

ENGAGEMENT TO ONLINE LEARNING, MENTAL WELL-BEING, SELF-REGULATED LEARNING, AND ACADEMIC PERFORMANCE: A PATH ANALYSIS

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ABSTRACT

The recent data disclosed that more than 50 percent of the countries worldwide and most of the ASEAN countries scored below average in the Science subjects. Furthermore, due to the pandemic, online or e-learning is the most effective way to continue the teaching and learning process. This is a quantitative study that used a descriptive-correlational design with route analysis to handle data. This study investigated the association between four interrelated variables: engagement to online learning (ETOL), self-regulated learning (SRL), mental well-being (MWB), and academic performance (AP) in science subjects. Stratified random sampling was used to choose grade 12 STEM students from schools in Davao del Norte, Philippines. Data gathered were treated using Pearson-r, mean, structural equation modelling, and multiple regression analysis. Findings revealed that only SRL turned out to be a statistically significant predictor of AP in Science. More so, as to the best fit model, both SRL and MWB have a direct influence on AP, but ETOL has a large indirect effect on AP through SRL and MWB. Thus, students should exercise greater self-regulation. Educators must highlight students' self-regulated learning skills in online learning.

Keywords: Path analysis, Sequential Equation Modeling, engagement to online learning, self-regulated learning, mental well-being, academic performance

INTRODUCTION

The concepts in Science are basic activities, as such when implemented can solve the problem in the environment and has significant technological application. Understanding nature is science, including humans and its products, will enable people to comprehend how they work. It is a value in science to teach how to search for things. It is apparent to learn the value of free ideas, the value of questioning, not only for science

development but for the value of free ideas in every area of discipline (Si'ayah et al., 2019).

Internationally, academic ranking in science subject of students has fallen below the average. In the recent 2018 Programme for International Student Assessment (PISA) with 489 as Organisation for Economic Co-operation and Development (OECD) average score, more than half of the country members has a national average of below average in science. Dominican Republic (336), Philippines (357), Panama (365), Kosovo (365), Morocco (377), Georgia (383), Lebanon

(384) and Saudi Arabia (386) belonged to the countries with the lowest average in science subject (OECD, 2019). The results in PISA also reflected the United States Students' National Assessment of Education Progress (NAEP) which showed no increase in progress of reading, math, and science since 2000 (Camera, 2019).

The average score of the ASEAN countries in science is 454 which is below from the 489 averages in the recent 2018 Programme for International Student Assessment (PISA). The country members' scores of the ASEAN in the recent PISA are as follows: Brunei Darussalam 431, Indonesia 396, 438, Philippines 357, Singapore 569, Thailand 426, and Vietnam 543 (Organisation for Economic Co-operation and Development, 2019). In the Philippines, a Department of Education official said that Filipino students' performance in large scale assessments like the National Achievement Test (NAT) has fallen towards low proficiency levels specifically in Math, English, and Science for Grades 6, 10, and 12 (Gonzales, 2019).

There are studies that correlates academic performance with student engagement to online learning (Suresh et al., 2018), self-regulated learning (Sahranavard and Salehiniya, 2018), and mental well-being (Wyatt, et al., 2017). However, the researcher has not encountered studies that correlated student engagement to online learning and self-regulated learning towards academic performance with mental well-being. Additionally, the researcher has not come across studies that uses path analysis on all four variables, especially on national and local setting. Thus, the researcher was urged to do such study.

This study is beneficial especially in assessing the relationship of several interconnected variables which affects academic performance in the new learning modality brought about by the pandemic COVID-19. Through the results and findings of this study, programs and interventions can be created to address problems and maintain healthy levels of certain factors which affects academic performance, and is reflective of students learning—something they can use as they carry out their duties as responsible citizens of the society.

OBJECTIVES OF THE STUDY

This study aimed to evaluate the association between online learning, self-regulated learning, mental well-being, and academic performance in Science.

More specifically, it sought to achieve the following specific objectives:

1. To determine the level of Students' Engagement to Online Learning, the extent of Students' Self-Regulated Learning and Students' Mental Well-Being.
2. To ascertain the level of Senior High School students' Science academic performance.
3. To identify if there is a significant relationship between:
 - 3.1. students' engagement to online learning and science subjects academic performance;
 - 3.2. self-regulated learning and science subjects academic performance;
 - 3.3. mental well-being and science subjects academic performance;
 - 3.4. students' engagement to online learning and their mental well-being;
 - 3.5. self-regulated learning and mental well-being.
4. To evaluate if students' mental well-being, engagement to online learning, and self-regulated learning significantly predict academic performance.
5. To determine which model shows the interrelationship of variables that fits the data.

This research was founded on the following ideas and studies:

According to Adam et al. (2017), online learning forces students to develop self-regulated learning practices. Furthermore, Wong et al. (2019) discovered a link between online learning, particularly MOOC or Massive Open Online Learning Courses, and self-regulated learning. According to their results, online learning promotes student self-regulation.

Lovibond and Lovibond (1995) define mental health as degrees of depression, stress, and

anxiety. Lazarevic's (2020) research discovered that online learning had a negative correlation with student stress. According to Lan's (2020) research, online learning has a direct effect on students' sadness, anxiety, and stress levels.

Mulders et al. (2012) and Elfaki et al. (2019) found that e-learning increased students' academic performance, learning process, and practical skills. Surprisingly, Suresh et al. (2018) found in their research that e-learning improves undergraduate students' academic performance.

Dabbagh and Kitsantas (2004) found that owing to the independent character of online learning, self-regulation among learners is very important. They also discovered the need of self-regulation in web-based learning settings.

Tavakolizadeh (2012) discovered that self-regulation learning methodologies had a beneficial influence on positive characteristics of students' mental health or psychological well-being state. Furthermore, Van Nguyen (2015) discovered that self-regulated learning procedures are substantially adversely related with depression, implying that people who better govern their learning process score lower for mental health indicators such as sadness, anxiety, and stress.

Sahranavard et al. discovered a favorable relationship between academic achievement and self-regulation among students in their research (2018). This is corroborated by the findings of Pintrich (2010) and Hosain et al. (2012), who discovered that students with self-regulated learning abilities or who completed self-regulated courses performed much better academically.

According to Bostani (2014), the more the pupils' emotional well-being, the better their educational achievement. This is backed by Agnafors's (2020) findings that in early infancy and adolescence, persons with low mental well-being increase their risk of poor academic performance, highlighting the need for more awareness and treatment to provide equal educational chances.

Davis's research (2021) investigated the relationship between self-regulated learning and mental health in university student achievement, and it explored a number of approaches and analyses to investigate this interplay. Their research discovered a link between psychological and mental well-being and self-regulated learning.

According to Evans (1997), self-esteem is a crucial aspect in mental and psychological well-being. Zimmerman (2000) backs this up by claiming that happiness is highly related to self-esteem. Kurtasz and Hamburger (2008) discovered a link between strong self-esteem and good attitudes toward e-learning based on the same notion.

The researcher postulated several models based on the assertions, ideas, and studies in the previous paragraphs that demonstrated links and correlations between individual variables.

METHODOLOGY

This is a quantitative research project that used a descriptive-correlational design and route analysis to handle data. The set design is acceptable given that the purpose of this research was to provide an accurate profile of the students who participated in online learning, mental well-being, self-regulated learning, and academic success in scientific disciplines.

Correlational design, on the other hand, looks for relationships between two or more variables. Using this methodology, the researcher was able to quantify the size and significance of the causative relationships between the exogenous variables' engagement in online learning, mental health, self-regulated learning, and academic success.

This study's participants were Grade 12 Senior High School students from four separate private schools in Davao del Norte who studied Science, Technology, Engineering, and Mathematics (STEM). All of the responders were enrolled in the school year 2020-2021, Grade 12, STEM Strand, and the online modality. Respondents for this research were Grade 12 Senior High School STEM strand students in Davao del Norte who were chosen using stratified random selection. Given a total population of 285, the researcher computed the number of respondents using the Online Raosoft Sample Size Calculator with a margin of error of 5% and a confidence level of 95%. Thus, it resulted to use 164 respondents in the survey.

Three validated modified survey questionnaires and researchers-made validated



summative exam were used to collect data that addressed the study's goals. The instruments were reformed by the validators and it was pilot tested on 30 students who were not participants in order to test its dependability.

To measure student engagement to online learning, the researcher used Students' Sustainable Engagement in e-Learning Instrument developed by Lee et al, (2019) to measure the level of engagement to online learning of the students.

To measure the self-regulated learning variable of this study, the researchers adopted the Online Self-Regulated Learning Questionnaire (OSLQ) (Barnard, Lan, To, Paton, & Lai, 2009; Barnard, Lan, & Paton, 2008).

The short version of the Warwick–Edinburgh Mental Wellbeing Scale (WEMWBS) by Tennant et al., (2007) was used in this study. This tool is a seven-statement questionnaire which are worded positively with five response categories from 'none of the time' to 'all of the time'. The researchers-made assessment was used to measure the academic performance of students. It is a 60-item test from Science topics taught in the First Semester of the School Year 2020-2021.

Data Gathering Procedure. The researchers asked for the Ethics clearance to conduct the study after the Research Ethics Committee has reviewed the research protocol incorporated herein. After the validation of the questionnaire and securing the endorsement letter, the researchers sought permissions from the principal/director/president of the selected schools for the conduct of the study. The researchers also procured a confidentiality agreement for the advisers/enumerators to ensure the confidentiality of any data they have learned and acquired.

The respondents received the google form link and filled out the form. They checked or marked a checkbox that proved their willingness to participate in the study and encoded their names after checking the checkbox. The checkbox served as the signature of both the parent for the Informed Consent form while respondent for the Informed Assent form. There was a section division between the Informed Consent and the Informed Assent forms for the parent and respondent in filling out the form. The Informed Parental Consent form was first filled out before the respondents have filled out

the Informed Assent form. On the other hand, the respondents of legal age directly filled the Informed Consent form. The name of the parent as well as the respondent was compulsory in the consent forms for monitoring purposes of the ethics committee.

The answers of the respondents were collected by the Google Form which was only accessible to the researcher. The raw answers of the respondents were encoded unto a secured and password-protected excel file. The file was then uploaded to the researchers' Google drive in a password protected ZIP form for safekeeping. E-mails and other possible ways for the respondents to be known was not encoded in the excel file as well as the saved file in the google drive. The researchers checked and encoded the responses two weeks after the administration of the tools. The Academic Performance Questionnaire was closed after the agreed time of answering. The Google form comprising the tools and questionnaires was then archived to ensure the safekeeping of the data and the anonymity of the respondents.

Mean, Multiple Regression Analysis, Pearson-r, and Structural Equation Modeling was used to treat the data.

RESULTS AND DISCUSSION

1. Summary on the Extent of Students' Engagement to Online Learning

The extent of students' engagement to online learning has an overall mean of 3.02 with a descriptive equivalent of moderately agree. This infers that the students' engagement to online learning is moderately evident. The standard deviation of 0.62 (SD<1.00) indicates the homogeneity of the responses for this indicator. The result further implies that it is less evident that online classes intensify the engagement of the student towards online learning. Furthermore, this means that online classes do not necessarily make students satisfied with their learning. It is also less evident that students collaborate and cooperate with their peers, solve problems cognitively, interact with their instructors, have a sense of belongingness with their community, and manage their own learning.



Table 1
Summary on the Extent of Students' Engagement to Online Learning

Indicators	Mean	SD	Description
Psychological Motivation	2.71	0.70	Moderately Agree
Peer Collaboration	3.29	0.81	Moderately Agree
Cognitive Problem Solving	3.16	0.77	Moderately Agree
Interactions with Instructors	2.66	0.80	Moderately Agree
Community Management	3.20	0.80	Moderately Agree
Learning Management	3.12	0.82	Moderately Agree
Overall Mean	3.02	0.62	Moderately Agree

These results were supported by different studies. Karaoglan Yilmaz & Yilmaz (2019) stated that over time, enthusiasm of students fades in an online setting. However, several studies positively associate engagement of students in online learning. Students are intrinsically motivated in an online learning environment (Dwijuliani, 2021 and Shroff et al., 2007), even if they are less motivated to study their lessons (Yilmaz & Karaoglan Yilmaz, 2019).

2. Extent of Students' Self-Regulated Learning

Table 2
Extent of Students' Self-Regulated Learning

Items	Mean	SD	Description
Overall Mean	3.15	0.700	Moderately Agree

The students' self-regulated learning has an overall mean of 3.15 with a descriptive equivalent of moderately agree. This means that students' self-regulated learning is just moderately manifested. The standard deviation of 0.700 (SD<1.00) indicates the homogeneity of the

responses for this indicator. The result further implies that self-regulated learning is less manifested by the students in the online learning setting.

The result exhibits that the students searched the internet on things they find difficult in the topics. This conclusion is reinforced by Muali (2018)'s results about Rich Internet-based Application (RIA), which address how online learning or a web may be used by students to undertake independent learning by browsing or downloading material files other than those gained throughout the course. In addition, Bacher-Hicks (2021) noted that by April 2020, national search frequency for both school- and parent-centered e-learning materials had almost quadrupled compared to pre-COVID levels.

3. Extent of Students' Mental Well-Being

Table 3
Extent of Students' Mental Well-Being

Mean Raw Score	Metric Score	SD	Description
24	21.54	10.32	Average Mental Well-Being

According to statistics from the United States, Canada, and the United Kingdom, students in the United States, Canada, and the United Kingdom have higher rates of mental health issues than the general population in the same age range (Adalf et al., 2001; Bewick et al., 2010; Keyes et al., 2012). According to Lister (2021), these disparities in distant learning may be due to various aspects such as curriculum, tuition, evaluation, interpersonal skills, self-management, study skills, places, systems, people, and life.

4. Level of Senior High School Students' Academic Performance in Science Subject

The same result was found by Alipio (2020) finding which stated that all strands in SHS in the locality of Davao City have ratings above 75 percent. In addition, his research discovered that



the SHS strand strongly moderates the association between academic adjustment and performance.

Table 4
Level of Senior High School Students' Academic Performance in Science Subject

Mean Score	Rating	SD	Description
23.74	75.83	10.32	Fairly Satisfactory

As stipulated in the context of Department of Education, learning outcome is expressed in terms of academic achievement and measured in terms of their grade as a result of their written works, performance tasks, and quarterly assessments (DO 08 s. 2015). Hence, it gives a picture on the status of the learning outcome of the students in the private schools with secondary students including senior high school students. Thus, educators can see its current level to lead in devising intervention plan to better address academic inefficiency.

5. Relationship Between Students' Engagement to Online Learning, Self-Regulated Learning, and Mental Well-Being towards Academic Performance in Science Subject

Table 5
Relationship Between Students' Engagement to Online Learning, Self-Regulated Learning, and Mental Well-Being Towards Academic Performance in Science Subject

Independent Variables	Academic Performance		
	r	p-value	Remarks
Students' Engagement to Online Learning	0.193	0.013	Significant
Self-Regulated Learning	0.283	0.000	Significant
Mental Well-Being	0.192	0.014	Significant
very weak positive correlation (0.00-0.20)			weak positive correlation (r= 0.21-0.40)

Researchers have shown that self-regulated learning improves academic achievement and learning motivation (Sadati and Simin, 2017). Time monitor, time value, and self-efficacy have a significant relationship with

students' academic achievement (Li et al., 2015). In secondary school, the effect of self-regulated learning on academic achievement has also been established (Zhang et al., 2012).

6. Relationship Between Students' Engagement to Online Learning and Self-Regulated Learning towards Mental Well-Being

Table 6
Relationship Between Students' Engagement to Online Learning and Self-Regulated Learning Towards Mental Well-Being

Independent Variables	Mental Well-Being		
	r	P-value	Remarks
Students' Engagement to Online Learning	0.586	0.000	Significant
Self-Regulated Learning	0.283	0.000	Significant

Many researches have shown links between positive psychological conceptions and student engagement, demonstrating that student engagement and psychological aspects are related (Medlin & Faulk, 2011). Additionally, studies of Lai et al. (2016) and Mayes (2018) and other studies often associates online learning with the use of technology. Every technology has the potential to influence psychological well-being, either intentionally or unintentionally.

7. Influence of Students' Engagement to Online Learning, Self-Regulated Learning, and Mental Well-Being towards Academic Performance

The R square of 0.089 illustrates that the model predicts 8.9% of the statistical variation observed in the academic performance of the students. The coefficient of alienation which is 91.10% points the extent at which other variables may explain the variance observed in the academic performance of the students.

SRL is especially important for online learners who are likely to manage their own learning on a regular basis. Previous research has revealed that self-regulated learners perform better academically in an online learning environment

(Bradley, Browne, & Kelley, 2017). Furthermore, students who are more interested in online learning activities and are more skilled at using a range of learning approaches may enjoy online learning and achieve better learning results (Bremer 2012).

The previous finding indicates that both online learning engagement and mental well-being link with academic achievement, although they are not significant predictors of academic performance ($p > 0.05$). The use of technology in online learning could be one of the reasons. True to the results, the study of Fonseca, et al. (2014) claimed that by utilizing technology, students were able to acquire a higher level of direct interaction with the suggested content, which increased overall success. They discovered a substantial association between technology use and academic success, as well as a strong association between technology and student motivation.

8. Best Fit Model of Academic Performance

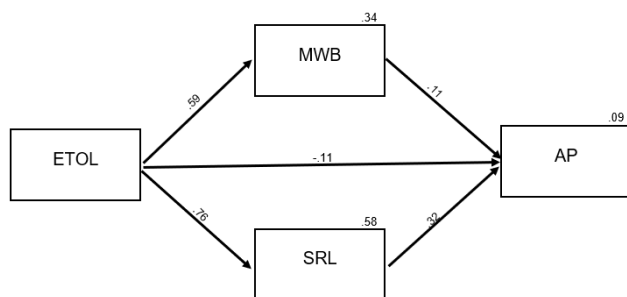


Figure 1: Hypothesized Model 6

Table 8
Direct, Indirect, and Total Effect Estimates for Hypothesized Model 6

Independent Variable	Direct Effect	P	Indirect Effect	P	Total Effect	P
Students' Engagement to Online Learning	-0.112	0.250	0.305	0.008	0.193	0.016
Self-Regulated Learning	0.317	0.013	0.000	-	0.317	0.013
Mental Well-Being	0.111	0.393	0.000	-	0.111	0.393

These results supported the concepts and theories presented in the theoretical and

conceptual framework of the study stating that engagement to online learning affects academic performance (Mulders et al., 2012; Elfaki et al., 2019; Suresh et al., 2018), self-regulated learning (Adam et al., 2017; Wong et al., 2019) and indicators of mental well-being (Lan, 2020). Additionally, it also proved that academic performance is affected by self-regulated learning (Ejubović & Puška, 2019; Sahranavard et al, 2018; Kosnin, 2007; Bail, 2008; Pintrich, 2010; Hosain et al., 2012) and mental well-being (Harrer et al., 2019; Bostani, 2014; Agnafors, 2020).

CONCLUSIONS

Conclusions were drawn based on findings of the study.

1. Engagement to online learning amongst the students is moderately evident.
2. Self-regulated learning amongst the students is moderately manifested. The students showed average mental well-being with regards to their learning in an online learning setting. The students performed fairly satisfactory in their science subjects which means that the academic performance of the student is lightly proficient.
3. Students' engagement to online learning towards academic performance showed a significant but very weak positive correlation. Self-regulated learning towards academic performance indicated a weak positive correlation. Moreover, mental well-being towards academic performance indicated a very weak positive correlation. Meanwhile, both students' engagement to online learning and self-regulated learning towards mental well-being showed a significant but weak positive correlation.
4. Self-regulated learning is shown to be a statistically significant predictor of science subjects' academic performance while engagement to online learning and mental well-being do not significantly predict academic performance.
5. The best fit model indicates that both mental well-being and self-regulated



learning have direct effect on academic performance. With that, self-regulated learning is proven to be significant. Engagement to online learning, through self-regulated learning and mental well-being, has a significant indirect effect on academic performance.

RECOMMENDATIONS

The following are the recommendations of the study:

1. Students must prioritize learning the skill of self-regulation towards their learning specially in Science subjects.
2. Teachers must integrate self-regulation skills in their teaching. They must also consider the mental well-being of the students in creating and administering class works and activities.
3. Parents should monitor their students' progress and give priority to their children's mental health as well as help promote and develop their self-regulated learning skills.
4. It is advised to investigate the students' degree of proficiency in the efficient use of technologies used in the online learning environment, since learners must understand how to learn and how to use digital tools in order to engage and have constructive peer interactions.
5. It is suggested to further research linked to this study in various fields such as Mathematics and Social Studies since it has been stated that SRL is domain-specific, such as: a person who can self-regulate in one topic may not be able to do so in another.

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