



Mediating Role of Positive Emotions on Students' Self-Regulated Learning and Academic Achievement: A Case of Colleges of Education in the Bono Region, Ghana

***Maxwell Kwesi Nyatsikor, PhD**

ORCID: <https://orcid.org/0000-0001-5123-4905>

Institute for Distance and Continuing Learning, University for Development Studies, Ghana

Email: mnyatsikor@uds.edu.gh

Augustine Bediako

ORCID: <https://orcid.org/0000-0001-9910-8692>

Department of Education, Alfaruq College of Education

Email: bediako284@gmail.com

Abubakari Iddrisu

ORCID: <https://orcid.org/0000-0002-0417-6703>

College of Distance Education, University of Cape Coast, Ghana

Email: alhajilee@gmail.com

Augustine Nuorikuu Gylku

ORCID: <https://orcid.org/0000-0002-8126-1071>

Department of Education, Alfaruq College of Education, Ghana

Email: augustinegyiliku@gmail.com

*Corresponding Author: mnyatsikor@uds.edu.gh

Copyright resides with the author(s) in terms of the Creative Commons Attribution CC BY-NC 4.0.
The users may copy, distribute, transmit and adapt the work, but must recognize the author(s) and the
East African Journal of Education and Social Sciences

Abstract: The study explored the mediating role of Ghanaian College of Education students' positive academic emotions in facilitating their self-regulation learning and academic achievement. The study utilized the descriptive cross-sectional design. The target population was 5,013 students from the three Colleges of Education in the Bono Region, of which 328 were selected for the study through a simple random sampling technique. Ethical protocols were strictly adhered to during the data collection, analysis and reporting stages of the study. The data were analysed using structural equation modelling. The study found statistically significant relationships between positive academic emotions and self-regulation learning and academic achievement. Of the constructs explored, the emotional states of joy and hope were the two most important variables mediating college students' self-regulating learning and achievement. The pride of success and relief associated with the execution of academic-related activities were comparatively less important constructs mediating students learning and achievement. Therefore, College of Education students should be consciously taught self-regulation strategies to sustain their learning. Moreover, reading, teaching and learning materials and resources should be presented in formats that will intrinsically sustain learners' enthusiasm and engagement.

Keywords: College students; emotions; self-regulatory learning; academic achievement.

How to cite: Nyatsikor, M. K., Bediako, A., Iddrisu, A. and Gylku, A. N. (2022). Mediating Role of Positive Emotions on Students' Self-Regulated Learning and Academic Achievement: A Case of Colleges of Education in the Bono Region, Ghana. *East African Journal of Education and Social Sciences* 3(3), 18-28. Doi: <https://dx.doi.org/10.4314/eajess.v3i3.175>.

Introduction

Improving the quality of learning at all levels of education is a prime concern for parents, teachers, governments and international organisations (OECD and Mo, 2019; UNESCO, 2019; Ghana Education Service Fact Sheet, 2020; World Bank, 2018). In achieving this objective, many studies, strategies and policies have been explored and applied in different contexts and countries (Pekrun, Moltenter, Titz and Perry, 2000; Bashir, Lockheed, Ninan and Tan, 2018; Meyer and Benavot, 2013). The diverse strategies and policies have resulted from many years of accumulated studies from different contexts, yielding different models and theories (Walberg, 2003; Creemers, Kyriakides and Sammons, 2010; Creemers and Kyriakides, 2012; Pekrun, Molfenter, Titz & Perry, 2000; 2006).

Predominantly, these theories and models highlight the importance of learners' psychological and emotional states in determining the quality of teaching and learning outcomes (Walberg, 2003; Bandura, 1997). According to Pekrun, Goetz, Titz and Perry (2002), emotions prepare and sustain reactions to important events and states by providing motivational and physiological energy. Emotions also facilitate attention, modulate thinking and trigger action-related wishes and intentions. For instance, learners' emotional states such as resentment, unhappiness, boredom, failure or elation, have been found to influence both the quantity and quality of learning (Pekrun and Linnenbrink-Garcia, 2014; Pekrun et al., 2002) and their attendant outcomes (Pandero, 2017; Zimmerman, 2015). According to Pekrun, Frenzel, Goetz and Perry (2007), these emotional states constitute achievement emotions tied with academic activities or outcomes. These achievement-driven emotions manifest in positive or negative experiences that impact the students' lives.

Studies from diverse contexts have established a profound effect of positive emotions on students' performance (Mega, Ronconi and De-Beni, 2014; Ben-Eliyahu, 2019; Burić and Sorić, 2012; Muis, Psaradellis, Lajoie, Leo and Chevrier, 2015). Evidence from literature indicates that students who feel competent in a domain perceive a higher level of control over learning and achievement activities, leading to higher enjoyment and less boredom (Pekrun & Stephens, 2010; Van der Beek, Van der Ven, Kroesbergen and Leseman,

2017). Thus, the positive academic emotion of feeling competent drive and facilitate self-regulated learning and better learning outcomes (Felicidad, Villavicencio and Bernardo, 2013; Gaeta, González and Guardado, 2021). On the contrary, negative academic emotions impede self-regulated learning and intended learning outcomes (Pekrun et al., 2007; Goetz, Nett and Hall, 2013).

According to Pekrun, Elliot and Maier (2009), the considerable impact and role of positive and negative emotional experiences in students' academic achievement cannot be overemphasized when students desire ultimate success in the academic domain. The important roles these emotional experiences and emotions play in influencing students' self-regulated learning and achievement has necessitated many psychological studies from different contexts and levels, resulting in diverse conclusions (Pekrun and Linnenbrink-Garcia, 2014; Yeager and Dweck, 2020; Gaeta et al., 2021). However, in educational and psychological studies, contextual differences such as national educational systems, cultural, social and economic structures and sample's characteristics matter in the results derived from such studies (Meyer and Benavot, 2013; Crossley, 2014; Bashir et al., 2018). It is against this background that this study sought to explore the extent Ghanaian College of Education students' positive emotions mediate their self-regulated learning and academic achievement. Two research questions were formulated to achieve this purpose.

1. To what extent do students' positive academic emotions mediate their self-regulated learning?
2. To what extent do students' positive academic emotions mediate their academic achievement?

Theoretical Framework

This study is anchored on the control-value theory of academic emotions (Pekrun, et al. 2000, 2006). The theory postulates the influence of emotions on achievement as connected with cognitive and motivational mechanisms (cognitive resources, learning motivation, learning strategies). According to the control-value theory, appraisals associated with self-regulation and the interest or value of the task play an essential role in learning (Pekrun, 2006). Favourable appraisals regarding competence are associated with positive

emotions (e.g. enjoyment, hope and pride), while unfavourable appraisals are linked to negative emotions (e.g. anger, anxiety, hopelessness and shame). On the other hand, granting an intrinsic value to a task produces higher levels of enjoyment, while the valence of emotions associated with the extrinsic value is variable. Thus, students have tendencies to hold varied reasons explaining their academic potentials and abilities, which can create a system of meaning that affects how to respond to academic situations.

These varied self-theories influence the way they perceive knowledge and abilities, self-regulating learning, interpreting and managing challenges within the academic situation (Lawson, Vosniadou, Van-Deur, Wyra and Jeffries, 2019; Yeager and Dweck, 2020). For example, Shirdel, Fakhri and Mirzaeyan (2018) found that attributing positive events to internal factors would enhance students' motivation for learning and further promote their self-regulated learning. Such students exercise greater control of their lives, including navigating their learning and self-regulating. As a result, any success or failure they encounter is solely due to their efforts.

Literature Review

This section reviewed related literature on students' emotions and how they influence their self-regulated learning and achievement in diverse ways.

Academic emotions and Students' Achievement

Researchers have discovered the influence of achievement emotions on motivation, self-regulation and students' cognitive processes (Camacho-Morles et al., 2021; Balaž, Marković and Brajša-Žganec, 2021). According to Kemeny and Shestyk (2008), emotions constitute an essential component of subjective well-being and psychological health. In different contexts and situations, learners' emotions may promote or inhibit their independent and self-regulated learning (Gaeta et al., 2021). Gaeta et al. (2021) contended that positive emotions need to be nurtured because they expand individuals' intellectual, physical and social resources, increasing the reserves they can draw when challenges or opportunities occur in learning.

Positive activating emotions (e.g., enjoyment) are thought to draw students' attention to learning tasks and facilitate the use of flexible learning strategies such as elaboration, critical thinking and metacognition (Artino-Jr and Jones, 2012; Pekrun et al., 2002; Ranellucci, Hall and Goetz, 2015) and which are positively related to motivation, effort, learning self-regulation and academic performance (Pekrun et al., 2002; Pekrun et al., 2007; Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011; Villavicencio and Bernardo, 2013). On the other hand, negative activating emotions create extrinsic motivation in students trying to avoid failure, allowing them to utilise strict learning practices, including rehearsal (Pekrun, 2006, Pekrun et al., 2002; Pekrun et al., 2011).

Negative, deactivating emotions (e.g., boredom) reduce persistence, effort, intrinsic motivation and attention and promote shallow information processing methods (Pekrun et al., 2007). They are also negatively related to students' learning strategies such as elaboration, metacognitive self-regulation and critical thinking (Cho and Heron, 2015; Artino, 2009; Artino and Jones, 2012). Students experiencing such emotions spend cognitive resources on irrelevant thoughts and concerns, diminishing their concentration and increasing test anxiety (Pekrun et al., 2002; Cho and Heron, 2015), leading to poor academic performance.

Academic Emotions and Self-regulated Learning

Zimmerman and Schunk (2001) defined self-regulation as the self-directive process through which learners transform their mental abilities into task-related skills. It is a form of acquiring knowledge and skills in which the learners are independent and self-motivated to choose their goals and learning strategies that will lead to achieving those goals (Pintrich, 2000). Achieving this partly depends on the learner's emotional state (Gaeta et al., 2021; Schunk and Greene, 2018; Perry, Hladkyj, Pekrun and Pelletier, 2001). These emotional states present an array of physiological, functional, and social/affective situations to respond to different contexts' demands (Pekrun, 2006; Camacho-Morles et al., 2021).

In the same vein, Wolters (2003) contended that regulation of emotions implies becoming aware,

monitoring, evaluating and modifying the occurrence, intensity and duration of particular emotional experiences that affect the learning process. Thus, self-regulated learning directs cognitive and affective processes, leading to control over many behaviours, including higher concentration levels during teaching and learning sessions (Sitzmann and Ely, 2011; Panadero, 2017; Zimmerman, 2015).

Pekrun et al. (2007; 2011) stated that positive emotions such as joy, enjoyment, hope and pride are positively associated with self-regulated learning, while negative emotions like anger, boredom and anxiety relate negatively to self-regulated learning. Extant empirical studies have equally found a negative impact of negative emotions on students' self-regulated learning and academic achievement (Chen and Wu, 2021; Karlen, Hirt, Liska and Stebner, 2021; Mega, Ronconi and De Beni, 2014).

Literature on the connections between positive emotions and student self-regulated learning and academic achievement is limited (Chen, et al., 2020; Karlen, Hertel and Hirt, 2020). Moreover, these limited studies largely relied on samples and contexts significantly different from the Ghanaian context regarding educational systems, school experiences, curricula and socio-economic backgrounds. This study, therefore, attempted to extend and build upon existing empirical work by exploring the extent the academic emotions of College of Education students in the Bono Region of Ghana mediate their self-regulated learning and academic achievement. Focusing on the Ghanaian context is key to contributing to existing knowledge in this area of study because emotions on learning vary depending on the component of

the learning process and the situational conditions considered (Pekrun and Linnenbrink-Garcia, 2014; Pekrun et al., 2007; 2011).

Methodology

Research Design

The study adopted the quantitative approach and used a descriptive cross-sectional survey design. This design allowed data to be collected from a cross-section of students concurrently from the sampled colleges.

Population and Sampling

The target population for the study was 5,013 students from three colleges of education students in the Bono Region. A simple random sampling technique was used to select a minimum sample of between 100 and 200 respondents from the participating colleges. This range of samples was appropriate for using the interpretation estimation with Structural Equation Modelling (SEM) as recommended by experts (Hair, Ortinau and Harrison, 2010). The author further argues that the determination of the minimum sample size for SEM is the number of indicators plus the number of latent variables multiplied by estimated parameters. Based on the guidelines, the minimum sample size for this study was calculated as $(23 + 2) \times 8 = 328$ respondents.

Instruments

A close-ended Likert scale questionnaire was developed to assess the impact of academic emotions on self-regulated learning and academic achievement for the students to indicate their responses. The statements were coded [1] representing 'strongly disagree' to [5] representing 'strongly agree.'

Table 1: Internal Reliability and Convergent Validity

Construct	Items	Reliability (α)	CR	AVE
Positive Academic Emotion	5	0.749	0.756	0.589
Students Achievement	8	0.755	0.716	0.623
Self-Regulated learning	13	0.867	0.786	0.765

Validity and Reliability

Table 1 shows the internal reliability and convergent validity of positive academic emotions for self-regulated learning and achievement. Cronbach's Alpha (α) for all latent constructs measured by their corresponding items were above the minimum requirement of 0.7 [$\alpha > 0.7$],

indicating greater consistency in measuring the same construct. Convergent validity [Composite Reliability (CR) and Average Variance Extracted (AVE)] and discriminant validity (Multicollinearity test) were tested to ascertain the item's reliability and validity. Convergent validity was determined by computing the AVE and CR. Their values were

above the minimum thresholds [AVE > 0.5, CR > 0.7], implying that the items used to measure positive emotions, students' achievement and self-regulated learning measure the amount of variance captured by the construct due to measurement error.

Statistical Treatment of Data

The data were analysed using the Structural Equation Modelling [SEM] technique using the Statistical Package for Social Science [SPSS] Amos version 23. A correlation analysis was computed to test the construct relationship between the independent variable [positive emotion] and the two dependent variables, students' self-regulated

learning and achievement, as shown in Figure 1. The correlation coefficients of inter-construct correlations between positive emotion and self-regulated learning [$R_{coefficient} = 0.56$] indicate a low positive relationship between the constructs. Inter-construct correlations between positive emotion and student achievement [$R_{coefficient} = 0.29$] indicate a weak positive relationship between the constructs, while inter-construct correlations between student achievement and self-regulated learning [$R_{coefficient} = -0.06$] indicate negative relationship between the constructs.

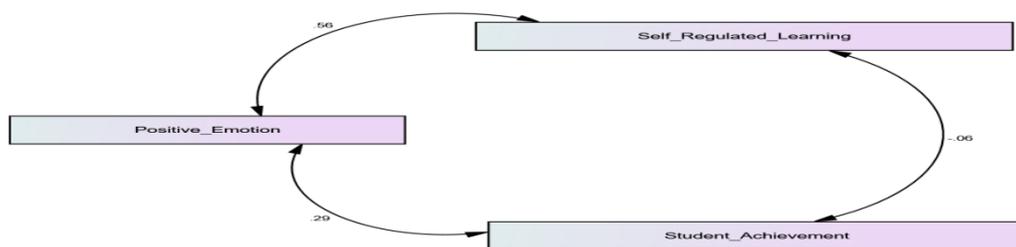


Figure 1: Structural Equation Model of positive emotion and students' self-regulation and achievement

Table 2: Hypothesis Coefficients

Construct	Coefficients				
	β_{OLS}	β_S	SE	CR	P - value
Self-Regulated Learning < ---- Positive Emotion	0.112	0.130	0.054	2.060	0.039

Dependent Variable: Self-Regulated Learning, 5% significance test (2-tail test)

All the latent variables measuring the constructs (academic emotions, self-regulated learning and student achievement) were calculated using SPSS Amos version 23 to measure the impact of the independent variable on the dependent variables and test the hypotheses (see Tables 2 and 3).

Ethical Considerations

The study adhered to ethical procedures and considerations at the data collection, analysis and reporting stages. Ethical considerations regarding respondents' anonymity, privacy, confidentiality, and rights to participate in the study were guaranteed and safeguarded at the data collection stage. An appropriate statistical technique (SEM) was selected and applied to

analyze the data according to the research questions.

Results and Discussions

The study results are presented with respect to the two research questions. Both questions were answered using the SEM technique.

Research Question 1: To what extent do students' positive academic emotions mediate their self-regulated learning?

This research question was answered by analyzing the data using the structural equation modelling technique, and the results are presented in Table 2. The results suggested that positive emotions have a statistically significant positive impact ($\beta =$

0.130; p-value = 0.039 < 0.05) on students' self-regulated learning, given the sample used for the study. Thus, holding other factors constant, a unit increase in students' positive emotions led to a 0.130 increase in students' self-regulated learning behavior among the sampled students. Presenting the results diagrammatically (see figure 2), a high

relationship between SR1 < --- SR2, SR3 < --- SR3, SR3 < --- SR5, SR5 < --- SR6, SR6 < --- SR9, SR5 < --- SR12 and SR10 < --- SR11 was observed, These were modified (see figure 2) and the model fitting indices enhanced to [GFI = 0.904], [NFI = 0.876], [TLI = 0.923], [IFI = 0.810], [RFI = 0.927] and [RMSEA = 0.087] indicating model adequacy.

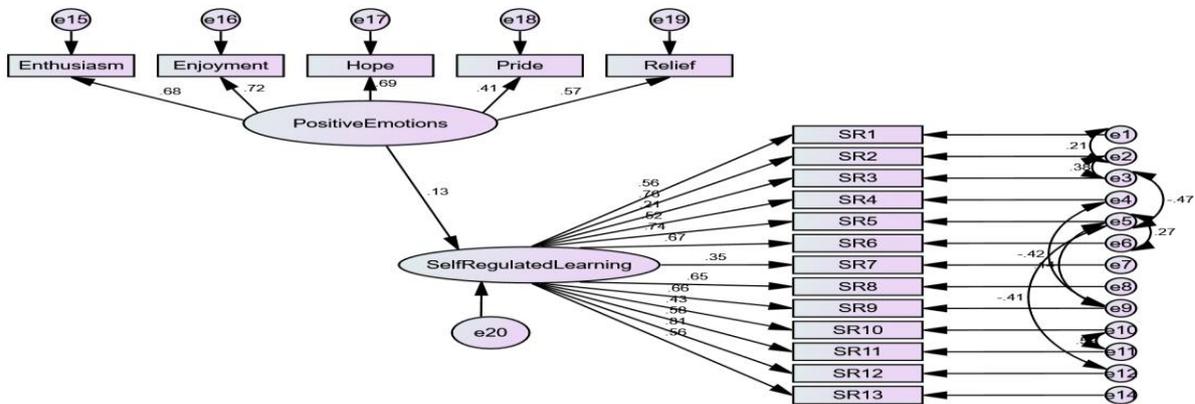


Figure 2: Structural Equation Model of Positive Emotion and Self-Regulated Learning

Table 3: Hypothesis Coefficients

Construct	Coefficients				
	β_{H1}	β_2	SE	CR	P - value
Student Achievement < ---- Positive Emotion	0.265	0.223	0.082	3.228	0.001

Dependent Variable: Students Achievements, 5% significance test (2-tail test)

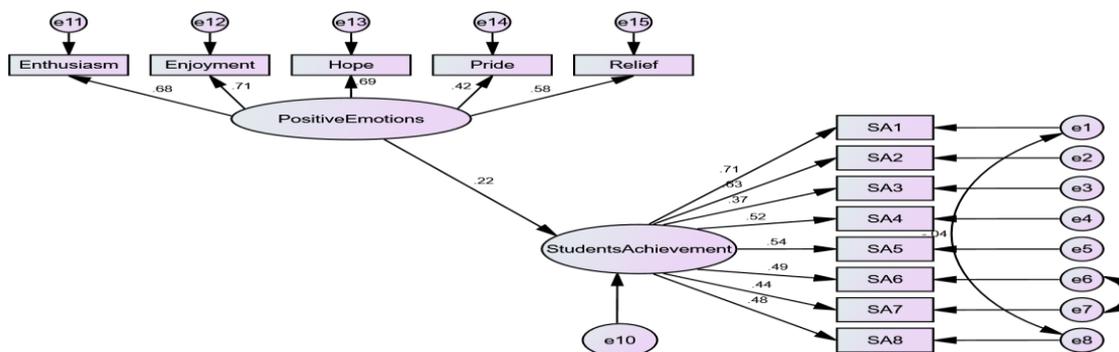


Figure 3: Structural Equation Model of Positive Emotion and Students Achievement

Research Question 2: To what extent do students' positive academic emotions mediate their academic achievement?

Similar to the previous research question, research question 2 was also analysed using the structural equation modelling technique and the results (see Table 3) show a very strong and statistically significant relationship between students' positive emotions and academic

achievement ($\beta = 0.223$; p-value = 0.001 < 0.05). This indicates that holding other factors constant, a unit increase in students' positive emotions led to a 0.223 increase in a student's achievement.

Following modification index analysis by considering maximum covariance, a high relation between SA1 < --- SA8, SA6 < --- SA7 was observed. These were modified (see figure 3) and the model fitting indices enhanced to [GFI =

0.938], [NFI = 0.912], [TLI = 0.924], [IFI = 0.903], [RFI = 0.957] and [RMSEA = 0.065] indicating model adequacy.

The results reveal that students' positive academic emotions significantly influence self-regulated learning ($\beta = 0.130$; p -value = 0.039 < 0.05) and academic achievement ($\beta = 0.223$; p -value = 0.001 < 0.05). The findings unanimously prove that positive academic emotions positively affect college of education students' self-regulation learning and academic achievement, as corroborated by considerable research (Zimmerman, 2002, 2008; Titz, 2001; Pekrun et al., 2002, 2007; Pekrun et al., 2011; Felicidad, Villavicencio and Bernardo, 2013). The results also suggest that students with higher levels of self-regulation learning are more likely to succeed academically than students with low self-regulation learning (Dignath and Buttner, 2008; Morrison, Ponitz, and McClelland, 2010; Rimm-Kaufman, Curby, Grimm, Nathanson and Brock, 2009). The study's outcome demonstrates that positive emotions mediated students' self-regulated learning. Essentially, students' positive emotions such as enthusiasm, enjoyment, hope, pride, and relief positively facilitated self-regulated learning among college of education students.

Similarly, these academic emotions mediated college students' achievement to varying extents. Of educational importance, self-regulation and academic achievement are improved when college students' levels of enthusiasm for learning-related activities are enhanced. This view is supported by Frenzel, Pekrun and Goetz (2007) and Villavicencio and Bernardo (2016) that learners are more willing to invest their effort and time if learning activities are enjoyable and interesting than in anxiety-laden or boredom inducing contexts. Thus, self-regulating students who experience enjoyment and pride during the learning task are likely to value both the task and the outcomes and are thus more likely to attain higher levels of learning achievement due to their self-regulation. Of the constructs explored, the emotional states of joy and hope were the two most important variables mediating college students' self-regulating learning and achievement. The pride of success and relief associated with the execution of academic-related activities were comparatively less important

constructs mediating students' self-regulated learning and academic achievement.

From the results, it is important that pre-service tutors and facilitators deliberately support student teachers to develop effective self-regulation learning strategies, given their indispensability to foster positive learning outcomes. Achieving this fits well into the cardinal goal of Higher Education to create lifelong learners characterized by the ability to self-manage, retain and retrieve new knowledge (Wirth & Leutner, 2008).

Conclusions and Recommendations

It is concluded that students' positive academic emotions positively influenced their self-regulated learning at a statistically significant extent ($\beta = 0.130$; p -value = 0.039 < 0.05). In this regard, college administrators and tutors should ensure that learners own their learning and eventual success in academic life. Pre-service teachers should be guided to set goals and develop realistic expectations. This will help the self-regulated learners monitor, direct and regulate their behaviors towards learning and other academic endeavors.

It is also concluded that students' positive academic emotions positively influenced their academic achievement at a statistically significant extent ($\beta = 0.223$; p -value = 0.001 < 0.05). It is recommended that colleges maintain cultures and classroom climates that evoke positive academic emotions among students to sustain their interest in learning and eventual achievement. This signals the importance of incorporating teaching and learning strategies and methods that excite learners.

References

- Artino, A. (2009). Think, feel, act: Motivational and emotional influences on military students' online academic success. *Journal of computing in higher education*, 21(2), 146-166.
- Artino-Jr, A., & Jones, K. (2012). Exploring the complex relations between achievement emotions and self-regulated learning behaviours in online learning. *The internet and higher education*, 15(3), 170-175.

- Balaž, B., Marković, I., & Brajša-Žganec, A. (2021). The exploration of the relationship between positive achievement emotions and academic success: Testing the assumptions of the control-value theory of achievement emotions. *The educational and developmental psychologist*, 38(1), 77-87.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological review journal*, 84(2), 191.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Bashir, S., Lockheed, M., Ninan, E., & Tan, J-P. (2018). Facing Forward Schooling for Learning in Africa. International Bank for Reconstruction and Development / The World Bank.
- Ben-Eliyahu, A. (2019). A situated perspective on self-regulated learning from a person-by-context perspective. *Journal for High Ability Studies*, 30(1-2), 199-236.
- Burić, I., & Sorić, I. (2012). The role of test hope and hopelessness in self-regulated learning: Relations between volitional strategies, cognitive appraisals and academic achievement. *Learning and Individual Differences Journal*, 22(4), 523-529.
- Camacho-Morles, J., Slep, G., Pekrun, R., Loderer, K., Hou, H., & Oades, L. (2021). Activity achievement emotions and academic performance: a meta-analysis. *Educational psychology review*, 20-85.
- Chen, G., Li, S., Xing, W., Zheng, J., & Xie, C. (2020). Longitudinal clustering of students' self-regulated learning behaviours in engineering design. *Computers and education journal*, 153, 103899.
- Chen, M., & Wu, X. (2021). Attributing academic success and its impact on academic achievement: The mediating role of self-regulated learning and negative learning emotions. *School psychology international*, 42(2), 170-186.
- Cho, M., & Heron, M. (2015). Self-regulated learning: The role of motivation, emotion, and use of learning strategies in students' learning experiences in a self-paced online mathematics course. *Distance education journal*, 36(1), 80-99.
- Creemers, B., & Kyriakides, L. (2012). *Improving quality of Education: Dynamic approaches to school improvement*. London: Routledge.
- Creemers, B., Kyriakides, L., & Sammons, P. (2010). *Methodological advances in educational effectiveness research*. New York: Routledge.
- Crossley, M. (2014). Global league tables, big data and the international transfer of educational research modalities. *Comparative education*, 50(1), pp.15-26, doi:10.1080/03050068.2013.871438.
- Dignath, C., & Buttner, G. (2008). Component of fostering self-regulated learning among students. A meta-analysis on intervention studies at primary and secondary school level. *Metacognition and learning*, 3(3), 231-264.
- Felicidad, T., Villavicencio, F., & Bernardo, A. (2013). Positive academic emotions moderate the relationship between self-regulation and academic achievement. *British Journal of Educational Psychology*, 83, 329-340.
- Frenzel, A., Pekrun, R., & Goetz, T. (2007). Perceived learning environment and students' emotional experiences: A multilevel analysis of mathematics classroom. *Learning and instruction journal*, 17(5), 478-493.
- Gaeta, M., González, L., & Guardado, M. (2021). Self-efficacy, emotional state and self-regulated learning in university students during COVID-19 pandemic. *Actualidades Investigativas en Educación*, 21(3), 3-27.
- Ghana Education Service Fact Sheet (2020). *Analyses for learning and equity using MICs data*. Accra.
- Goetz, T., Nett, U., & Hall, N. (2013). *Self-regulated learning. Emotion, motivation*

- and self-regulation: A handbook for teachers, 123-166.
- Hair, J., Ortinau, D., & Harrison, D. (2010). *Essentials of marketing research*. London: McGraw-Hill.
- Karlen, Y., Hertel, S., & Hirt, C. (2020). Teachers' professional competencies in self-regulated learning: An approach to integrate teachers' competencies as self-regulated learners and as agents of self-regulated. *Frontiers in Education*, 159.
- Karlen, Y., Hirt, C., Liska, A., & Stebner, F. (2021). Mindsets and self-concepts about self-regulated learning: Their relationships with emotions, strategy knowledge and academic achievement. *Frontiers in psychology*, 12.
- Kemeny, M., & Shestyuk, A. (2008). Emotions, the neuroendocrine and immune systems, and health. In M. Lewis, J. M. Haviland-Jones, & L. Feldman-Barrett (Eds.), *Handbook of emotions* (3.a ed., pp. 661-676). Washington: The Guilford Press.
- Kramarski, B., & Michalski, T. (2010). "Preparing pre-service teachers for self-regulated learning in the context of technological pedagogical content knowledge". *Journal of learning instruction*, 20(5), 434-447.
- Kramarski, B., & Michalski, T. (2009). "Investigating pre-service teachers' professional growth in self-regulated learning environments,". *Journal of Educational Psychology*, 101(1), 161-175.
- Lawson, M., 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, 223–251.
- Mega, C., Ronconi, L., & De-Beni, R. (2014). What makes a good student? How emotions, self-regulated learning and motivation contribute to academic achievement. *Journal of educational psychology*, 106(1), 121.
- Meyer, H., & Benavot, A. (Eds) (2013). *PISA, power, and policy: The emergence of global educational governance*. Oxford Studies in Comparative Education. The UK. Symposium books.
- Morrison, F., Ponitz, C., & McClelland, M. (2010). "Self-regulation and academic achievement in the transition to school," in child development at the intersection of emotion and cognition, S.D. Chalkins and M.A. Bell, Eds, (pp. 203-224. Washinton, DC, USA: American psychological association.
- Muis, K., Psaradellis, C., Lajoie, S., Leo, I., & Chevrier, M. (2015). The role of epistemic emotions in mathematics problem-solving. *Contemporary Educational Psychology*, 42, 172-185.
- OECD, & Mo, J. (2019). *How students' motivation related to their performance and anxiety*. Chicago: OECD publications
- Panadero, E. (2017). A review of self-regulated learning: Six models and four directions for research. *Frontiers in psychology*, 8, Article 422. <https://doi.org/10.3389/fpsyg.2017.00422>
- Pekrun, R. (2006). The control–value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review*, 18, 315–341.
- Pekrun, R., Goetz, T., Titz, W., & Perry, P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. *Educational psychologist*, 37(2), 91-105.
- Pekrun, R., & Linnenbrink-Garcia, L. (2014). Introduction to emotions in education. In R. Pekrun and L. Linnenbrink-Garcia (Eds.), *International handbook of emotions in education* (pp. 1-10). New York: Routledge/Taylor & Francis Group.
- Pekrun, R., Elliot, A., & Maier, M. (2009). Achievement goals and achievement emotions: Testing a model of their joint relations with academic performance. *Journal of Educational Psychology*, 101, 115-135.

- Pekrun, R., Frenzel, A., Goetz, T., & Perry, R. (2007). The control-value theory of achievement emotions: An integrative approach to emotions in education. In P. A. Schutz, & R. Pekrun (Eds.), *Emotion in education* (pp. 13–36). San Diego: Academic Press.
- Pekrun, R., Goetz, T., Frenzel, A., Barchfeld, P., & Perry, R. (2011). Measuring emotions in students' learning and performance: The Achievement Emotions Questionnaire (AEQ). *Contemporary Educational Psychology*, 36, 36-48.
- Pekrun, R., Molfenter, S., Titz, W., & Perry, R. (2000). Emotion, learning, and achievement in University students: Longitudinal studies. Paper presented at the annual meeting of the American Educational Research Association. New Orleans: LA.
- Pekrun, R., & Stephens, E. J. (2010). Achievement emotions: A control-value approach. *Social and personality psychology compass*, 4(4), 238–255. <https://doi.org/10.1111/j.1751-9004.x>
- Perry, R., Hladkyj, S., Pekrun, R., & Pelletier, S. (2001). Academic control and action control in the achievement of college students: A longitudinal field study. *Journal of educational psychology*, 93, 776–789.
- Pintrich, P. (2000). Multiple goals, multiple pathways: the role of goal orientation in learning and achievement. *Journal of Educational Psychology*, 92, 544–555.
- Ranellucci, J., Hall, N., & Goetz, T. (2015). Achievement goals, emotions, learning and performance: A process model. *Motivation science*, 1(2), 98.
- Rimm-Kaufman, S., Curby, T., Grimm, K., Nathanson, L., & Brock, L. (2009). "The contribution of children's self-regulation and classroom quality to children's adaptive behaviors in the kindergarten classroom,". *Developmental psychology*, 45(4), 958-972.
- Schunk, D., & Greene, J. (2018). *Handbook of self-regulation of learning and performance*. London: Routledge.
- Shirdel, K., Fakhri, M., & Mirzaeyan, B. (2018). The structural model of educational self-regulation based on learning strategies and attributional styles by the mediator of achievement motivation among secondary high school. *International clinical neuroscience journal*, 5(3), 92.
- Sitzmann, T., & Ely, K. (2011). A meta-analysis of self-regulated learning in work-related training and educational attainment: What we know and where we need to go. *Psychological bulletin*, 137(3), 421.
- Titz, W. (2001). *Emotionen von Studierenden in Lernsituationen [University students' emotions at learning]*. Münster, Germany: Waxmann.
- UNESCO. (2019). *Global education monitoring report*. Paris: UNESCO.
- Van der Beek, J., Van der Ven, S.H.G., Kroesbergen, E., Leseman, P.P.M (2017). Self-concept mediates the relation between achievement and emotions in mathematics. *British Journal of Educational Psychology* 87(3), DOI: 10.1111/bjep.12160
- Villavicencio, F. T., & Bernardo, A. B. I. (2013). Positive academic emotions moderate the relationship between self-regulation and academic achievement. *British journal of educational psychology*, 83(2), 329–340. <https://doi.org/10.1111/j.2044-8279.2012.02064.x>
- Villavicencio, F., & Bernardo, A. (2016). Beyond Math Anxiety: Positive Emotions Predict Mathematics Achievement, Self-Regulation, and Self-Efficacy. *Asia-pacific education research*, 25, 415-422.
- Walberg, H. (2003). *Improving educational productivity*. Washington DC: Institute of education sciences (ED).
- Wirth, J., & Leutner, D. (2008). Self-regulated learning as a competence: Implications of theoretical models for assessment methods. *Journal of psychology*, 216(2), 102-110.
- Wolters, C. (2003). *Regulation of motivation: Evaluating an underemphasised aspect of*

- self-regulated learning. *Educational psychologist*, 38(4), 189-205.
- World-Bank. (2018). *World development report: Learning to realise education's promise*. The world bank, 1.
- Yeager, D., & Dweck, C. (2020). What can be learned from growth mindset controversies? *American psychological review*, 75, 1269-1284.
- Zimmerman, B. (2015). *Self-regulated learning: Theories, measures and outcome*. Oxford: Elsevier.
- Zimmerman, B., & Schunk, D. (2001). *Self-regulated learning and academic achievement: Theoretical perspectives*. Mahwah, NJ: Lawrence Erlbaum.
- Zimmerman, B.J., (2002). Becoming a self-regulated learner: An overview. *Theory into practice*, 41, 64-70.
- Zimmerman, B.J., (2008). Investigating self-regulation and motivation: Historical background, methodological developments and future prospects *Am Educ Res J* 2008 45: 166 DOI: 10.3102/0002831207312909