

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

PATH MODELS ON SELF-REGULATION, ACADEMIC STRESS, LEARNING STYLES,
AND GENERAL BIOLOGY APTITUDE ON LEARNING DIFFICULTIES OF
SENIOR HIGH SCHOOL (SHS) STUDENTS

A Dissertation Presented to the
Faculty of the Graduate School
College of Education
West Visayas State University
La Paz, Iloilo City

In Partial Fulfilment
of the Requirements for the Degree
Doctor of Philosophy in Science Education
(Biology)

by
Helyn Joy T. Diaz
December 2022

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

APPROVAL SHEET

A Dissertation for the Degree
Doctor of Philosophy in Science Education
(Biology)

by

Helyn Joy T. Diaz

Approved by the Research Committee:

ATTY. RYAN J. ODIO, PhD, Chair

ROBERTO G. SAGGE, JR., PhD,

REY G. TANTIADO, PhD, Member

VAN HELEN S. CUADERES, PhD, Outside Expert

JEANNEMAR GENEVIVE YAP-FIGUERAS, PhD, Adviser

RICKY M. MAGNO, LPT, PhD
Dean

December 2022

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

Diaz, Helyn Joy T., *"Path Models on Self-regulation, Academic Stress, Learning Styles and General Biology Aptitude on Learning Difficulties of Senior High School (SHS) Students,"* Doctor of Philosophy in Science Education (Biology). Dissertation, West Visayas State University, December 2022.

Abstract

The low acquisition of learning in high school biology subjects is a concern of various stakeholders in the basic education department agencies. This study aimed to determine the relationship of probable factors influencing learning difficulty among SHS STEM learners in a public secondary school in General Biology I. It also identified the topics in General Biology I subject that were considered difficult by students, the physical and social factors that caused students to experience difficulties in learning biology, and the teaching methods suitable to use in biology learning activities. The participants in this study were the one hundred twenty-four (124) grade 12 SHS STEM learners taking General Biology I for the 1st semester of A.Y. 2022-2023. Six questionnaires were used to assess the different academic status of the students. Step-wise multiple regression was utilized to determine predictors for learning difficulty among socio-demographic profile and academic factors. Path analysis models were then devised based on basis of the step-wise regression results and these were tested for goodness of fit using Structural Equation Modeling (SEM). The results showed that cell transport mechanisms, cell structures, cell division and structures, and functions of biological molecules such as enzyme were difficult topics in General Biology I based Most Essential Learning Competencies (MELC). Self-regulation significantly correlates and predicts learning

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

difficulty among SHS STEM learners in public secondary school. Moreover, biology aptitude scores, learning style, and age correlate to self-regulation. One corrected model was accepted since it satisfied at least 3 of the fit indices criteria of SEM.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

TABLE OF CONTENTS

	Page
Title Page	i
Approval Sheet	ii
Acknowledgment	iii
Abstract	v
Table of Contents	vii
List of Tables	xi
List of Figures	xii
List of Appendices	xiii
Chapter	
1 INTRODUCTION TO THE STUDY	1
Background of the Study	2
Theoretical Framework of the Study	6
Research Paradigm of the Study	9
Statement of the Problem and the Hypothesis	10
Definition of Terms	12
Delimitation of the Study	14
Significance of the Study	15
2 REVIEW OF RELATED LITERATURE	18
Aptitude in Science	18

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

Academic Stress	20
Learning Styles	22
Learning Difficulty in Biology among STEM Learners	26
Structural Equation Modeling (SEM) and Path Analysis Related Studies	30
Self-regulation	34
Socio-demographic Profiles and Academic Factors as Predictors to Academic Achievement	35
Summary of Related Studies	38
3 RESEARCH DESIGN AND METHODOLOGY	39
Research Design	39
Methodology	40
The Sample/Participants	40
Instruments	41
Data Collection Procedure	43
Data Analysis Procedure	46
4 RESULTS AND DISCUSSION	51
Descriptive Data Analysis	51
Socio-Demographic Profiles of SHS STEM Students in a Public Secondary School	51
Levels of Biology Aptitude Scores of SHS STEM Students in a Public Secondary School	56
Identified Difficult Topics in General Biology I Among SHS STEM Learners	57
Analysis of the Identified Difficult Topics in General Biology I Among SHS STEM Students	60

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

Learning Difficulty in Biology	63
Inferential Data Analysis	68
Correlation Among Socio-demographic Profiles and Academic Factors of SHS STEM Students in a Public Secondary School	68
Correlation Between Academic Stress and Learning Difficulty	71
Correlation Between Self-regulation, Learning Difficulty, Biology Aptitude, Learning Style, and Age	71
Correlation Among Sex, Biology Aptitude, Academic Stress, Parents' Educational Attainment, and GWA	72
Correlation Among Internet, Age, Income, and Parents' (Mother) Educational Attainment	75
Correlation Between GWA, Learning Difficulty, Academic Stress, Biology Aptitude, Parents' (Father) Educational Attainment	75
Correlation Between Parents' Educational Attainment, Academic Stress, Income, Number of Siblings, and Internet	77
Accepted Predictive Path Model for Learning Difficulty in Biology and Various Academic Factors	80
Path Model for Learning Difficulty in Biology with Self-regulation as a Predictor	82
5 SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS	87
Summary of the Problem, Methods, and Findings	87
Conclusions	92
Implications	93
For Theory	93

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

For Practice	93
Recommendations	94
REFERENCES	97
APPENDICES	131

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

LIST OF TABLES

Table		Page
1	Aptitude Percentage Score Scale	47
2	Levels of the Learning Difficulties	47
3	Self-regulation and Academic Stress Scales	48
4	Different Model Fit Indices for Data Determination	49
5	Levels of Biology Aptitude Scores of SHS STEM Students in a Public Secondary School	57
6	Identified Difficult Topics in General Biology I Among SHS STEM Learners	58
7	Levels of Learning Difficulty, Self-regulation, and Academic Stress Among SHS STEM Learners	63
8	Correlation Between Socio-demographic Profiles and Academic Factors Among SHS STEM Learners	70
9	Socio-demographic Profiles and Academic Factors' Predictor to Learning Difficulty Among SHS STEM Learners and Contribution to the Model	79
10	<i>Analysis of Variance (ANCOVA)</i> of the Overall Regression Model	79
11	Summary of Fit Indices of the Model	82

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

LIST OF FIGURES

Figure		Page
1	Theoretical Path Model Showing Relationships of the Different Academic Factors and Socio-Demographic Profiles Influencing Learning Difficulties in General Biology I Among SHS STEM Learners	10
2	Percentage of Participants Categorized by Sex	52
3	Percentage of Participants Categorized by Age	52
4	Highest Educational Attainment of Parents Categorized by Levels	53
5	Percentage of the Number of Siblings of the Participants	53
6	Average Monthly Income of the Participants	54
7	Presence of Internet at Home	54
8	Learning Styles of Participants	55
9	General Weighted Average of the Participants	55
10	Model Considering Factors that Correlate with Self-regulation, and Self-regulation to Learning Difficulty	81

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

LIST OF APPENDICES

Appendix		Page
A	Data Gathering Instrument: General Biology Aptitude Table of Specifications	132
B	Data Gathering Instrument: General Biology Aptitude Test	135
C	Socio-Demographic Profile Questionnaire	146
D	Validation Checklist	147
E	Informed Consent	148
F	Sample Letters	153
G	Socio-Demographic Profiles of SHS STEM Students in a Public Secondary School	156
H	Reliability Result for Self-regulation Questionnaire	158
I	Reliability Result for Learning Styles Questionnaire	159
J	Reliability Result for Learning Difficulty Questionnaire	161
K	Reliability Result for Academic Stress Questionnaire	162
L	Reliability Result for General Biology I Aptitude Test	163
M	Photographs	167

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

107

Dunn, R. (1990, October). Rita Dunn answers questions on learning styles. *Educational leadership*.

Dunn, R., & Dunn, K. (1978). *Teaching Students Through Their Individual Learning Styles: A Practical Approach*. Allyn and Bacon.

Durmaz, B. (2007). *The Effects of the Concept Cartoons to the Success of the Students and Sensory Features in the Constructivist Science Teaching (Mugla Provincial, Administrative District Sample)*, Master's Dissertation, Mugla University, Mugla, Turkey.

Efe, Ç. (2002). *The role of readiness level of university's first year students in the learning of the basis and side concepts of cell divisions*, PhD Dissertation, Atatürk University, Erzurum, Turkey.

Ekici, G. (2010). *An examination of the high school student's perceptions about biology laboratory environment education*. *EJournal of New World Sci. Acad.*, 5(3): 180-186.

El Hajjar, S. (2015). *An Empirical Approach of Exploring and Confirming a Reliable Scale for Faculty Evaluation at Higher Institutions*. *International Journal of Arts & Sciences*. 8. 53-76.

Elias, H., Ping, W.S. and Abdullah, M.C. (2011). *Stress and Academic Achievement among Undergraduate Students in Universiti Putra Malaysia*. *Procedia—Social and Behavioral Sciences*, 29, 646-655. <https://doi.org/10.1016/j.sbspro.2011.11.288>

References

- Abidin, M. J., Rezaee, A. A., Abdullah, H. N., & Singh, K. K. (2011). Learning Styles and Overall Academic Achievement in a Specific Educational System. *International Journal of Humanities and Social Science*, 1(10), 143-153.
- Agustyaningrun, N., Sari, R. N., Abadi, A. M., & Mahmudi, A. (2021). Dominant Factors that Cause Students' Difficulties in Learning Abstract Algebra: A Case Study at a University in Indonesia. *International Journal of Instruction*, 14(1), 847-866.
<https://doi.org/10.29333/iji.2021.14151a>
- Ahn, D., Park, G., Baek, K. J., & Chung, S. I. (2007). Academic motivation, academic stress, and perceptions of academic performance in medical students. *Korean Journal of Medical Education*, 19(1), 59-71.
- Akaike, H. (1974). "A New Look at the Statistical Model Identification," *IEE Transactions on Automatic Control*, 19 (6), 716-23.
- Akgun, S., & Ciarrochi, J. (2003). Learned resourcefulness moderates the relationship between academic stress and academic performance. *Educational Psychology*, 23(3), 287-294.
- Akinci, T. (2021). Determination of Predictive Relationships between Problematic Smartphone use, Self-Regulation, Academic Procrastination and Academic Stress Through Modelling. *International Journal of Progressive Education*, Volume 17 Number 1.; INASED 35

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

99

- Alam, A. (2009). Academic achievement in relation to creativity and academic motivation: a correlational study. *Educational Tracks*, 8(9), 31-33.
- Alegre, A. (2014). Academic self-efficacy, self-regulated learning and academic performance in first-year university students. *Propósitos y Representaciones*, 2(1), 79-120. doi: <http://dx.doi.org/10.20511/pyr2014.v2n1.54>
- Ali, S. (2017). Addressing First Year University Students' Perceptual Learning Style Preferences: A Study on their Possible Relationships with Instructors Teaching Styles and Students' Achievement. *Proceedings of the National Conference on Quality Education in Ethiopia: The Missing Link between Theory and Practices*. Wollega University, Nekemte, Ethiopia.
- Almoslamanim, Y. (2022). The relationship between self-regulation learning and online learning adoption. *Cypriot Journal of Educational Science*. 17(6), 2117-2126. <https://doi.org/10.18844/cjes.v17i6.7550>
- Amabile, T. M., & Fisher, C. M. (2009). Stimulate creativity by fueling passion. In *Handbook of Principles of Organizational Behavior: Indispensable Knowledge for Evidence-Based Management*, 2nd ed.; Locke, E.A., Ed.; Wiley: Chichester, UK; pp. 481–497. ISBN 978-0-470-74095-8.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

100

- Amedu, O. I. (2015). The Effect of Gender on the Achievement of Students in Biology Using the Jigsaw Method. *Journal of Education and Practice* www.iiste.org ISSN 2222-1735 (Paper) ISSN 2222-288X (Online) Vol.6, No.17.
- Anderson, C. W., Sheldon, T. H., & Dubay, J. (1990). The effects of instruction on collage non-majors' concepts of respiration and photosynthesis. *J. Res. Sci. Teach.*, 27(8): 761 - 776.
- Ang, R. P., & Huan, V. S. (2006). Academic Expectations Stress Inventory Development, Factor Analysis, Reliability, and Validity. *Educational and Psychological Measurement Volume 66 Number 3 June 2006 522-539* © 2006 Sage Publications 10.1177/0013164405282461 <http://epm.sagepub.com>
- Arora, R. (2013). Study of Achievement in Biology in Relation to Scientific Aptitude, Study Habits and Socio-Economic Status Among Secondary School Students. A Doctoral Dissertation, Guru Nanak Dev University. Retrieved from <http://hdl.handle.net/10603/176831>
- Aruna, P.K., & Amanulla, A.K. (2009). Academic achievement in relation to social phobia and socio economic status. *Educational Tracks*, 8(5), 26-29.
- Asparouhov, T., & Muthén, B. (2009). Exploratory structural equation modeling. *Structural Equation Modeling*, 16(3), 397-438. doi:10.1080/10705510903008204
- Avena, J. S., McIntosh, B. B., Whitney, O.N., Wiens, A., & Knight, J. K. (2021). Successful Problem Solving in Genetics Varies Based on Question Content, *CBE—Life Sciences Education*, 10.1187/cbe.21-01-0016, 20, 4.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

101

- Bagozzi, R. P., Yi, Y., & Phillips, L.W. (1991), "Assessing Construct Validity in Organizational Research," *Administrative Science Quarterly*, 36 (3), 421-58.
- Bahar, M., Johnstone, A. H., & Hansell, M.H. (1999). Revisiting Learning Difficulties in Biology. *J. Biol. Educ.*;33(2):84-6.
- Baia, R. (2006). Teacher parental support, study habits, aptitude for and attitude towards mathematics as predictor of mathematical achievement. Unpublished doctoral dissertation, Panjab University, Chandigarh.
- Baltaş & Baltaş (2008). Stres ve başa çıkma yolları. [Stress and ways to cope] Ankara: Remzi Kitabevi.
- Bandura, A. (2012). *Self-Efficacy. The Exercise of Control*, 13th ed.; Freeman: New York, NY, USA, 2012; ISBN 978-0716728504
- Barnard-Brak, L., Fatou, V. O., & Lan, W. Y. (2010). Self-regulation across time of first-generation online learners. *Research in Learning Technology*, 18(1), 61-70.
<https://doi.org/10.1080/09687761003657572>
- Barrett, P. (2007), "Structural Equation Modelling: Adjudging Model Fit," *Personality and Individual Differences*, 42 (5), 815-24.
- Beede, D. N., Julian, T. A., Langdon, D., McKittrick, G., Khan, B., & Doms, M.E. (2011). *Women in STEM: A Gender Gap to Innovation*. SSRN J. 2011.
- Bernbenutty, H. (2008). Self regulation of learning and test anxiety. *Psychology Journal*, 5, 122-139.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

102

Bennett-Levy, J. (2003). Mechanisms of Change in Cognitive Therapy: The Case of Automatic thought Records and Behavioural Experiments. *Behavioural and Cognitive Psychotherapy*, 31, 261-277.

<http://dx.doi.org/10.1017/S1352465803003035>

Bentler, P. M. (1990), "Comparative Fit Indexes in Structural Models," *Psychological Bulletin*, 107 (2), 238-46.

Bentler, P. M. and Bonnet, D.C. (1980), "Significance Tests and Goodness of Fit in the Analysis of Covariance Structures," *Psychological Bulletin*, 88 (3), 588-606.

Bian, M., & Leung, L. (2015). Linking loneliness, shyness, smartphone addiction symptoms, and patterns of smartphone use to social capital. *Social Science Computer Review*, 33(1), 61-79.

Borekci, C., & Uyangor, N. (2018). Family attitude, academic procrastination and test anxiety as predictors of academic achievement. *International Journal of Educational Methodology*, 4(4), 219-226. doi: 10.12973/ijem.4.4.219

Braakten D., Størksen, I., Idsoe, T., & McClelland, M. (2019). Bidirectionality in self-regulation and academic skills in play-based early childhood education. *Journal of Applied Developmental Psychology*, 65(September), 101064.

<https://doi.org/10.1016/j.appdev.2019.101064>

Bredo, E. (1997). The Social Construction of Learning. In GD Phye (Ed) *Handbook of Academic Learning: Construction of Knowledge* San Diego: Academic Press.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

103

- Euĝa, A., & Kaya, İ. (2022). The Role of Cognitive Distortions related Academic Achievement in Predicting the Depression, Stress and Anxiety Levels of Adolescents. *International Journal of Contemporary Educational Research*, 9(1), 103-114. <https://doi.org/10.33200/ijcer.1000210>
- Büyükoztürk, Ş.; Atalay, K.; Sozgun, Z., & Kebapçı, Ş. (2011). The development of research self-efficacy scale. *Cypriot Journal Of Educational Sciences*, 1, 22-29.
- Byrne, B. M. (1998). *Structural Equation Modeling with LISREL, PRELIS and SIMPLIS: Basic Concepts, Applications and Programming*. Mahwah, New Jersey: Lawrence Erlbaum Associates.
- Çakiroglu, J., Telli, S., & Çakiroglu, E. (2003). Turkish high school student's perceptions of learning environment in biology classrooms and their attitudes toward biology. Paper presented at the Annual Meeting of the American Association Research Association, Chicago.
- Calaguas, G. (2011). College Academic Stress: Differences along Gender Lines. *Journal of Social and Development Sciences*. 1. 194-201. [10.22610/jsds.v1i5.644](https://doi.org/10.22610/jsds.v1i5.644).
- Casanova, P., De la Torre Cruz, M. & Carpio, M. (2005). Influence of family and socio-demographic variables on students with low academic achievement. *Educational Psychology - EDUC PSYCHOL-UK*. 25. 423-435. [10.1080/01443410500041688](https://doi.org/10.1080/01443410500041688).
- Cazan, A. M. (2012). Self-regulated learning strategies – predictors of academic adjustment. *Procedia - Social and Behavioral Sciences* 33 (2012) 104 – 108.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Halo City

104

- Cazan, A. M., & AniGel, M. (2010). Motivation, learning strategies and academic adjustment. *Romanian Journal of Experimental Applied Psychology*, 1(1), 61-69.
- Chachia, M., & Kaur, N. (2010). Impact of optimistic and pessimistic attitude on academic achievement among adolescents. *Recent researches in education*, 13, 43-50.
- Chahal, J. and Bhandari, R. (2010). Effect of awareness training model on academic achievement. *Journal of education*, 1(1), 82-89.
- Chen, P. Y., & Hwang, G. J. (2019). An empirical examination of the effect of self-regulation and the Unified Theory of Acceptance and Use of Technology (UTAUT) factors on the online learning behavioural intention of college students. *Asia Pacific Journal of Education*, 1-18.
<https://doi.org/10.1080/02188791.2019.1575184>
- Cheng, D., Leong, F. T., & Geist, R. (1993). Cultural differences in psychological distress between Asian and Caucasian American college students. *Journal of Multicultural Counseling and Development*, 21(3), 182-190.
- Cheng, M. M. H., Cheng, A. Y. N., & Tang, S. Y. F. (2010): Closing the gap between the theory and practice of teaching: implications for teacher education programmes in Hong Kong. *Journal of Education for Teaching*, Vol 36, No. 1, pp. 91-104.
- Chiappetta E.L., & Fillman, D.A. Clarifying the Place of Essential Topics and Unifying Principles in High School Biology. *Sch. Sci. Maths.* 1998;9(10):12-8.
- Chiu, M. M., & Khoo, L. (2005). Effects of resources, inequality, and privilege bias on achievement: Country, school, and student level analyses.

- American Educational Research Journal, 42(4), 575-603.
- Çirner, A. (2004). A study of Turkish biology teachers' and students' views of effective teaching in schools and teacher education. EdD Dissertation, The University of Nottingham, Nottingham, U.K.
- Cogliano, M., Bernacki, M. L., Hilpert, J. C., & Strong, C. L. (2022). A self-regulated learning analytics prediction-and-intervention design: Detecting and supporting struggling biology students. *Journal of Educational Psychology, 114*(8), 1801–1816. <https://doi.org/10.1037/edu0000745>
- Conger, R. D., & Donnellan, M. B. (2007). An interactionist perspective on the socioeconomic context of human development. *Annu. Rev. Psychol.*, 58, 175-199.
- Conradty, C., & Bogner, F. (2016). Hypertext or Textbook: Effects on Motivation and Gain in Knowledge. *Educ. Sci.* 2016, 6, 29.
- Çorlu, M. S. (2017). STEM Kuram ve Uygulamalarıyla Fen, Teknoloji, Mühendislik ve Matematik Eğitimi. *Pusulula 20 Teknoloji ve Yayıncılık*, 1-10, İstanbul.
- Cotabish, A., Dailey, D., Robinson, A., & Hunches, G. (2013). The effects of a STEM intervention on elementary students' science knowledge and skills. *School Science and Mathematics, 113*(5), 215–226.
- Crowley, S.L. and Fan, X. (1997). "Structural Equation Modeling: Basic Concepts and Applications in Personality Assessment Research," *Journal of Personality Assessment, 68* (3), 508-31.
- Csikszentmihalyi, M. (2010). *Creativity. Flow and the Psychology of Discovery and Invention*; Harper: New York, NY, USA, 2010; ISBN 9780060171339.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

106

- Davis, P., & Florian, L. (2004). *Teaching Strategies & Approaches for Pupils with SEN: A scoping Study*. London: DfES.
- Deci, E. L., Schwartz, A.J., Sheinman, L., Ryan, R. M. (1981). An instrument to assess adults' orientations toward control versus autonomy with children: Reflections on intrinsic motivation and perceived competence. *J. Educ. Psychol.* 1981, 73, 642-650.
- De Leon, M. S., Estrelia, F. A., & Duay, B. S. C. (2016). Correlation among the General Weighted Average, Mental Ability and Battery Test Scores of First Year Teacher Education Students Correlation among the General Weighted Average, Mental Ability and Battery Test Scores of First Year Teacher Education Students. *Global Journal of Human-Social Science: G Linguistics & Education Volume 16 Issue 7 Version 1.0 ISSN: 2249-460x & Print ISSN: 0975-587X*
- Diamantopoulos, A., & Siguaw, J. A. (2000). *Introducing LISREL*. London: Sage Publications.
- Du, J., Havard, B., Sansing, W., & Yu, C. (2002). *The Impact of Technology Use on Low-Income and Minority Students' Academic Achievements: Educational Longitudinal Study of 2002*. *Education Longitudinal Study of 2002*. <https://files.eric.ed.gov/fulltext/ED485086.pdf>
- Duke, N. (2000). For the rich it is richer: print environments and experiences offered to first grade students in very low and very high socio economic school districts. *American Education Research Journal*, 37(2), 163-175.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

107

- Dunn, R. (1990, October). Rita Dunn answers questions on learning styles. *Educational Leadership*.
- Dunn, R., & Dunn, K. (1978). *Teaching Students Through Their Individual Learning Styles: A Practical Approach*. Allyn and Bacon.
- Durmaz, B. (2007). *The Effects of the Concept Cartoons to the Success of the Students and Sensory Features in the Constructivist Science Teaching (Muğla Provincial, Administrative District Sample)*, Master's Dissertation, Muğla University, Muğla, Turkey.
- Efe, Ç. (2002). *The role of readiness level of university's first year students in the learning of the basis and side concepts of cell divisions*, PhD Dissertation, Atatürk University, Erzurum, Turkey.
- Ekici, G. (2010). *An examination of the high school student's perceptions about biology laboratory environment education*. *EJournal of New World Sci. Acad.*, 5(3): 180-186.
- El Hajjar, S. (2015). *An Empirical Approach of Exploring and Confirming a Reliable Scale for Faculty Evaluation at Higher Institutions*. *International Journal of Arts & Sciences*. 8. 53-76.
- Elias, H., Ping, W.S. and Abdullah, M.C. (2011). *Stress and Academic Achievement among Undergraduate Students in Universiti Putra Malaysia*. *Procedia—Social and Behavioral Sciences*, 29, 646-655. <https://doi.org/10.1016/j.sbspro.2011.11.288>

- Enu, J., Agyman, O. K., & Nkum, D. (2015). Factors influencing students' mathematics performance in some selected colleges of education in Ghana. *International Journal of Education Learning and Development*, 3(3), 68-74.
- Epstein, N., & Fischer, M. R. (2017). Academic career intentions in the life sciences: Can research self-efficacy beliefs explain low numbers of aspiring physician and female scientists? *PLoS ONE* 2017, 12, e0184543.
- Fawait, A., Setyosari, P., Sulthoni, S., & Ulfa, S. (2020). Identification of factors affecting of character education program on high school students' self-regulation skills. *Journal for the Education of Gifted Young Scientists*, 8(1), 435-450.
<http://dx.doi.org/10.17478/jegys.683155>
- Ferla, J., Valcke, M., & Cai, Y. (2009). Academic self-efficacy and academic self-concept: Reconsidering structural relationships. *Learn. Individ. Differ.* 2009, 19, 499-505.
- Fenstermacher, G. D., & V. Richardson. 2005. On making determinations of quality in teaching. *Teachers College Record* 107 (1): 186-213.
- Ferryansyah, Widyawati, E. & Rahayu, S. W. (2018). The analysis of student's difficulty in learning linear algebra. *IOP Conf. Series: Journal of Physics: Conf. Series*.
<https://doi.org/10.1088/1742-6596/1028/1/012152>
- Fisher, S. (1994). *Stress in academic life: The mental assembly line*. Open University Press.
- Fleming, G. (2020). *Learning Styles: Holistic or Global Learning*. ThoughtCo, Aug. 26, 2020, [thoughtco.com/holistic-learners-1857093](https://www.thoughtco.com/holistic-learners-1857093).

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

109

- Fletcher, J. M. (2012). Classification and identification of learning disabilities. In *Learning about learning disabilities*. 4th ed. Edited by Bernice Wong and Deborah L. Butler, 1–26. London: Academic Press.
- Fraser, B. J. (1998). Classroom environment instruments: Development, validity and applications. *Learn. Environ. Res.*, 1:7-33.
- Fuchs, L. S., Fuchs, D., & Speece, D. L. (2002). Treatment validity as a unifying construct for identifying learning disabilities. *Learning Disability Quarterly* 25:33–45. DOI: 10.2307/1511189
- Fullan, M. (1991). *The New Meaning of Educational Change*, 2nd ed., New York: Teachers College Press.
- Gao, Y., & Hangsing, E. (2019). Scientific Aptitude and Academic Achievement: A Study on Tribal Students. *International Journal of Scientific and Research Publications*, Volume 9, Issue 11, 246 ISSN 2250-3153
<http://dx.doi.org/10.29322/IJSRP.9.11.2019.p9526> www.ijsrp.org
- Garcia, A. C., Cheung, A. M. G., & Loredó – Abuyo, M. (2015). Correlation of the Academic Performance and Grit Among The College of Arts And Sciences Batch 2014 Students of Lyceum of the Philippines- Laguna. *CAS Research Journal Psychological Research* Vol. 2 No.2.
- Garg, R., Melanson, S., & Levin, E. (2007). Educational aspirations of male and female adolescents from single-parent and two biological parent families: A comparison of influential factors. *Journal of Youth & Adolescence*, 36, 1010-1023.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

110

- "General Biology." (2019). DepEd: K to 12 Basic Education Curriculum Senior High School – Science, Technology, Engineering And Mathematics (STEM) Specialized Subject, www.deped.gov.ph. Accessed 4 Feb. 2022.
- Ghwela, M., Mustaffa, R., & Noor, N. M. (2017). Perceptual Learning Style Preferences of EFL Libyan University Learners, *International Journal of Social Science and Humanities Research*, 5 (2), 409-416.
- Gogus, A. (2012). Analytic Learning. In: Seel, N.M. (eds) *Encyclopedia of the Sciences of Learning*. Springer, Boston, MA. https://doi.org/10.1007/978-1-4419-1428-6_490
- Gonzalez, H. B., & Kuenzi, J. J. (2012). Science, technology, engineering, and mathematics (STEM) education: A primer. Congressional Research Service, Library of Congress.
- Hamed, M., & Almabruk, A. (2021). Perceptual Learning Style Preferences of English Major Libyan University Students and their Correlations with Academic Achievement *Advances in Language and Literary Studies* ISSN: 2203-4714 www.all.s.aiac.org.au. <http://dx.doi.org/10.7575/aiac.all.s.v.12n.5.p.1>
- Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural Equation Modeling: Guidelines for Determining Model Fit. *Electronic Journal of Business Research Methods*. 6:1:53-60. Retrieved from: www.ejbm.com
- Hu, L. T., & Bentler, P. M. (1999). "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives," *Structural Equation Modeling*, 6 (1), 1-55.

- Hystad, S. W., Eid, J., Laberg, J. C., Johnsen, B. H., & Bartone, P. T. (2009). Academic stress and health: Exploring the moderating role of personality hardiness. *Scandinavian journal of educational research*, 53(5), 421-429.
- Inhelder, B. and Piaget, J. (1958). *The growth of logical thinking from childhood to adolescence*. New York, USA: Basic Books.
- Jöreskog, K., & Long, J. S. (1993). "Introduction," in *Testing Structural Equation Models*, Kenneth A. Bollen and J. Scott Long, Eds. Newbury Park, CA: Sage.
- Jöreskog, K., & Sörbom, D. (1993). *LISREL 8: Structural Equation Modeling with the SIMPLIS Command Language*. Chicago, IL: Scientific Software International Inc.
- Kadzikowska-Wrzosek, R. (2018). Self-regulation and bedtime procrastination: the role of self-regulation skills and chronotype. *Personality and Individual Differences*, 128(February), 10–15. <https://doi.org/10.1016/j.paid.2018.02.015>
- Karabenick, S. A. (2003). Help seeking in large college classes: A person-centered approach. *Contemporary Educational Psychology*, 28, 37–58.
- Karcı, M. (2018). 5. Sınıf Elektrik Ünitesinin Öğretiminde Kullanılan STEM Etkinliklerine Dayalı Senaryo Tabanlı Öğrenme Yaklaşımının Öğrencilerin Akademik Başarı, STEM Disiplinlerine Dayalı Meslek Seçmeye Olan İlgisi ve Fen Öğrenmeye Yönelik Motivasyonlarına Olan Etkisini İncelemek, Çukurova Üniversitesi Sosyal Bilimler Üniversitesi İlköğretim Anabilim Dalı. Adana.
- Kaya E., & Gürbuz, H. (2002). The views of the high schools and vocational high schools students on the problems of biology teaching. *Erzincan Univ. J. Educ.*, 4(2): 11-21.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

112

- Keith, T. Z. (2019). Multiple Regression and Beyond: An Introduction to Multiple Regression and Structural Equation Modeling. In *Principles & Methods of Statistical Analysis* (3rd. Ed.). <https://doi.org/10.4135/9781071878903.n18>
- Kidman, G. (2008). Asking students: What key ideas would make classroom biology interesting? *Teach. Sci.*, 54 (2): 34-38.
- Kitsantas, A., Winsler, A, & Huie, F. (2008). Self-Regulation and Ability Predictors of Academic Success during College: A Predictive Validity Study. *Journal of Advanced Academics*, 20(1), 42-68.
- Klinckman, E. (1970). *Biology Teachers' Handbook*. New York, USA: John Wiley & Sons.
- Kline, R. B. (2005). *Principles and Practice of Structural Equation Modeling* (2nd Edition ed.). New York: The Guilford Press.
- Kornell, N., & Metcalfe, J. (2006). Study efficacy and the region of proximal learning framework. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 32, 609–622.
- Lamb, R., Akmal, T., & Petrie, K. (2015). Development of A cognition-priming model describing learning in a STEM classroom. *Journal of Research in Science Teaching*, 52(3), 410–437.
- Landrum, B. (2020). Examining students' confidence to learn online, self-regulation skills and perceptions of satisfaction and usefulness of online classes. *Online Learning*, 24(3), 128–146. <http://dx.doi.org/10.24059/olj.v24i3.2066>
- Lanier, J.E., Little, J.W. (1986). Research on teacher education. In: Wittrock MC (ed) *Handbook of Research on Teaching*, 3rd ed., New York: Macmillan, pp 527-569.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

113

- Lawson, A. E. (1975). Developing formal thought through biology teaching. *The American Biology Teacher*, 37(7), 411-419.
- Lawson, A. E. and Renner, J. W. (1975). Relationships of science subject matter and developmental levels of learners. *Journal of Research in Science Teaching*, 12, 347-358.
- Lazarowitz, R., & Penso, S. (1992). High School Students' Difficulties in Learning Biology Concepts. *J. Biol. Educ.*;26(3):215-24.
- Lee, Y., Choi, J., & Kim, T. (2013). Discriminating factors between completers of and dropouts from online learning courses. *British Journal of Educational Technology*, 44(2), 328-337. <https://doi.org/10.1111/j.1467-8535.2012.01306.x>
- Leon, K. E. (2013). Factors that influence the understanding of good mathematics teaching. *Eurasia Journal of Mathematics, Science & Technology Education*, 9(3), 319- 328.
- Li, W., Chen, J., Li, M., Smith, A. P., and Fan, J. (2022). The effect of exercise on academic fatigue and sleep quality among university students. *Front. Psychol.* 13:1025280. doi: 10.3389/fpsyg.2022.1025280
- Lomax, R. G., & Gammill, P. S. (1984). Sex differences and perceived parental influence of student occupational and educational aspirations. *Sociological Perspectives*, 27, 465-473.
- MacBeath J., Mortimore, P. (eds) (2001). *Improving School Effectiveness*, Buckingham: Open University Press.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

114

- MacBeath, J., Schratz, M., Meuret, D., & Jakobsen, L. (2000). *Self-Evaluation in European Schools: A Story of Change*, London: Routledge.
- MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, 1(2), 130–149. <https://doi.org/10.1037/1082-989X.1.2.130>
- MacGeorge, E. L., Samter, W., & Gillihan, S. J. (2005). Academic stress, supportive communication, and health. *Communication Education*, 54(4), 365-372.
- MacIntyre, D. (2003). Has classroom teaching served its day? In M Nind, J Rix, K Sheehy & K Simmons (Eds), *Inclusive Education: Diverse Perspectives*. London: David Fulton Publishers.
- MacKeracher, D. (2004). *Making sense of adult learning*, (2nd ed.). Canada: University of Toronto Press Incorporated.
- McCarthy, B. (2000). *About Teaching: 4MAT® in the Classroom*. Wauconda, IL: About Learning, Inc.
- McKinney, C. J. (2011). *Global vs. Analytic Learning Styles*. Retrieved from <https://www.theclassroom.com/global-vs-analytical-learning-styles-8572440.html>
- McLeod, G. (2003). Learning theory and instructional design. *Learning Matters* 2: 35–53.
- Maksum, A., Widiana, I. W., & Marini, A. (2021). Path Analysis of Self-Regulation, Social Skills, Critical Thinking and Problem-Solving Ability on Social Studies Learning Outcomes. *International Journal of Instruction*, 14(3), 613-628. <https://doi.org/10.29333/iji.2021.14336a>

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

115

- Manichander, T., & Brindhamani, M. (2014). Academic Achievement and Scientific Aptitude in Science among the Students of Standard-X. *American Research Thoughts* ISSN: 2392 – 876X Volume 1 ; Issue 1 Available online at: www.researchthoughts.us
- Manitoba Education and Training. (2000). Senior 4 English Language Arts: A Foundation for Implementation. Winnipeg, MB: Manitoba Education and Training. Section 3, pp. 9–11.
- Manjula, M. N. (2015). A Study of Scientific Aptitude of Matriculation School in relation to their Achievement in Mathematics. *Indian Streams Research Journal*, Vol. V, Issue. XI, DOI : 10.9780/22307850, <http://isrj.org/UploadedData/7693.pdf>
- Mansolf, M., Jorgensen, T. D., & Enders, C. K. (2020). A multiple imputation score test for model modification in structural equation models. *Psychol Methods*. 2020 Aug;25(4):393-411. doi: 10.1037/met0000243. Epub 2019 Oct 17. PMID: 31621350.
- Marbuah, D. A. A. (2016). Influence of Parental Income and Educational Attainment on Children's Years of Schooling: Case of Ghana. Institutionen for pedagogik, didaktik och utbildningsstudier Department of Education. Master's thesis in Sociology of Education Nr 1.
- McClelland, M. M., & Cameron, C. E. (2012). Self-regulation early childhood: improving conceptual clarity and developing ecologically valid measures. *Child Development Perspectives*, 6(2), 136–142. <https://doi.org/10.1111/j.1750-8606.2011.00191.x>

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

116

- McDonald, R. P. & Ho, M. H. R. (2002). Principles and Practice in Reporting Statistical Equation Analyses. *Psychological Methods*, 7 (1), 64-82.
- MacKinnon, D. P., Krull, J. L., & Lockwood, C. M. (2000). Equivalence of the mediation, confounding, and suppression effect. *Prevention Science*, 1, 173-181.
- Maksum, A., Widiana, I. W., & Marini, A. (2021). Path Analysis of Self-Regulation, Social Skills, Critical Thinking and Problem-Solving Ability on Social Studies Learning Outcomes. *International Journal of Instruction*, 14(3), 613-628.
<https://doi.org/10.29333/iji.2021.14336a>
- Mendoza, O. V. M. (2017). Internet Access and Inequalities of Income and Educational Attainment. Conference: 9th International Symposium on Human Capital and Labor Markets. At: Central University of Finance and Economics, Beijing, China
- Merriam, S. B. (2004). The changing landscape of adult learning theory. In J Comings, B Garner & C Smith (Eds), *Review of Adult Learning and Literacy* (Vol. 4). Mahway NJ: Lawrence Earlbaum Associates.
- Miles, J., & Shevlin, M. (2007). A Time and A Place for Incremental Fit Indices. *Personality and Individual Differences*, 42, 869-874.
<https://doi.org/10.1016/j.paid.2006.09.022>
- Misra, R., & Castillo, L. G. (2004). Academic stress among college students: Comparison of American and international students. *International Journal of stress management*, 11(2), 132-148.
- Mitchel, C. (2009). *Effect of preferred learning styles on motivation and achievement in kindergarten students*. (Doctoral dissertation).

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

117

- Mondal, G. (2018). A study of socio-economic status and its impact to academic achievement of Higher Secondary School Students. *Journal of Emerging Technologies and Innovative Research (JETIR)* www.jetir.org 5. 189-198.
- Moreno-Marcos, P. M., Muñoz-Merino, P. J., Maldonado-Mahauad, J., Pérez-Sanagustín, M., Alario-Hoyos, C., & Kloos, C. D. (2020, February). Temporal analysis for dropout prediction using self-regulated learning strategies in self-paced MOOCs. *Computers & Education*, 145, 1–41.
<https://doi.org/10.1016/j.compedu.2019.103728>
- Mulaik, S. A., James, L. R., Van Alstine, J., Bennet, N., Lind, S., and Stilwell, C.D. (1989). "Evaluation of Goodness-of-Fit Indices for Structural Equation Models," *Psychological Bulletin*, 105 (3), 430-45.
- Muller, G. A. (1974). The magical number 7+ or -2: some limits on our capacity for processing information. *Psychological Review*, 63, 81-97.
- Murshid, K. R. (2013). The predictive value of individual admission criteria on academic performance in a Saudi medical college. *Journal of Taibah University Medical Sciences*, 8(1), 18-23.
- Mutakinati, L., Anwari, I., & Kumano, Y. (2018). Analysis of students' critical thinking skill of middle school through STEM education project-based learning. *Jurnal Pendidikan IPA Indonesia*, 7(1), 54–65.
- Naserieh, F., & Sarab, M. R. (2013). Perceptual learning style preferences among Iranian graduate students. *System*, 41, 122-133.
<http://dx.doi.org/10.1016/j.system.2013.01.018>

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

118

Navarro-Carrillo, G., Alonso-Ferres, M., Moya, M., & Valor-Segura, I. (2020).

Socioeconomic Status and Psychological Well-Being: Revisiting the Role of Subjective Socioeconomic Status. *Frontiers in Psychology*. 11.

10.3389/fpsyg.2020.01303.

Nelson, K. (2009). Impact of Parent Education on Student Success. Utah Valley

University 800 W. University Parkway, MS 126 Orem, UT 84058 (801)226-2030

Niazov, Z., Hen, M., & Ferrari, J. R. (2022). Online and Academic Procrastination in

Students with Learning Disabilities: The Impact of Academic Stress and Self-Efficacy. *Psychol Rep.* 2022 Apr;125(2):890-912. doi:

10.1177/0033294120988113. Epub 2021 Feb 11. PMID: 33573501.

Norwich, B. (2000). *Education and Psychology in Interaction: Working with Uncertainty in Interconnected Fields*. London: Routledge

Nworgu, B. G. (2003). *Educational Measurement and Evaluation Theory and Practice*.

Nsukka: University Trust Publishers.

Odaci, H. (2011). Academic self-efficacy and academic procrastination as predictors of problematic internet use in university students. *Computers & Education*, 57(1), 1109–1113.

Oghenevwe, O. (2019). Enhancing Biology Students' Academic Achievement and Attitude through Self-Regulated Learning Strategy in Senior Secondary Schools in Delta Central Senatorial District. *Journal of Educational and Social Research*. 9. 149-156. 10.2478/jesr-2019-0064.

- Onsekizlioglu, A. S. (2018). Webquest Destekli STEM Egitiminin Akademik Başarıya Etkisi & Zeka Türleri İle Öğrenme Stilleri Arasındaki İlişki. Yüksek Lisans Tezi. Marmara Üniversitesi Eğitim Bilimleri Enstitüsü Matematik & Fen Bilimleri Eğitimi Anabilim Dalı Kimya Öğretmenliği Bilim Dalı, İstanbul.
- Osborne, J., & Collins, S. (2001). Pupils' views of the role and value of the science curriculum. *Int. J. Sci. Educ.*, 23(5): 441-467.
- Oweini, A., & Daouk, C. (2016). Effects of the Dunn and Dunn Learning Styles Model on Reading Comprehension and Motivation: A case study in innovative learning. *International Journal of Talent Development and Creativity*.
- Ozcan, N. (2003). A Group of Students' and Teachers' Perceptions with Respect to Biology Education at High School Level, MA Dissertation, Middle East Technical University, Ankara, Turkey.
- Ozcan, Z. Ç., & Eren Gümüş, A. (2019). A modeling study to explain mathematical problem-solving performance through metacognition, self-efficacy, motivation, and anxiety. *Australian Journal of Education*, 63(1), 116–134. <https://doi.org/10.1177/0004944119840073>
- Pardo, A., Han, F., & Ellis, R. A. (2016). Exploring the relation between self-regulation, online activities, and academic performance: a case study. The Sixth International Conference on Learning Analytics & Knowledge (pp. 422–429). Association for computing Machinery (ACM). <https://doi.org/10.1145/2883851.2883883>
- Pascual-Leone, J. and Goodman, D. (1979). Intelligence and experience: a Neo-Piagetian approach. *Instructional Science*, 8, 301-367.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

120

- Pastorino, E. E., & Doyle-Portillo, S. M. (2012). *What is psychology? Essentials*. Cengage Learning.
- Patrick, A. O. (2012). *Unequal Achievement of Science Undergraduates: Does Sex Influence the Differences? US-China Education Review B 6 578-594* Earlier title: *US-China Education Review*, ISSN 1548-6613.
- Perry, N. (2002). *Introduction: Using qualitative methods to enrich understandings of self-regulated learning*. *Educational Psychologist*, 37 (1), 1-3.
- Phoenix, D. A. (2000). *Looking toward Reform – the Student Focus*. *J Biol Educ.*; 34 (4):171.
- Pillai, K. S. (1990). *Interactive effect of scientific aptitude and attitude towards science and biology achievement*. *Journal of Educational Research and Extension*, 26 (4), 206-210.
- Pintrich, P. R. (2004). *A Conceptual Framework for Assessing Motivation and Self-Regulated Learning in College Students*. *Educational Psychology Review*, 16 (4), 385-407.
- Pintrich, P. R., Zusho, A., Schiefele, U., & Pekrun, R. (2001). *Goal orientation and self-regulated learning in the college classroom: A cross-cultural comparison*. In F. Salili, C-Y. Chiu, & Y-Y. Hong (Eds.), *Student motivation: The culture and context of learning* (pp. 149-169). New York: Plenum.

- Prabhu, A., & Wani, P. (2015). A study of Importance of English Language Proficiency in Hospitality Industry and the Role of Hospitality Educators in Enhancing the Same Amongst the Students. *ATITHYA: A Journal of Hospitality*. 1.10.21863/ATITHYA/2015.1.1.009.
- Rabbani, M., Kasmaienezhadford, S., & Pourrajab, M. (2014). The Relationship between Parental Attachment and Stress: A Review of Literatures Related to Stress among Students, *The Online Journal of Counseling and Education*, 3,1, 42-50.
- Rafanan, R.J. L., De Guzman, C. Y., & Rogayan, D.V. J. (2020). Pursuing STEM Careers: Perspectives of Senior High School Students. *Participatory Educational Research (PER)* Vol. 7(3), pp. 38-58, December 2020 Available online at <http://www.perjournal.com> ISSN: 2148-6123
<http://dx.doi.org/10.17275/per.20.34.7.3>
- Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers & Education*, 144, 1–17. <https://doi.org/10.1016/j.compedu.2019.103701>
- Reddy, J. K., Menon, K. R., & Thattil, A. (2018). Academic Stress and its Sources among University Students. *Biomed. Pharmacol. J.* 2018, 11, 531–537.
- Reddy, S., Brothers, K., Quave, C. L., & Chen, S. C. (2019). Altering Perceptions of Scientists among Fifth Graders by the Introduction of Female Role Models: A New Opportunity for Dermatologists? *J. Investig. Dermatol.* 2019, 139, 723–724.

- Rhoads, A. (2005). *Reaching them all: Using student learning styles to teach more effectively*. Manuscript submitted for publication, Baker College, Baker College, Michigan.
- Ros, G., Rey, A. F., Calonge, A., Carrillo, M. D. L. (2021). The Design of a Teaching-Learning Sequence on Simple Machines in Elementary Education and its Benefit on Creativity and Self-Regulation. *EURASIA Journal of Mathematics, Science and Technology Education*, 2022, 18(1), em2066 ISSN:1305-8223 (online) OPEN ACCESS Research Paper <https://doi.org/10.29333/ejmste/11487>
- Rostaminezhad, M., Mozayani, N., Norozi, D., & Iziy, M. (2013). Factors related to e-learner dropout: case study of IUST Elearning Center. *Procedia – Social and Behavioral Sciences*, 83(2013), 522–527. <https://doi.org/10.1016/j.sbspro.2013.06.100>
- Roth, K. J., Druker, S. L., Garnier, H. E., Lemmens, M., Chen, C., & Kawanka T. (1999). *Teaching Science in Five Countries: Results From the TIMSS 1999 Video Study (NCES 2006-011)*.
- Roth, K. J., Druker, S. L., Garnier, H. E., Lemmens, M., Chen, C., Kawanaka, T., Rasmussen, D., Trubacova, S., Warvi, D., Okamoto, Y., Gonzales, P., Stigler, J., & Gallimore, R. (2006). *Teaching Science in Five Countries: Results From the TIMSS 1999 Video Study (NCES 2006-011)*. U.S. <http://nces.ed.gov/pubs2006/2006011.pdf>
- Runco, M. A. (2014). *Theories and Themes: Research, Development, and Practice*, 2nd ed.; Academic Press: London, UK, 2014; ISBN 978-0-12-410512-6.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

123

- Safari, E., & Hejazi, M. (2017). Learning Styles and Self-regulation: An Associational Study on High School Students in Iran. *Mediterranean Journal of Social Sciences*, 8. 10.5901/mjss.2017.v8n1p463.
- Sahranavard, S., Miri, M. R., & Salehiniya, H. (2018). The relationship between self-regulation and educational performance in students. *J Educ Health Promot*. 2018 Dec 28;7:154. doi: 10.4103/jehp.jehp_93_18. PMID: 30693291; PMCID: PMC6332646.
- Sahin, Y. L. (2014). Comparison of users' adoption and use cases of Facebook and their academic procrastination. *Digital Education Review*, 25, 127–138.
- Saka, A. (2006). The effect of 5e model on removing science student teachers' misconceptions about genetics, PhD Dissertation, Karadeniz Technical University, Trabzon Turkey.
- Sanchez, S., Reyes, O., & Singh, J. (2006). Makin' it in college: The value of significant individuals in the lives of Mexican American adolescents. *Journal of Hispanic Higher Education*, 5, 48-67.
- Sander, W. (2001). Chicago public schools and students achievement. *Urban Education*, 36(1),27-38.
- Sanders, M. (2009). Integrative STEM education: Primer. *The Technology Teacher*, 68(4), 20–26.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

125

- Stanley, L. S. (2016). Scientific Aptitude & Achievement in Science of IX Standard Students in Puducherry Region. *Indian Journal of Research*, 5(2), 290-291.
Retrieved from <https://www.worldwidejournals.com>>Fe
- Staver, J. (1986). The effects of problem format, number of independent variables, and their interaction on student performance on a control of variables, reasoning problem. *Journal of Research in Science Teaching*, 23(6), 533-542.
- Steiger, J. H. (1990). "Structural model evaluation and modification. *Multivariate Behavioral Research*, 25, 214-12.
- Steiger, J. H. (2007). Understanding the Limitations of Global Fit Assessment in Structural Equation Modeling. *Personality and Individual Differences*, 42, 893-898.
<https://doi.org/10.1016/j.paid.2006.09.017>
- Struthers, C. W., Perry, R. P., & Menec, V. H. (2000). An examination of the relationship among academic stress, coping, motivation, and performance in college. *Research in higher education*, 41(5), 581-592.
- Studenska, A. (2011). Educational level, gender and foreign language learning self-regulation difficulty. *Procedia - Social and Behavioral Sciences* 29 (2011) 1349 – 1358.
- Sun, J. C. Y., & Rueda, R. (2012). Situational interest, computer self-efficacy and self-regulation: Their impact on student engagement in distance education. *British Journal of Educational Technology*, 43(2), 191–204.
<https://doi.org/10.1111/j.1467-8535.2010.01157.x>

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

126

- Suneetha, B., & Mayuri, K. (2001). A study of age and gender differences on the factors affecting high academic achievers. *Journal of Community Guidance and Research*, 18(2), 197-208.
- Tabachnick, B. G., and Fidell, L. S. (2007). *Using Multivariate Statistics* (5th ed.). New York: Allyn and Bacon.
- Talib, N., & Zia-ur-Rehman, M. (2012). Academic performance and perceived stress among university students. *Educational Research and Reviews*, 7(5), 127-132.
- Tanti, M., Syefrinando, B., Daryanto, M., & Salma, H. (2020). Students' self-regulation and motivation in learning science. *International Journal of Evaluation and Research in Education (IJERE)* Vol. 9, No. 4, December 2020, pp. 865~873 ISSN: 2252-8822, DOI: 10.11591/ijere.v9i4.20657
- Teachman, J. D., & Paasch, K. (1998). The family and educational aspirations. *Journal of Marriage & Family*, 60, 704-714.
- Tekkaya, C., Ozkan, O., & Sungur, S. (2001). Biology Concepts Perceived as Difficult by Turkish High School Students. *Hacettepe Univ. J. Educ.*;21:145-50.
- Telli, S., Brok, P., Tekkaya, C., & Çakıroğlu, J. (2009). Turkish students' perceptions of their biology learning environments: The Effects of Gender and Grade Level. *Asian J. Educ. Res. Syn.*, 1(1): 110-124
- The Learning Community. (2011). *Tips for Parents: Global vs. Analytic Learners*. Retrieved from <http://www.thelearningcommunity.us/ResourcesbyFormat/TipsforParents/GlobalvsAnalyticLearners/tabid/329/Default.aspx>

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

127

- Tonkaboni, A., Pareshkooh, M. K., Manafi, S., Amaral Mendes, R., & Kharazifard, M. J. (2022). Different Scoring Methods of The VARK Questionnaire to Evaluate Dentistry Students' Learning Styles. *European Journal of Dental Education*.
- Tuckman, B. W. (2003). The effect of learning and motivation strategies on college students' achievement. *Journal of College Student Development*, 44, 430–437.
- Tusting, K., & Barton, D. (2003). *Models of Adult Learning: A Literature Review*. London: NRDC.
- Twomey, E. (2006). Linking learning theories and learning difficulties, *Australian Journal of Learning Disabilities*, 11:2, 9398, DOI: 10.1080/19404150609546812
- Valenzuela, S., & Bachmann, I. (2017). *Path Analysis*. 10.1002/9781118901731.iecrm0181.
- Van Houtte, M. (2004). Why boys achieve less at school than girls: The difference between boys' and girls' academic culture. *Educational Studies*. 30. 159-173. 10.1080/0305569032000159804.
- Vattøy, K. D. (2020). Teachers' beliefs about feedback practice as related to student self-regulation, self-efficacy, and language skills in teaching English as a foreign language. *Studies in Educational Evaluation*, 64, 1– 10. <https://doi.org/10.1016/j.stueduc.2019.100828>
- Valenzuela, J. S., Connery, M. C., & Musanti, S. I. (2000). The theoretical foundations of professional development in special education: Is sociocultural theory enough? *Remedial and Special Education*, Vol. 21, No. 2, pp. 111-120

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

128

- Vilia, P. N., Candeias, A. A., Neto, A. S., Franco, M. D. G. S., & Melo, M. (2017). Academic Achievement in Physics-Chemistry: The Predictive Effect of Attitudes and Reasoning Abilities. *Front Psychol.* 2017 Jun 28;8:1064. doi: 10.3389/fpsyg.2017.01064. PMID: 28701978; PMCID: PMC5487439.
- Walker, R. A., Hendrix, J. R., and Mertens, R. T. (1980). Sequenced instruction in genetics and Piagetian cognitive development. *The American Biology Teacher*, 42(2), 104-109.
- Wang, C., Li, S., & Su, Y. S. (2022). Impact of academic stress by parent-proxy on parents' learning-support-services: a moderated-mediation model of health anxiety by parents' educational level. *Library Hi Tech*, Vol. ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/LHT-07-2022-0329>
- Wheaton, B., Muthen, B., Alwin, D. F., & Summers, G. (1977). Assessing Reliability and Stability in Panel Models. *Sociological Methodology*, 8, 84-136. <http://dx.doi.org/10.2307/270754>
- Whittaker, T. A., & Schmacker, R. E. (2022). *A Beginner's Guide to Structural Equation Modeling*, 5th ed. New York: Routledge Taylor and Francis Group.
- Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology*, 25, 68-81.
- Wolters, C. (2001). Motivational problems experienced by college students. Presented at the annual meetings of the American Psychological Association, San Francisco, CA.

- Wolters, C., & Rosenthal, H. (2000). The relation between students' motivational beliefs and attitudes and their use of motivational regulation strategies. *International Journal of Educational Research*, 33, 801 – 820.
- Yaduvanshi, S., & Singh, S. (2019). Fostering Achievement of Low-, Average-, and High-Achievers Students in Biology through Structured Cooperative Learning (STAD Method). *Education research International Journal*, 1(10). Retrieved from <http://doi.org/10.1155/2019/1462179>
- Yaman, M., & Soran, H. (2000). Türkiye' de ortaöğretim kurumlarında biyoloji öğretiminin değerlendirilmesi. *Hacettepe Univ. J. Educ.*, 18: 229-237.
- Yuzbaşılıoğlu, A., & Atav, E. (2004). Determining students' learning level of daily life biology subjects. *Hacettepe Univ. J. Educ.*, 27: 276-285.
- Yusri, G., Nik, M.R., Parilah, S., & Wan, H. (2011). Test anxiety among: Arabic language course students. *International Journal of Learning*. 18. 73-86.
- Zeidan A. (2010). The Relationship between Grade 11 Palestinian Attitudes toward Biology and Their Perception of the Biology Learning Environment. *Int. J. Math. Educ.*; 8:783–800.
- Zhang, F., Jiang, Y., Ming, H., Ren, Y., Wang, L., & Huang, S. (2020). Family socio-economic status and children's academic achievement: The different roles of parental academic involvement and subjective social mobility. *Br J Educ Psychol*;90(3):561-579. doi: 10.1111/bjep.12374. Epub 2020 Aug 10.
- Zimmerman, B. J. (2000). Self-Efficacy: An Essential Motive to Learn. *Contemp. Educ. Psychol.*, 25, 82–91.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

130

Zeidan, A. (2010). The Relationship between grade 11 Palestinian attitudes toward biology and their perceptions of the biology learning environment. *Int. J. Sci. Maths. Educ.*, 8:783-800.

Zoller, U. (2000). Teaching tomorrow's college science courses - are we getting it right? *J. Coll. Sci. Teach.*, 29 (6): 409-414