement, are significantly correlated with one another. The relationship between students' meta-affective and success, in contrast, is non-existent (Rusyati et al., 2021).

It has been discovered that self-efficacy and teacher support have a variety of indirect relationships with student competencies and engage students in a variety of ways. Cognitive engagement served as a mediator between the effects of teacher support and self-efficacy on students' skills, but affective engagement's mediated effects were only discernible in terms of academic buoyancy (Chong et al., 2018). Teachers' attitudes toward learning and self-regulation of learning procedures hinder their capacity to encourage these behaviours in students. Students' ignorance of and failure to use such strategies is a direct result of this. To increase the level of self-regulation in the promotion and application of learning strategies, these concepts are presented as a component of a broader system that has to be clarified and examined (Lawson et al., 2019). The students' performance is not significantly impacted by the teachers' gender or education. Therefore, should hire qualified male and female lecturers to teach vocational technical education courses. Since students' performance is unrelated to the teacher's gender and qualification, there should be no preference in hiring teachers in schools based on these factors (Igberadja, 2016).

Self-confidence was the only emotional factor that influenced the elements of, demand for, and participation in self-reflection. On the other hand, the only aspect of affect that was connected to insight was a positive feeling. Self-reflection engagement was associated to insight, which was linked to the need for self-reflection (Tee et al., 2019). Learner-learner, learner-instructor, and learner-content interactions all have a favourable effect on students' affective engagement (Daher et al., 2021). The ability of collaborative groups to control their emotions in the face of a variety of challenges (Järvenoja et al., 2019). The cognitive and affective aspects of students who were exposed to the problem-solving technique through game-based learning show beneficial impacts (Pratama & Setyaningrum, 2018). Overall, six methods were found: temporal perspective, continuous evaluation, motivational orientation, strength and resource gathering, system thinking and framing, and system thinking and framing (Van der Lingen et al., 2018). As a motivator, heart-mind correlation is added to internal incentives. It is intuitively understood that virtue and knowledge are extensions of inherent goodness; once affective impulses respond to the environment, knowledge is communicated to cognitive processes, and behaviour takes place (Sertdemir, 2022).

The relationship between students' meta-affective tendencies during chemistry class preparation and their use of study techniques, metacognitive self-regulation, and self-efficacy utilizing mean results of the measurements All of the associations were statistically significant and of a medium to large size. The strongest relationship was found between affective awareness and elaboration, and between affective control and metacognitive self-regulation (Kirbulut & Uzuntiryaki-Kondakci, 2019). Multilevel modelling showed a significant racialized anger bias toward both Black boys and girls, but nuanced racialized emotion detection accuracy with a race by gender interaction. More frequently than White boys and White girls, both Black boys and Black girls were mistakenly perceived as furious. Higher levels of implicit or explicit bias decreased rather than increased the likelihood that White youngsters would be mistakenly interpreted as being angry. The implications for overcoming inherent prejudices among children, parents, and teacher training programs are highlighted (Halberstadt et al., 2022).

Student anxiety, both positive and negative academic emotions, self-regulated learning, and performance are all related. The statistics indicate significant emotional distinctions between men and women that may have an impact on STEM retention. Students' emotions have a significant impact on their performance, and they can be used to guide efforts designed to alter how university students perceive and handle emotions like student anxiety (Pelch, 2018). The significance of teacher assistance while implementing self-directed learning in the classroom. Thus, the relationship between happy feelings and good behaviour at school is lessened by teacher assistance. This implies that even pupils who acquire lesser positive emotions are helped in self-directed learning (Schweder & Raufelder, 2019). Only Secondary Education students showed a substantial improvement in their social interactions compared to both their Primary

Education counterparts and the pre-test following the intervention program. However, both groups had a significant increase in motivation. In order to build respect for others in primary school students and sentiments of belonging to a group and group responsibility in secondary school students, cooperative learning should be encouraged, according to both the participating instructor and the students (Hortigüela Alcalá et al., 2019)

#### 4. Conclusion

Both on affective awareness and affective regulation, showed that female students had a higher average response score than male students. Except for one item that has the same score for both. The items are MATS-12 "If I get angry with myself when I do not understand a topic, I notice that feeling" on affective awareness and MATS-10 "If I feel angry when I am not successful, I try to control it". This implies that female students are better able to recognize and control their emotions, except for feelings of anger, which can be recognized and controlled equally in both genders of students.

#### Acknowledgement

Authors would like to thanks to all who involved in this research completion.

#### References

- Adiyanti, M. G., Nugraheni, A. A., Yuliawanti, R., Ragasukmasuci, L. B., & Maharani, M. (2020). Emotion regulation and empathy as mediators of self-esteem and friendship quality in predicting cyberbullying tendency in Javanese-Indonesian adolescents. *International Journal of Adolescence and Youth*, 25(1), 251-263.
- Ahad, R., Mustafa, M. Z., Mohamad, S., Abdullah, N. H. S., & Nordin, M. N. (2021). Work attitude, organizational commitment and emotional intelligence of Malaysian vocational college teachers. *Journal of Technical Education and Training*, 13(1), 15–21.
- Azevedo, R. (2015). Defining and measuring engagement and learning in science: Conceptual, theoretical, methodological, and analytical issues. *Educational Psychologist*, 50(1), 84–94.
- Ben-Eliyahu, A. (2019). Academic emotional learning: A critical component of self-regulated learning in the emotional learning cycle. *Educational Psychologist*, 54(2), 84–10.
- Bohler, T. E., Brown, R. F., & Dunn, S. (2021). Relationship between affective state and empathy in medical and psychology students. *Australian Psychologist*, 56(4), 311-323.
- Bursal, M. & Yetis, S. (2020). Middle school students' graph skills and affective states about graphs. *International Journal of Research in Education and Science*, 6(4), 692-704.
- Chick, N., Karis, T., & Kernahan, C. (2009). Learning from their own learning: How metacognitive and meta-affective reflections enhance learning in race-related courses. *Intr. J. for the Scholarship of Teaching and Learning*, 3(1), 1–28.
- Chong, W. H., Liem, G. A. D., Huan, V. S., Kit, P. L., & Ang, R. P. (2018). Student perceptions of self-efficacy and teacher support for learning in fostering youth competencies: Roles of affective and cognitive engagement. *Journal of Adolescence*, 68(1), 1–11.
- Conley, C. S., Shapiro, J. B., Huguenel, B. M., & Kirsch, A. C. (2020). Navigating the college years: Developmental trajectories and gender differences in psychological functioning, cognitive-affective strategies, and social well-being. *Emerging Adulthood*, 8(2), 103-117.
- Coughlan, T., Lister, K., & Lucassen, M. (2021). Representing the unseen with “our journey”: a platform to capture affective experiences and support emotional awareness in university-level study. *Journal of Formative Design in Learning*, 5(1), 39–52.
- Daher, W., Sabbah, K., & Abuzant, M. (2021). Affective engagement of higher education students in an online course. *Emerging Science Journal*, 5(4), 545–558.
- DeBellis, V. A. & Goldin, G. A. (2006). Affect and meta-affect in mathematical problem solving: A representational perspective. *Educational Studies in mathematics*, 63(2), 131-147.
- de Coninck-Smith, N. (2020). Gender encounters university—university encounters gender: affective archives Aarhus University, Denmark 1928–1953. *Women's History Review*, 29(3), 413-428.
- Dehghani, Y., Golestaneh, S. M., & Zangouei, S. (2018). The effectiveness of emotion regulation training on academic burnout, social acceptance and affective control of students with learning disabilities. *Journal of Applied Psychology*, 12(2), 163–182.
- Dewi, Z. L., Halim, M. S., & Derksen, J. (2018). Emotional intelligence competences of three different ethnic groups in Indonesia. *Asian Ethnicity*, 19(1), 36-58.

- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), 59–109.
- Gasah, M., Baharum, A., Zain, N. H. M., Halamy, S., Hanapi, R., & Noor, N. A. M. (2020). Evaluation of positive emotion in children mobile learning application. *Bulletin of Electrical Engineering and Informatics*, 9(2), 818–826.
- Ghobari B., B., Khodayarifard, M., Geshnigani, R. H., Khoei, B., Nosrati, F., Song, M. J., & Enright, R. D. (2021). Effectiveness of forgiveness education with adolescents in reducing anger and ethnic prejudice in Iran. *Journal of Educational Psychology*, 113(4), 846.
- Halberstadt, A. G., Cooke, A. N., Garner, P. W., Hughes, S. A., Oertwig, D., & Neupert, S. D. (2022). Racialized emotion recognition accuracy and anger bias of children's faces. *Emotion*, 22(3), 403–417
- Haslam, D., Poniman, C., Filus, A., Sumargi, A., & Boediman, L. (2020). Parenting style, child emotion regulation and behavioral problems: The moderating role of cultural values in Australia and Indonesia. *Marriage & fam. rev.*, 56(4), 320–342.
- He, X. & Zhang, W. (2018). Emotion recognition by assisted learning with convolutional neural networks. *Neurocomputing*, 291(1), 187–194.
- Hortiguëla Alcalá, D., Hernando Garijo, A., Pérez-Pueyo, Á., & Fernández-Río, J. (2019). Cooperative learning and students' Motivation, social interactions and attitudes: perspectives from two different educational stages. *Sustainability*, 11(24), 1–11.
- Høglend, P. & Hagtvet, K. (2019). Change mechanisms in psychotherapy: Both improved insight and improved affective awareness are necessary. *Journal of Consulting and Clinical Psychology*, 87(4), 332–344.
- Igberadja, S. (2016). Effects of teachers' gender and qualification on students' performance in vocational technical education. *Journal of Technical Education and Training*, 8(1), 34–42.
- Izzati, U. A., Bachri, B. S., Sahid, M., & Indriani, D. E. (2019). Character education: Gender differences in moral knowing, moral feeling, and moral action in elementary schools in Indonesia. *J. for the Edu. of Gifted Young Scientists*, 7(3), 547-556.
- Jaber, L. Z. & Hammer, D. (2016). Learning to feel like a scientist. *Science Education*, 100(2), 189–220.
- Järvenoja, H., Näykki, P., & Törmänen, T. (2019). Emotional regulation in collaborative learning: when do higher education students activate group level regulation in the face of challenges? *Studies in Higher Education*, 44(10), 1747–1757.
- Johnson, M. & Sinatra, G. M. (2013). Use of task-value instructional inductions for facilitating engagement and conceptual change. *Contemporary Educational Psychology*, 38(1), 51–63.
- Kalokerinos, E. K., Erbas, Y., Ceulemans, E., & Kuppens, P. (2019). Differentiate to regulate: Low negative emotion differentiation is associated with ineffective use but not selection of emotion-regulation strategies. *Psychological Science*, 30(6), 863–879.
- Kaya, D. (2020). Investigation of sixth grade students' mathematical connection self-efficacy levels in terms of perceived teacher affective support, gender and mathematics achievement. *Necatibey Eğitim Fakültesi Elektronik Fen ve Matematik Eğitimi Dergisi*, 14(1), 106–132.
- Karababa, A. (2020). The relationship between trait anger and loneliness among early adolescents: The moderating role of emotion regulation. *Personality and Individual Differences*, 159(1), 1–10.
- Kirbulut, Z. D. & Uzuntiryaki-Kondakci, E. (2019). Examining the mediating effect of science self-efficacy on the relationship between metavariabls and science achievement. *International J. of Science Education*, 41(8), 995–1014.
- Kültür, Y. Z. & Özcan, B. (2022). The impact of cognitive and affective components of test anxiety on the high-stakes exam performance in 12<sup>th</sup> grade students. *International Journal of Progressive Education*, 18(1), 448-457.
- Limprecht, S., Janko, T., & Gläser-Zikuda, M. (2018). Achievement Emotions of Boys and Girls in Physics Instruction: Does a Portfolio Make a Difference?. *Orbis scholae*, 7(2), 43-66.
- Lawson, M. J., Vosniadou, S., Van Deur, P., Wyr, M., & Jeffries, D. (2019). Teachers' and students' belief systems about the self-regulation of learning. *Educational Psychology Review*, 31(1), 223–251.
- McCabe, S. & Nekaris, K. A. I. (2019). The impact of subtle anthropomorphism on gender differences in learning conservation ecology in Indonesian school children. *Applied Environmental Education & Communication*, 18(1), 13-24.



- Nandiyanto, A. B. D., Hofifah, S. N., Girsang, G. C. S., Trianadewi, D., Ainisyifa, Z. N., Siswanto, A., Putri, S. R., Anggraeni, S., Maryanti, R., & Muslimin, Z. (2022). Distance learning innovation in teaching chemistry in vocational school using the concept of isotherm adsorption of carbon microparticles. *J. of Tech. Edu. and Training*, 14(1), 14–26.
- Pascoe, M. C., Hetrick, S. E., & Parker, A. G. (2020). The impact of stress on students in secondary school and higher education. *International Journal of Adolescence and Youth*, 25(1), 104–112.
- Pelch, M. (2018). Gendered differences in academic emotions and their implications for student success in STEM. *International journal of STEM education*, 5(1), 1-15.
- Phillips, A. M., Watkins, J., & Hammer, D. (2017). Problematizing as a scientific endeavor. *Physical Review Physics Education Research*, 13(2), 1–13.
- Plass, J. L. & Kalyuga, S. (2019). Four ways of considering emotion in cognitive load theory. *Educational Psychology Review*, 31(2), 339–359.
- Pratama, L. D. & Setyaningrum, W. (2018). Game-Based Learning: The effects on student cognitive and affective aspects. *Journal of Physics: Conference Series*, 1097(1), 1–6.
- Radoff, J., Jaber, L. Z., & Hammer, D. (2019). “It’s scary but it’s also exciting”: Evidence of meta-affective learning in science. *Cognition and Instruction*, 37(1), 73–92.
- Rowe, A. D. & Fitness, J. (2018). Understanding the role of negative emotions in adult learning and achievement: A social functional perspective. *Behavioral Sciences*, 8(2), 27–47.
- Rusyati, L., Rustaman, N. Y., Widodo, A., & Ha, M. (2021). The interconnection between students’ meta-affective, meta-cognitive and achievement in science learning. *Advances in Social Science, Edu. and Humanities Research*, 566(1), 1–2.
- Sanchis-Sanchis, A., Grau, M. D., Moliner, A. R., & Morales-Murillo, C. P. (2020). Effects of age and gender in emotion regulation of children and adolescents. *Frontiers in Psychology*, 11(1), 1–13.
- Seema, G. B. & Kumar, G. V. (2018). Impact of social skills training on self-esteem among male and female adolescent students. *Indian Journal of Positive Psychology*, 9(1), 147–151.
- Sertdemir, İ. (2022). Intuitive learning in moral awareness. Cognitive-affective processes in Mencius’ Innatist theory. *Academicus International Scientific Journal*, 13(25), 235–254.
- Sewell, K. M., Sanders, J. E., Kourgiantakis, T., Katz, E., & Bogo, M. (2021). Cognitive and affective processes: MSW students’ awareness and coping through simulated interviews. *Social Work Education*, 40(5), 641–655.
- Schweder, S. & Raufelder, D. (2019). Positive emotions, learning behavior and teacher support in self-directed learning during adolescence: Do age and gender matter?. *Journal of adolescence*, 73(1), 73-84.
- Suhron, M., Yusuf, A., Subarniati, R., Amir, F., & Zainiyah, Z. (2020). How does forgiveness therapy versus emotion-focused therapy reduce violent behavior schizophrenia post restrain at East Java, Indonesia. *International Journal of Public Health*, 9(4), 314-319.
- Svenningsson, J., Höst, G., Hultén, M., & Hallström, J. (2022). Students’ attitudes toward technology: Exploring the relationship among affective, cognitive and behavioral components of the attitude construct. *International Journal of Technology and Design Education*, 32(3), 1531-1551.
- Tee, K. N., Leong, K. E., & Rahim, S. S. A. (2019). Modeling relationships of affective and metacognitive factors on grade eleven students’ mathematics achievement. *International J. of Research in Education and Science*, 5(1), 295–308.
- Torres-Marín, J., Navarro-Carrillo, G., & Carretero-Dios, H. (2018). Is the use of humor associated with anger management? The assessment of individual differences in humour styles in Spain. *Personality and Individual Differences*, 120(1), 193–201.
- Törmänen, T., Järvenoja, H., & Mänty, K. (2021). Exploring groups’ affective states during collaborative learning: what triggers activating affect on a group level? *Educational Technology Research and Development*, 69(5), 2523–2545.
- Uzuntiryaki-Kondakci, E. & Kirbulut, Z. D. (2016). The development of the meta-affective trait scale. *Psychology in the Schools*, 53(4), 359–374.
- Van der Lingen, E., Chen, J. Y., Lourens, R., & Armstrong, A. (2018). Towards a new model of grit within a cognitive-affective framework of self-regulation. *Youth African Journal of Business Management*, 49(1), 1–8.
- Volet, S., Seghezzi, C., & Ritchie, S. (2019). Positive emotions in student-led collaborative science activities: Relating types and sources of emotions to engagement in learning. *Studies in Higher Education*, 44(10), 1734–1746.

Wedaloka, K. B. & Turnip, S. S. (2019). Gender differences in the experience of loneliness among adolescents in Jakarta. *HUMANITAS: Indonesian Psychological Journal*, 16(1), 33–42.

Wu, Q., Chi, P., Zeng, X., Lin, X., & Du, H. (2019). Roles of anger and rumination in the relationship between self-compassion and forgiveness. *Mindfulness*, 10(2), 272-278.