INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN PROGRESSIVE EDUCATION & DEVELOPMENT

OPEN ACCESS JOURNAL

Vol 11, Issue 4, (2022) E-ISSN: 2226-6348

Common Emotion Regulation Strategies among Science Teachers for Maximizing Their Personal and Social Well-Being

Fatin Syahira Mohd Shaifuddin, Nor Tutiaini Ab.Wahid

Universiti Teknologi MARA Malaysia

To Link this Article: http://dx.doi.org/10.6007/IJARPED/v11-i4/15861 DOI:10.6007/IJARPED/v11-i4/15861

Published Online: 12 December 2022

Abstract

Managing classroom is a teacher's responsibility and this can affect their emotion through students' academic achievement, behaviour, or participation in the classroom. In dealing with this matter, teachers may have their own solutions since they can enhance their skills in handling their students but there are some arguments saying that some of them could not handle it by themselves. This study aims to identify the most common emotion regulation strategies among science teachers based on previous studies. In achieving that objective, a systematic literature review has been carried out based on established guidelines using leading databases namely Scopus, Dimensions.ai, Google Scholar, Mendeley and Semantic Scholar. This paper reveals four themes which are 1) emotion, 2) teacher, 3) student and 4) classroom management. The significance of this study is 1) to assist stakeholders such as teachers as well as students theoretically; 2) provide an insight for other teachers to regulate their own emotions in dealing with students; 3) give benefits to teachers, students and society as a whole because teachers can influence the students through the emotions portrayed; and 4) the elements in this study can be recreated to be tested in future research and benefit other populations as well. As conclusion, this study found that teachers regulate their emotions through intrinsic regulation, antecedent-focused emotion regulation, cognitive change, acceptance and appraisal. Teacher's well-being is an important quality to be looked after, which has proven to be achieved through an emotion regulation technique, thus increase the positive emotion. In addition, other factors that contribute to their emotion can also be identified from students' engagement, achievement and motivation. A good mental health can help teachers to improvise themselves.

Keywords: Emotion Regulation Strategies, Teachers' Well-Being, Science Education, Managing Classroom, Teachers' Mental Health.

Introduction

Just like any other subjects, science subject is unique and has its own attraction among teachers as well as students. Humans view things differently according to their very own perspectives. In the respect of this study, teachers also have their own opinions in teaching science subject. In fact, their emotion can be predictor of a very good classroom climate that can be detected by students (Zembylas, 2004). Specifically, teacher's emotion when they

were teaching was related with their teaching practices (Borrachero et al., 2014; Maulucci, 2013; Zembylas, 2004). Zembylas (2004) discovered that science teachers feel shame and low confidence when their emotional salience changes. In other words, teachers may experience negative emotions when their power of experiences in teaching science changes. Moreover, teachers are mostly experienced positive emotions when the students understand science concept, motivated to learn, and participate actively during lesson.

Meanwhile, negative emotions such as frustration, guilt and shame has been confirmed is due to classroom management issues such as misbehave and issues with students who were not participate in lesson (Uzuntiryaki-Kondakci et al., 2021). The types of pedagogies implemented in the classroom also have a strong influence to teachers' emotion. For instance, novice science teachers feel anxious when it comes to pedagogies of inquiry-based science enactment and planning. They prefer to proceed with dialogical approach rather than inquiry-based instruction, also known as student-centered approach (Dreon & McDonald, 2012). In a study by Hufnagel (2019), a teacher claimed by having frustration, she is able to understand the students better rather than excitement or enjoyment. This shows a negative emotion also can contribute to student's learning and not necessarily positive emotion only.

In dealing with teaching science, teachers may have their own solutions to regulate their emotions, since they can enhance their skills in handling their students. However, there are some arguments saying that some of them could not handle it by themselves (Chang, 2009). The most common regulation methods used by teachers are cognitive reappraisal and expressive suppression (Lee et al., 2016). Cognitive reappraisal refers to individuals reinterpreting the situation to alter the impact of their emotions. Cognitive reappraisal occurs early in the process of generating emotion, so it is effective in changing the whole track of emotion before responding (Gross and John, 2003, as cited by (Fried, 2011). Thus, cognitive reappraisal can decrease negative emotions and improve positive emotion instead. Conversely, expressive suppression is the process of modifying the response to avoid expressive behaviour from emotion (Gross, 1998). Teachers can apply expressive suppression when they are angry in class, they can ignore that emotion, as if it is not bothering. Expressive suppression occurs late in the process of generating emotion, so it may decrease the visible behaviour but is not applicable to reduce the negative emotions (Gross, 2002, as edited by (Fridovich et al., 2007). This is done by teachers because they thought it is inappropriate to express those feelings towards students (Sutton, 2004, as cited by Sutton & Harper (2009). These emotion regulation strategies have their own different roles in the process of generating emotion, yet people use them for different implications for their social and personal life (Gross, 2002; Gross & John, 2003; Lopes, Salovey, & Straus, 2003, as cited by (Lopes et al., 2005). Thus, this study intends to identify what are the most common regulation strategies among science teachers for maximizing their personal and social well-being to propose a solution.

Research Gap-the Existing Studies Related to Emotion Regulation Strategies among Teachers Based on Previous Studies

A systematic literature review (SLR) is an analysis into a clearly articulated problem that use systematic and explicit techniques to find, select, and critically evaluate relevant research, as well as gather and analyse data from studies included in the review. The results of the included studies may or may not be analysed and summarised using statistical methods

(Higgins et al., 2011). Authors' claims of rigour in their study can be justified by a systematic review, allowing for the detection of gaps and essential paths for future studies.

Despite abundance of studies on emotion regulation strategies on teachers, efforts to review all possible studies systematically are still lacking. Thus, this article is an attempt to fill the gap of the concept of emotion regulation strategies to understand, identify and characterize it among teachers. Scholars are attracted on how teachers regulate their emotions and examined it from various perspectives (Brouskeli et al., 2018; Conde, 2018; Lamminpaa & Vesterinen, 2018), (Borrachero et al., 2019), (Akfirat, 2020; Jeans, 2020; Uzuntiryaki-Kondakci et al., 2020; Wei et al., 2021), and (Han & Xu, 2021; Keleynikov et al., 2022; Uzuntiryaki-Kondakci et al., 2021). Although there are many studies on teachers on how they regulate their emotions, but there was still an insufficient review by scholars systematically regarding existing studies. It is crucial to review studies systematically, as stated by Robinson & Lowe (2015) because the traditional literature is lacking in terms of highly susceptible and rarely comprehensive to reviewer bias and differences in study quality are rarely taken into account.

The present paper's attempt is to provide existing knowledge by establishing a systematic literature review on the common emotion regulation strategies among science teachers to maximize their personal and social well-being. In fact, a systematic literature review is an organized way to review existing literature more practical ways. Furthermore, Dewey and Drahota (2016) highlighted SLR is a procedure of classifying, selecting and critically appraising previous studies towards aim of answering the formulated research question. Another strength of SLR is the review process takes place after the protocol or plan is specified. This results an organized and transparent process of searching that conducted over several databases which also replicated using the similar process by other researchers. It answers a defined question which also covers an accurate search strategy (Xiao & Watson, 2019). On top of that, SLR enables others to perform the same review process by offering the details on the keywords used and articles selection so that the analysis can be confirmed, and the generality can be studied.

The systematic literature review conducted in this study is assisted by the central research question-What are the most common emotion regulation strategies among science teachers based on previous studies? Hence, the gap that needs to be filled is to find out what are the most common emotion regulation strategies among science teachers based on previous studies. This study offers significant contributions with regard to the stakeholders such as teachers and students through many perspectives. One of them is the theory can help future researchers to apply it in their studies since not many people use them. Other than that, theory developed in this study can be used to demonstrate an understanding towards teacher emotion that act as a key to get a bigger picture of the proposed topic.

The study results will provide an insight for other teachers to regulate their own emotions in dealing with varieties circumstances at school. So, in future, perhaps the numbers of teachers that able to regulate their emotions increase and subsequently decrease the stress level among them. This can eventually benefits teachers, students, and society as a whole because teachers can influence the students through the emotions portrayed. Next, many parties such as the government, researchers, therapists, and counselors can finally

understand the process of emotion regulation practiced by teachers and they can highlight this strategy in response to the teachers who need the support, and this can narrow down the gap that lacking in the existing study. Furthermore, the empirical result from this study is important so that the elements in this study can be recreated to be tested in future research and benefit other populations as well. Lastly, the results can be insight so that teachers in future will be able to manage their emotions better and work on improving their strengths and weaknesses in the classrooms. The insight which will be collected through this study could be useful for school and ministry management to develop training to upskilling and reskilling Malaysian teachers in future based on their strength and weakness.

Methodology

The methodology section explains the retrieval process of articles related to emotion regulation strategies among science teachers from the resources used such as Mendeley, Google Scholar and Semantic Scholar. The authors used the method called established guideline and the process used to run the systematic review includes systematic searching strategy (identification, screening, and eligibility) and data extraction and analysis.

Conducting Systematic Literature Review

Guided used for the review process is established guidelines by Alexander (2020); Newman & Gough (2020); Soledad (2018); Xiao & Watson (2019) specifically for education field. The crucial steps of a systematic literature review can be summarized in nine distinct but interconnected steps. The steps include (1) formulate research question, (2) design conceptual framework, (3) establishing justifiable inclusion and exclusion criteria, (4) develop search strategy, (5) conducting the review, (6) study quality assessment, (7) extract data, (8) analyse and synthesize data, and (9) report findings.

Formulation of Research Questions

The formulation of research questions in this study were utilised using two sources; first, ideas from previous studies by Uzuntiryaki-Kondakci et al (2020, 2021). These articles discussed on what and how do teachers regulate their emotions in the classroom. The second source is based on the mnemonics of PICo, by which the letters have their own meanings. For example, ‘P’ signifies Population or Problem, ‘I’ signifies Interest and ‘Co’ signifies Context (Lockwood et al., 2015). Thus, the authors make use of three concepts as part of the review such as science teachers (Population), common emotion regulation strategies (Interest) and based on previous studies (Context). As such, the main formulated research question of this study is “What are the most common emotion regulation strategies among science teachers based on previous studies?”

Systematic Review Process

Identification, screening, and eligibility are the three key steps involved in the systematic searching strategies process (Stephanidis, 2016) as illustrated in the Figure 1 below.

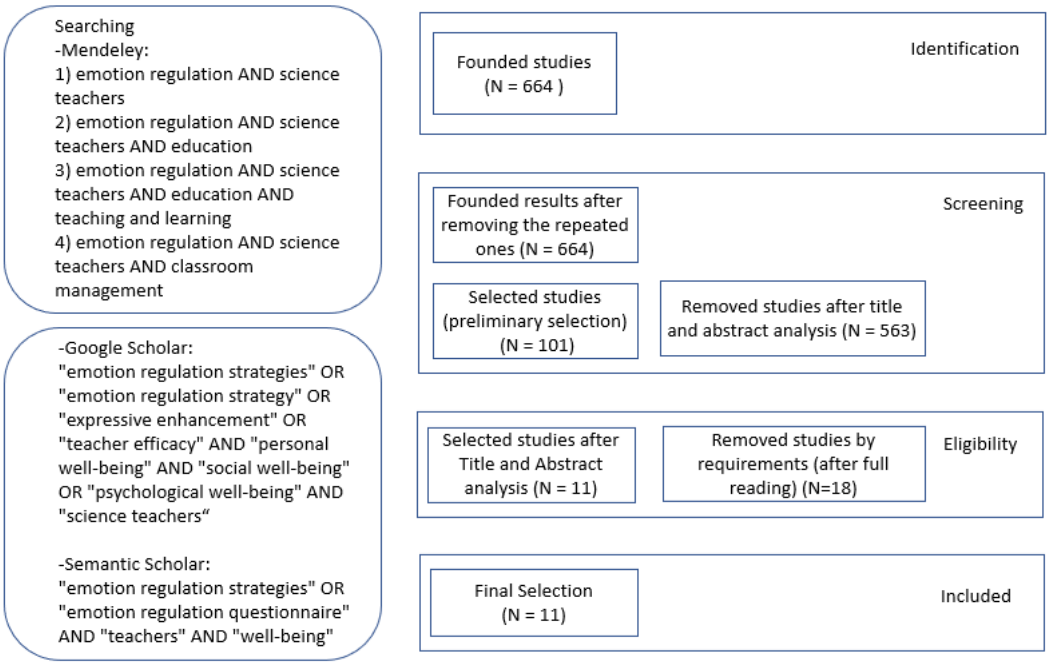

Figure 1. Systematic Literature Review Process (Stephanidis, 2016).

Identification

After formulating the research question, some keywords were identified such as: emotion regulation, science teachers and education. These keywords then involved in enrichment process by sighting its synonym in online Thesaurus, related terms and variations by past studies, suggested keywords in Mendeley database as well as opinions from experts. According to this process, several keywords from searching string were identified which also suggested by experts such as 1) emotion regulation AND science teachers, 2) emotion regulation AND science teachers AND education, 3) emotion regulation AND science teachers AND education AND teaching and learning, and 4) emotion regulation AND science teachers AND classroom management were checked. From Mendeley alone, there were 242 results, 163 results, 117 results and 32 results for the first, second, third and fourth keywords respectively. Altogether, there were 554 articles from identification process through Mendeley.

The next attempt was to use searching string on the other two databases such as Google Scholar and Semantic Scholar. Keywords similar to emotion regulation among teachers are emotion regulation strategies, emotion regulation strategy, expressive enhancement, teacher efficacy, personal well-being, social well-being, psychological well-being and science teachers from Google Scholar. Whereas keywords namely emotion regulation strategies, emotion regulation questionnaire, teachers, and well-being were checked from Semantic Scholar. The process involved to combine these keywords were using search functions, such as phrase searching, field code functions, truncation, Boolean operators, and wild cards. A 'handpicking' method was used in these databases resulting a total of 110 articles found from these two chosen databases. Combined with identification keywords from Mendeley, the total of articles identified from this process is 664 articles. The searching string used in this study is shown in Table 1:

Table 1
Keywords and Searching String Used

Databases	**Keywords used**
Google Scholar	"emotion regulation strategies" OR "emotion regulation strategy" OR "expressive enhancement" OR "teacher efficacy" AND "personal well-being" AND "social well-being" OR "psychological well-being" AND "science teachers"
Semantic Scholar	"emotion regulation strategies" OR "emotion regulation questionnaire" AND "teachers" AND "well-being"

Screening

In screening, the criteria of the selected articles are narrowed even more. In other words, the exclusion criterion is determined such as type of article, year published, and language chosen. This study screened 101 selected articles and only selected articles from 2018 to 2021 as suggested by expert due to impossibility of reviewing all the existing articles that published on databases, as suggested by Okoli (2015) who highlighted the importance of determining range of period that authors are able to review. This is due to the sufficient number of published studies to have a representative review. This study also marking on research paper with empirical data since it offers primary data. Particularly, the authors decided to incorporate articles written in English to avoid confusion. This process had removed 563 articles that did not fit the inclusion criteria and three articles were removed as they are duplicated. Lastly, with regard to objectives which focus on common emotion regulation strategies among teachers, only related articles are selected. The inclusion and exclusion criteria in this process is as shown in Table 2:

Table 2
The Inclusion and Exclusion Criteria

Criterion	**Eligibility**	**Exclusion**
Literature type	Journal (research articles)	Journals of systematic review, book series, book, book's chapters, conference
Language	English	Non-English
Timeline	2018-2021	<2018

Eligibility

Next process involved in this study is eligibility, a process by the selected articles from the screening process to be manually monitored in making sure they are in line with the criteria set. In this stage, the title and abstract of the selected articles will be read in details to make sure only relevant articles will be selected in the next stage. Then, only 11 articles were selected after excluding 90 articles including the three duplicated articles from different databases.

Quality Appraisal

A quality appraisal was done to ensure the quality of the articles' content for the purpose of quality assessment. The quality of reviewed articles was assessed after presented and compared qualitatively after they have fulfilled the inclusion criteria, which also called as

Primary Studies (PSs). Kitchenham & Charters (2007) suggested that the PSs was assessed by the mean of Quality Assessment (QAs). There were six QAs defined such as:

- QA1. Is the purpose of the study clearly stated?
- QA2. Is the interest and the usefulness of the work clearly presented?
- QA3. Is the study methodology clearly established?
- QA4. Are the concepts of the approach clearly defined?
- QA5. Is the work compared and measured with other similar work?
- QA6. Are the limitations of the work clearly mentioned?

For each of the articles, the evaluation of QA was scored by:
Yes (Y) = 1, Partly (P) = 0.5 or No (N) = 0.

To determine the rank of the quality, only articles with a score of more than 3.0 should be reviewed since the average of 6.0 (total marks) is 3.0. After being reviewed, there were 11 articles ranked as at least average, which makes them eligible for the review.

Data Abstraction and Analysis

A method in conducting the study is based on an integrative review. It is also known for method that allows combination of experimental and non-experimental study for a better comprehension regarding a phenomenon of interest. In addition, data can be obtained from theoretical and empirical literature for purposes of defining concepts, reviewing theories and evidence, and examining issues methodologically (Broome, 1993). On top of that, integrative review is best analysed using qualitative or mixed-method approach that allows the study to compare multiple primary data sources iteratively (Whittemore & Knafl, 2005). In this study, qualitative technique is selected, and all nine articles are read thoroughly especially in the abstract, result and discussion's sections. This process takes place from the formulated research question, by which data from studies that have been reviewed that capable of answering the research question are tabulated and abstracted. In that event, a thematic analysis was performed to analyse the abstracted data. It is an effort to identify themes and sub-themes which can attain the identified themes related to common emotion regulation strategies among science teachers in Malaysia. According to Braun & Clarke (2006), the identified themes are related to recognizing patterns and themes in the abstracted data, as well as clustering, counting, underlining similarities, and establishing relationships. Moreover, this method can also minimize data in a flexible pattern that can be entwined with other data analysis methods (Vaismoradi et al., 2013)

In thematic analysis, the first process that took place is to develop themes. It was done by identification of patterns of the abstracted data from the reviewed articles are turned up and pooled in a group as well as research question of the present study. This process is known as deductive analysis. Eventually, this created a total of five main groups. Then, they were re-examined for the authors to find out that there are another 19 sub-groups. Next, the authors review the accuracy of these themes by re-examining all the five main and 18 sub-themes to make sure they are useful and accurate as a set of data representation. As a result, two sub-themes were excluded – cognitive theme under the theme of teacher, and online learning theme under the theme of classroom management. Then, after this process was accomplished, the patterns that were finalized are four main themes and 13 sub-themes. Subsequently, the authors put any word to name the themes for each group and their sub-

group. This process is called naming and it was done by going through the main groups first and later the sub-group, as shown in Table 3:

Table 3
The Themes and Sub-Themes Emerged

					Emotion			Teacher						Classroom management	Student			
Studies		Years	Region	Design	PE	NE	ER	TW	ST	SE	R	WX	WV	CM	SB	A	EG	MV
1.	Brouskeli et al.	2018	Greece	QN				/	/		/		/			/		
2.	Conde	2018	Canada	QN	/	/	/	/		/		/				/		/
3.	Lamminpaa & Vesterinen	2018	Finland	QL	/	/	/		/				/	/		/	/	
4.	Borracher o et al.	2019	Spain	QN	/	/	/		/	/		/	/	/		/		/
5.	Akfirat	2020	Turkey	QN	/	/	/	/		/		/						
6.	Jeans	2020	United States	QN												/		
7.	Uzuntiryaki-Kondakci et al.	2020	Turkey	QN	/	/	/		/	/			/		/		/	/
8.	Wei et al.	2020	Malaysia	QN	/	/	/			/		/						
9.	Han & Xu	2021	China	QL	/	/	/			/	/				/	/	/	/
10.	Uzuntiryaki-Kondakci et al.	2021	Turkey	QL	/	/	/		/	/		/	/	/	/	/	/	/
11.	Keleynikov et al.	2022	Israel	QN	/	/	/	/			/	/	/					

PE: positive emotion
NE: negative emotion
ER: emotion regulation
TW: teacher's well-being
ST: Science teachers
SE: self-efficacy
R: resilience
WX: working experience
WV: working environment
CM: classroom management
SB: student behaviour
A: achievement
EG: engagement
MV: motivation

This technique was also used for the development of themes by corresponding author and co-authors regarding the theme of the findings. Within this process, any inconsistencies, ideas, problems or thought were discussed thoroughly by researcher in relation to the data interpretation until they agreed about the finalized themes and sub-themes that have been developed. After that, the themes were presented to two panel experts. They are experts in education. The experts were demanded to evaluate four themes and 13 sub-themes non objectively. Lastly, they agreed that the themes and sub-themes developed can be used since they are relevant and appropriate to the results of the current study.

Results

Background of the Selected Articles

This systematic literature review managed to get 11 articles to be reviewed in total. After going through thematic analysis, there were four themes developed namely emotions, teacher, classroom and student. The result of further analysis produce another 13 sub-themes. Under theme of emotion, there were three sub-themes such as positive emotion, negative emotion and emotion regulation. Under second theme namely teacher, there were six sub-themes such as teacher well-being, science teachers, self-efficacy, resilience, working experience and working environment. There was no sub-theme under theme of classroom management. For the last theme; student, there were four sub-themes such as student's behaviour, achievement, engagement and motivation. Out of 11 selected articles, three studies were conducted in Turkey, and one study was conducted in these countries such as Canada, China, Finland, Greece, Israel, Malaysia, Spain and United States. Out of the 11 articles reviewed, three were published in 2018, one in 2019, four in 2020, two in 2021, and one in 2022.

The Themes and the Sub-themes

Emotion

Under this theme, there are three sub-themes found namely positive emotion, negative emotion and emotion regulation. The first and second sub-themes involving various of emotions experienced by teachers. Generally, teacher feels a lot of emotions while teaching, both positive and negative. For example, they experience contentment and enjoyment as well as anger and worry with regards to the objective of lesson. Negative emotion that teachers feel most frequent is worried whether the students can grasp the idea of lesson, and anger when dealing with classroom management issues (Uzuntiryaki-Kondakci et al., 2021). Other common positive emotions felt by other teachers along with uncertainty and stress are happiness and love. Meanwhile, for negative emotion such as anxiety, anger, frustration, disappointment, pain, guilt, sadness, exhaustion (Han & Xu, 2021; Borrachero et al., 2019). In science subject specifically, positive emotions such as curiosity even felt by teachers as it is fundamental in scientific activities as well as confidence and satisfaction when they can do reasoning on their own. Another example of positive emotion namely enthusiasm, followed by satisfaction, confidence and joy also reported by science teachers after their students succeeded in problem solving (Borrachero et al., 2019). Furthermore, a new norm of open and distance learning which require teachers to try new teaching methods have both positive and negative impacts on them (Kolumbayeva et al., 2020).

The third sub-theme is emotion regulation. In dealing with negative emotions, teachers have their own way or skills to regulate them. There were past studies that discovered teachers regulate their emotions for hedonic goals. For example, teachers tend to use the intrinsic regulation to avoid or decrease negative emotion and extrinsic regulation to increase positive emotion during classroom management issues. This was done by upregulating their students' positive emotions because teachers are aware of the emotion portrayed by students and the effort is to increase their motivation and engagement in class (Han & Xu, 2021; Uzuntiryaki-Kondakci et al., 2021). On top of that, teachers use antecedent-focused emotion regulation approach through "situation selection". In addition, there are also teachers use cognitive change approach to regulate their emotions. They upgrade or downgrade the meaning of emotions and its precursor, reassessing the relationship between

student achievement, supervision, and teachers' own goals in life, as well as assessing students' and teachers' control on students' achievement (Han & Xu, 2021). From the articles that being reviewed, result found that the emotion and its regulation is positively associated with each other.

However, negative emotion is not related to it. For example, when negative emotions among science teachers increases, the regulation method utilized is less, further decreases the teacher efficacy beliefs (Uzuntiryaki-Kondakci et al., 2020). It is also found that, teachers looked alternative self-regulating techniques to adjust what was impeding their self-efficacy to cope with any difficulties arose. The teachers also are aware of their own competence by just overcoming it (Borrachero et al., 2019). It is hypothesized that the association between self-efficacy and positive emotion is found and it may done by implementing self-regulated learning skills (Conde, 2018), together with other variables namely self-esteem, adaptive and maladaptive cognitive emotion regulation techniques, and hopelessness were the predictor of psychological well-being (individually and together) (Akfirat, 2020).

According to a study by Keleynikov et al (2022), MBIs (mindfulness-based interventions) has been proven to improve teacher's mental health. The emotion regulation among teachers has increased through their participation in C2C-IT (The Call2Care-Israel for Teachers) which then improved their work engagement and lower the emotional distress. It has been witnessed that teachers apply more effective emotion regulation such as acceptance and appraisal. This is done by strengthened positive cognitive emotional process, together with disrupting the negatives. On top of that, a study by Wei et al (2021) implied that a good metacognitive skill can prepare teachers to have their own emotion regulation strategies in coping themselves with stress. This indirectly enable them, especially pre-service teachers to have a realistic self-efficacy in their career. Although the present study is about teachers' emotions, somehow there was a study showed different perspective of emotion regulation strategies by students through humour. It can regulate negative emotion such as nervousness, disappointment, uncertainty, boredom, and frustration in the fear of failure to take place (Lamminpaa & Vesterinen, 2018).

Teacher

Under the second theme, there are seven sub-themes found namely teacher well-being, resilience, science teachers, self-efficacy, working experience and working environment. First is teacher well-being. School type is found to be related to teacher's occupational well-being. For example, teachers from Professional Secondary and Lower Secondary schools have greater levels of well-being compared to those from Upper Secondary schools. In Malaysia, (Kementerian Pendidikan Malaysia, 2014) explained that most schools in Malaysia have a high willingness to improve the implementation of Professional Learning Communities in Malaysia. The Professional Learning Community also has a mandate from the Malaysian Ministry of Education to improve the quality of education.

The reason of lower secondary schools have greater sense of well-being due to the stress faced by Upper Secondary Schools teachers in making sure the students could pursue education in university for higher education. Resilience level among teachers is positively correlated with occupational well-being but does not affect the years of teaching experience (Brouskeli et al., 2018). This is under the second sub-theme and the third sub-theme is science teachers. Teachers' pedagogical content knowledge (PCK) in science teaching was related to their emotions. This is said to be a mastery goal orientation, longer experience in teaching,

and greater self-efficacy beliefs. These attributes give a better emotion to the teachers who have it compared to those other teachers that have lower level of PCK (Uzuntiryaki-Kondakci et al., 2021), thus it was found to be associated with their self-efficacy.

This brings us to the fourth sub-theme, namely self-efficacy. Study by (Conde, 2018) suggested a positive correlation between positive affect and self-efficacy but no correlation between the negative ones. Meanwhile for some other teachers, they experienced pedagogical pleasure and intellectual pleasure when they witnessed students' achievement and progress, and when their motivation and enjoyment was ignited by an extended knowledge boundary, known as self-efficacy, respectively (Han & Xu, 2021). Regarding teachers' working experience, pre-service teachers tend to be caught up by negative emotions such as worry, stress and nervousness instead of use self-regulation strategies (Borrachero et al., 2019). However, another study conducted by Conde (2018) found that self-efficacy do not get affected by years of teaching experience. This is due to no significant difference between pre-service and in-service teachers on their mean levels of self-efficacy, but it is not found.

Classroom Management

Under this theme, there is no sub-theme found and this theme is developed to highlight how classroom management with other variables as well, affect teacher emotions. When teachers engage with students in learning through different teaching strategies effectively as well as an effective classroom management skill, the approach of student-centered can be achieved since it enables students to be cognitively, physically, and affectively active, suits the nature of science curriculum. This explains why study about teachers' emotion is crucial among science teachers in teaching science context. Besides the physical classroom with chalk and board, a laboratory also identified as a classroom and it was fun for students to learn there. For example, laboratory activity in science specifically was proven to make the students feel free from pressure in their learning, self-reliance, and self-determination, through portraying, sharing, and proving their own ideas, as well as the emotions elicited (Borrachero et al., 2019). Classroom ambience and mood can also be lightened through humour, learning feels more enjoyable when not only students, but teachers as well apply it especially when dealing with difficulties in tasks (Lamminpaa & Vesterinen, 2018).

Student

For the last theme of the present study, sub-themes developed are student's behaviour, achievement, engagement, and motivation. Study by Jeans, (2020) confirmed the association between externalizing behaviour and relationship quality existed. In other words, both relationship closeness and conflict are correlated with the way students behave in the classroom. Generally, all attributes involving students like motivation, engagement, and achievement-when they understood the concepts, contributed to positive emotions among teachers. They somehow felt angry when the students acted otherwise (Uzuntiryaki-Kondakci et al., 2020). The feeling of believing in themselves to maintain the students' engagement and alternative teaching and classroom management strategies especially when they feel positive emotions is called self-efficacy, and they are related to each other (Uzuntiryaki-Kondakci et al., 2020). From a study by Han & Xu (2021), teachers feel joyful when students can talk about both academic and non-academic issues with them because they think students can engage well with them.

In addition, they also feel happy when dealing with competent and excellent students when the students achieve the purpose of learning. However, when the students do the work poorly such as in missing deadlines repeatedly, it will trigger anger among the teachers and lead them to feel exhausted. Student behavior such as lack of self-discipline and low ability to complete up the tasks given independently will cause teachers to feel anxious. Teachers' frustration also is induced by the student's failure to show progress, which when occurred repeatedly prone to be exhaustion and sadness. Surprisingly, there was a study conducted signified students from higher socio-economic status resulted in a lower level of teacher's occupational well-being. Even though it seemed strange with the conclusion found between these two variables, it happened because of the element "school" has a significant effect in the contentment among teachers (Brouskeli et al., 2018).

Discussion

The thematic analysis developed four themes and 13 sub-themes. In this section, further information is discussed and presented on the developed themes. Table 4 shows the summary of themes and sub-themes developed throughout this study.

Table 4
Summary of Themes and Sub-themes

Themes	**Sub-themes**
Emotion	Positive emotion Negative emotion Emotion regulation
Teacher	Teacher well-being Science teachers Self-efficacy Resilience Working experience Working environment
Classroom management	-
Student	Student's behaviour Achievement Engagement Motivation

Emotion experienced by teachers and the emotion regulation they applied can be correlated as bidirectional (Frenzel et al., 2009). The relationship between these two variables also emphasized by control-value theory of achievement emotions (Pekrun et al., 2002, 2014). This theory is explained as a condition where teachers might feel more positive emotion and less negative emotion when they regulate their emotions. For example, they tend to enjoy themselves more while teaching, more interested with their students, are more eager with their instruction, and feel less worried, angry, or nervous than teachers who apply hardly any emotion regulation strategies. As reviewed in result, Borrachero et al (2019) explained that teachers viewed obstacles as a challenge for them thus increase their self-efficacy.

Previous research also found that people with high self-efficacy recognised complicated work as challenges to be overcome instead of see it as threats to escape from (Malmberg et

al., 2019), and indeed, they are perceived as challenges that necessitate a greater commitment (Whyte et al., 1998). Instead, people who are unsure of their competence perceive such scenarios to be much more complex and difficult than they are, resulting in despondency and an incapability to solve the problems (Agbornu & Edekor, 2020). Self-efficacy is proven to be achievable when teachers experience positive emotions, which also increases their motivation when the students achieve specific goals of learning or when the parents give positive feedbacks (Hargreaves, 1998, 2000). In general, emotional responses aid an individual's functional adaptive response to stressful or unfavorable circumstances (Lasa-Aristu et al., 2019).

Science teachers' attributes such as well-being, resilience, self-efficacy, working experience and working environment more or less is correlated with their emotions. Emotion regulation strategies used by science teachers were associated with high self-efficacy beliefs. When faced with unexpected situations related to their instruction, science teachers may use emotion regulation strategies; as a result, they develop competence to deal with classroom management issues, increase student learning through effective instructional methods and strategies, and choose effective assessment methods (Soric et al., 2013). Pre-service teachers, or also known as teacher candidates in their final year of education who were enrolled in a teacher education programme, did not regulate their emotions. This is due to low self-efficacy resulted from the difficulties they must endure as a teacher, in the absence of data in laboratory activities for instance. This experience was totally different from the enjoyable moment they remembered in their undergraduate education. As a result, they were aware of the drawback psychologically and pedagogically (discovering how to self-regulate, comprehending key concepts, and considering potential strategies, etc.). When they have low self-efficacy, they will be emotionally vulnerable, viewing the problems in class as a constant threat associated with anxiety (Tahmassian & Moghadam, 2011). However, this contradicts with a finding by Conde (2018) where the teachers' years of teaching experience does not affect their self-efficacy.

Pre-service or in-service teachers have been reported to have access to different rewards in academic (i.e., scholarship) and adequate grades. On top of that, these teachers do not have problem in self-regulation because they just had completed their study, as stated by Boekaerts & Corno (2005), being a student or a recent graduate at a university is crucial because educational settings promote bottom-up self-regulation. Bottom-up self-regulation requires students to gather information from their surroundings to achieve a specific goal. Feedback from the educational setting clarifies goals and delivers information to alter or continue improving how an individual's self-regulated learning components are used (Boekaerts & Corno, 2005). For example, if students continue to miss previously agreed-upon deadlines, a supervisor or tutor may provide feedback on time management. This feedback serves as an environmental cue for a student to improve his or her time management by allocating more time to a task.

In terms of student and classroom management, it is concluded that students in the inquiry-type investigation found the laboratory learning environment to be more open-ended and integrated with a conceptual framework than students in the control group, according to findings by (Hofstein, 2004). Furthermore, discussion and collaboration with classmates may aid certain students in seeing the teacher's task as relevant. For example, novices around 16-

year-old students frequently failed to reach a point where they could engage in meaningful conflict. What the teacher finds meaningful for his or her students will not be significant for them. The topics and problems offered to students must be relevant to them in order for them to consider new data or information presented as significant. That is, students must be interested in and motivated by the learning activities. They must also have some past knowledge to comprehend the new knowledge. In line with the previous findings by Lamminpaa and Vesterinen (2018); Berge and Danielsson (2013) which highlighted humour which are relevant to the field under study was also important in developing a collective identity as students. In terms of teacher well-being and its relationship with students' socio-economic status, specific school culture or local policy could be the factors that have the ability to modify the concept of well-being, and is considered as major factors which influence the teachers well-being status. A third element, such as the teacher's relationship with a more or less demanding parent, could also mediate between pupils' socio-economic status and their teachers' well-being level.

Recommendation

A few recommendations have been suggested for the consideration of future scholars. First, more studies needed to work on the emotion state as well as the emotion regulation strategies they apply among teachers in Asia Pacific region since not much studies have been carried out so far in these countries, thus there are not much evidence on teachers in Malaysia. This review also revealed that in future, studies among science teachers are very much needed due to only half percentage of articles reviewed discovered about teachers emotion in science field specifically. For a variety of reasons, the research is crucial and beneficial. First, the stakeholders' sensitivity on the emotion experienced among teachers to get the bigger picture theoretically on how teachers perceive their emotions both positively or negatively according to specific factors in school; second, as the highlight of the review by which to identify the most common emotion regulation methods done by science teachers; third, as a key to everyone involved in emotions portrayed by teachers to others, especially students and lastly, the parts of this study can be replicated and tested in future studies, benefiting other groups as well. According to the pattern recognised from previous studies, this study agreed with Borrachero et al (2019); Wei et al (2021) that highlight the importance of pre-service teachers to be prepared with metacognitive skills in helping them to regulate emotions, enable them to have self-efficacy, and improve the quality as teachers. Therefore, this gap should be addressed in future studies. On top of that, future researchers can investigate how does students achievement, behaviour and engagement can contribute to teachers' emotions in any way. For example, positive emotion such as enthusiasm, satisfaction, confidence and joy reported by teachers after their students succeeded in problem solving (Borrachero et al., 2019).

Conclusion

This study has one main purpose which is to systematically review the most common emotion regulation strategies among science teachers based on previous studies. As a result, several significant contributions have been identified for practical purposes and knowledge base. From the review, interested parties such as the policy maker, researchers, stakeholders-teachers and students can benefit from this study. The result of this study offers some basics knowledge about emotions generated among science teachers and the factors of certain emotions-positive and negative. The review concluded that teachers regulate their emotions

through instinsic regulation, antecedent-focused emotion regulation, cognitive change, acceptance and appraisal. When teachers succeeded on regulating their emotions, their well-being can be achieved through a positive emotion developed from emotion regulation technique itself in return. In addition, other factors that contribute to their emotion can also be identified from students' engagement, achievement and motivation. Teacher should be able to increase their self-efficacy beliefs if they view the obstacles they face in class as a challenge to accept, rather than to give up easily and eventually can improve their instruction in the classroom.

Acknowledgement

This study have no reported competing financial interests or grant providers that would appear to have influenced the study disclosed in this publication. Writing this publication would have been not completed without assistance from many parties. Sincere thanks to Universiti Teknologi MARA, Puncak Alam campus for providing meaningful webinars from such as NVIVO training and Journal Article Writing Systematic Literature Review Course that provide helps to complete up this paper.

Corresponding Author

Nor Tutiaini binti Ab.Wahid

Universiti Teknologi MARA Faculty of Education Aras 5 & 7, Bangunan FSK 1, 5 Kampus Puncak Alam 42300 Bandar Puncak Alam Selangor Darul Ehsan, MALAYSIA

Email: tutiaini@uitm.edu.my

References

Aelterman, A., Engels, N., Van Petegem, K., & Verhaeghe, J. P. (2007). The well-being of teachers in Flanders: The importance of a supportive school culture. *Educational Studies*, *33*(3), 285–297. https://doi.org/10.1080/03055690701423085

Agbornu, S., & Edekor, K. L. (2020). Relationship between Senior High School Students' Mathematics Self-Efficacy, Self-concept and Their Mathematics Achievement in Twifo Hemang Lower Denkyira District, Ghana. *American Journal of Educational Research*, *8*(9), 698–704. https://doi.org/10.12691/education-8-9-12

Akfirat, O. N. (2020). Investigation of Relationship Between Psychological Well-Being, Self Esteem, Perceived General Self-Efficacy, Level of Hope and Cognitive Emotion Regulation Strategies. *European Journal of Education Studies*, *7*(9), 286–306. https://doi.org/10.46827/ejes.v7i9.3267

Berge, M., & Danielsson, A. T. (2013). Characterising Learning Interactions: A Study of University Students Solving Physics Problems in Groups. *Research in Science Education*, *43*(3), 1177–1196. https://doi.org/10.1007/s11165-012-9307-0

Boekaerts, M., & Corno, L. (2005). Self-regulation in the classroom: A perspective on assessment and intervention. *Applied Psychology*, *54*(2), 199–231. https://doi.org/10.1111/j.1464-0597.2005.00205.x

Borrachero, A. B., Brígido, M., Dávila, M. A., Costillo, E., Cañada, F., & Mellado, V. (2019). Improving the self-regulation in prospective science teachers: the case of the calculus of the period of a simple pendulum. *Heliyon*, *5*(12). https://doi.org/10.1016/j.heliyon.2019.e02827

Brouskeli, V., Kaltsi, V., & Loumakou, M. (2018). Resilience and occupational well-being of secondary education teachers in Greece. *Issues in Educational Research*, *28*(1), 43–60.

Conde, C. F. (2018). *Understanding Teacher Strengths: Self-Regulated Learning and Self-efficacy in a Canadian Sample of Pre-and in-service Teachers*. https://doi.org/10.11575/PRISM/32863

Frenzel, A. C., Goetz, T., Stephens, E. J., & Jacob, B. (2009). AFrenzel, A. C., Goetz, T., Stephens, E. J., & Jacob, B. (2009). Antecedents and effects of teachers' emotional experiences: An integrated perspective and empirical test. In P. A. Schutz & M. Zembylas (Eds.), Advances in teacher emotion research: The impa. *Advances in Teacher Emotion Research: The Impact on Teachers' Lives*, 129–151.

Han, Y., & Xu, Y. (2021). Unpacking the Emotional Dimension of Doctoral Supervision: Supervisors' Emotions and Emotion Regulation Strategies. *Frontiers in Psychology*, *12*(June), 1–12. https://doi.org/10.3389/fpsyg.2021.651859

Hargreaves, A. (1998). The emotional practice of teaching. *Teaching and Teacher Education*, *14*(8), 835–854. https://doi.org/10.1016/S0742-051X(98)00025-0

Hargreaves, A. (2000). Mixed emotions: Teachers' perceptions of their interactions with students. *Teaching and Teacher Education*, *16*(8), 811–826. https://doi.org/10.1016/S0742-051X(00)00028-7

Higgins, J. P. T., Altman, D. G., Gotzsche, P. C., Juni, P., Moher, D., Oxman, A. D., Savovic, J., Schulz, K. F., Weeks, L., & Sterne, J. A. C. (2011). The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ (Online)*, *343*(7829), 1–9. https://doi.org/10.1136/bmj.d5928

Hofstein, A. (2004). The Role of Laboratory in Science Teaching and Learning The Weizmann Institute of Science , Department of Science Teaching THIRTY YEARS OF EXPERIENCE WITH. *Chemistry Education Research and Practice*, *5*(3), 247–264. https://doi.org/10.1007/978-94-6300-749-8

Jeans, B. (2020). The Association of Emotion Regulation with Student Teacher Relationship Quality in The Context of Poverty A. Retrieved July 28, 2022, from https://scholarshare.temple.edu/handle/20.500.12613/4761

Keleynikov, M., Benatov, J., & Berger, R. (2022). Preschool Teachers' Psychological Distress and Work Engagement during COVID-19 Outbreak: The Protective Role of Mindfulness and Emotion Regulation. *International Journal of Environmental Research and Public Health*, *19*(5). https://doi.org/10.3390/ijerph19052645

Kolumbayeva, S. Z., Lantseva, T. V., & Kiyassova, B. A. (2020). Emotional Work of the Teacher in the Conditions of the Online Educational Environment. *Bulletin Series of Pedagogical Sciences*, *68*(4), 71–77. https://doi.org/10.51889/2020-4.1728-5496.10

Lamminpaa, J., & Vesterinen, V. M. (2018). The use of humour during a collaborative inquiry. *International Journal of Science Education*, *40*(14), 1718–1735. https://doi.org/10.1080/09500693.2018.1508926

Lasa-Aristu, A., Delgado-Egido, B., Holgado-Tello, F. P., Amor, P. J., & Domínguez-Sánchez, F. J. (2019). Profiles of cognitive emotion regulation and their association with emotional traits. *Clinica y Salud*, *30*(1), 33–39. https://doi.org/10.5093/clysa2019a6

Malmberg, J., Jarvela, S., Holappa, J., Haataja, E., Huang, X., Siipo, A., Hadwin, A. A. F., Oshige, M., Buder, J., Hesse, F. W., Jarvenoja, H., Jarvela, S., Lane, J. D., Shepley, C., Spriggs, A. D., Isohatala, J., Naykki, P., Jarvela, S., Webster, E. A., … Seppanen, T. (2019). Within Self-Regulated Learning. *Handbook of Self-Regulation of Learning and Performance*, *100*(May), 13–15. https://doi.org/10.1016/j.chb.2018.12.019

Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research.

Educational Psychologist, *37*(2), 91–105. https://doi.org/10.1207/S15326985EP3702_4

Pekrun, R., Hall, N. C., Goetz, T., & Perry, R. P. (2014). Boredom and academic achievement: Testing a model of reciprocal causation. *Journal of Educational Psychology*, *106*(3), 696–710. https://doi.org/10.1037/a0036006

Soric, I., Penezic, Z., & Buric, I. (2013). Big Five personality traits, cognitive appraisals and emotion regulation strategies as predictors of achievement emotions. *Psihologijske Teme*, *22*(2), 325–349.

Tahmassian, K., & Moghadam, N. J. (2011). Relationship between self-efficacy and symptoms of anxiety, depression, worry and social avoidance in a normal sample of students. *Iranian Journal of Psychiatry and Behavioral Sciences*, *5*(2), 91–98.

Uzuntiryaki-Kondakci, E., Kirbulut, Z. D., Oktay, O., & Sarici, E. (2021). A Qualitative Examination of Science Teachers' Emotions, Emotion Regulation Goals and Strategies. *Research in Science Education*. https://doi.org/10.1007/s11165-020-09986-y

Uzuntiryaki-Kondakci, E., Kirbulut, Z. D., Sarici, E., & Oktay, O. (2020). Emotion regulation as a mediator of the influence of science teacher emotions on teacher efficacy beliefs. *Educational Studies*, *00*(00), 1–19. https://doi.org/10.1080/03055698.2020.1793300

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing and Health Sciences*, *15*(3), 398–405. https://doi.org/10.1111/nhs.12048

Wei, Y. S., Hutagalung, F. D., & Peng, C. F. (2021). A Conceptual Paper: Moderating Effects of Metacognition and Gender on the Association between Emotion Regulation and Self-Efficacy Among Pre-Service Teachers. *KnE Social Sciences*, *2020*, 290–297. https://doi.org/10.18502/kss.v4i15.8218

Whyte, G., Saks, A. M., & Hook, S. (1998). When success breeds failure : The role of self-efficacy in escalating commitme ... *Journal of Organizational Behavior*, *18*(April 1996), 415–432.