



Predictors of Students' Academic Performance in Science 7 Using Alternative Delivery Mode

Angel Rose A. Cabugnason¹, Joji D. Linaugo²

Governor Julian L. Teves Memorial High School, Calasga-an, Bais City, Negros Oriental, Philippines, ²Carlos Hilado Memorial State University, Talisay City, Negros Occidental, Philippines

angelrose.cabugnason@deped.gov.ph¹, joji.linaugo@deped.gov.ph²

Abstract. The COVID-19 pandemic brought an abrupt change in the world, including the educational system. To prevent academic freeze, and for the public safety, distance learning is adopted, and in Philippines, modular learning is adopted in general. Science is a subject that is considered difficult, and it challenged the teachers in making the students grasp the concepts well, most especially to the Grade 7 students who transition to secondary school. A descriptive correlational research design was used to determine the predictors of students' academic performance in Science 7 using Alternative Delivery Mode (ADM)-modules at a secondary school in Central Philippines. These predictors which some are found in the Learner Enrollment and Survey Form (LESF) are age, sex, learning styles, academic achievement in English, utilization of gadget, parents' educational attainment, and family income. Fifty-two (52) Grade 7 students were taken as respondents through stratified sampling technique. A 40-item multiple-choice validated researcher-made questionnaire that covers the Most Essential Learning Competencies (MELCs) from the first to second quarters was administered to the respondents. The results of the test in Science 7 are interpreted as Low/Below Standard. From the seven variables tested for the study, it is only the learning style that weakly predicts students' academic performance in Science 7 using Alternative Delivery Mode (ADM) modules. It is recommended that teachers should provide set of activities catering different learning styles of the students that the modules/learning activity sheets will be enhanced to improve the students' performance.

Keywords. Science Education, Modular Distance Learning, Descriptive-Correlational, Central Philippines.



1. Introduction

With the challenges brought by the Corona Virus Disease (COVID-19) pandemic, the United Nations Educational, Scientific and Cultural Organization [1] reported that about 200 states closed schools. Over 90% of learners across all levels face some interruption to their learning. Countries have replaced conventional close education with distance learning as a defensive measure [2].

Distance learning is described as a mode of instruction in which students and instructors have minimal to no face-to-face contact [3]. In addition, all learning activities undergo a transition in which instructors can no longer directly instruct learning and its assessment is conducted online [4] and even through modules if internet connectivity is not feasible. In modular learning, students use Self-Learning Modules (SLMs) in the form of individualized instruction [5] which is more effective as it results in significantly higher gain in process skills [6].

Each learner is also a teacher in the self-learning process, and it is beneficial to join a learning community and share your expertise with others [7]. Educators have developed these strategies to unique to modular learning: inspire student motivation for learning; coach students to set objectives; and develop learning plans, and train students to self-evaluate [8]. With this, students could have improved academic achievement, increased motivation and confidence, higher likelihood to be imaginative and intellectually innovative, cultivated inclusion and contradicted marginalization from peer group, and increased opportunities to complete teacher-assigned differentiated tasks [9].

Science in the Philippine curriculum is designed as being a learner-centered, inquiry-based, and evidence-based. Concepts and skills in Life Sciences, Physics, Chemistry, and Earth Sciences are presented in a spiral manner, that is, increasing levels of complexity from lower to higher grade level [10]. Science is a difficult and complicated subject that contains many specialized vocabularies and needs a lot of memorizations [11]. Delivering this subject through distance learning is a key challenge. There is a need to offer the learner real and profound laboratory experience. Developing strategies necessitates identification of relevant mode to approach. Moreover, defining and prioritizing short and long-term objectives and aligning the agenda with requirements is a must [12].

In the Philippines, the COVID-19 problem has impacted around 27 million students, a million teachers and non-teaching personnel, as well as the families of students. The advances in information technology and the internet have also widened the educational divide [13]. The Department of Education (DepEd) insists that the education of millions of Filipino pupils should not be delayed until 2021 despite calls to do so [14]. To highlight, it rejected suggestions for a "academic freeze" [15], as this does not take into account the effects of a prolonged halt on children's learning.

The Department of Education discovered that majority of the parents and guardians are inclined to the modular learning modality for their children compared to other options. This was based on the results of Learner Enrollment Survey Form (LESF) [16]. The official gazette of DepEd (2020) also reported the provision Self-Learning Modules (SLMs) with the options for learning delivery modalities such as modular, television-based, radio-based instruction, blended, and online. For learning to continue, DepEd prescribed the distance learning approach [14]. This situates students to learn in their homes, and that limited to almost no contact with mentors will



make parents or guardians as the students' model or the "More Knowledgeable Other" (MKO) [17].

In one small rural secondary school in the mountainous central Philippines, majority of students enrolled do not have access to internet. Anent to this, the school adopted Modular Distance Learning (MDL) using printed modules. When the enrollment took place and with MDL, this study found out that some factors found in the Learner Enrollment and Survey Form (LESF) can predict academic performance in Science of Grade 7 students.

2. Framework

It can be said that each way of learning makes a big difference in how well students do in school and how long they remember what they've learned [18]. This also gives a solid base for research, especially in the humanities, education, and other areas of behavior research. In pedagogy, it helps students learn the most [19]. This also encourages independent learning, or the ability to take charge of one's own learning [20], and it's considered "active learning," which usually means student-centered, engaging teaching methods and activities led by the teacher [21]. Through this, a student learns by doing, which was made popular by the theorist John Dewey. An experiential learning method is based on the idea that learners should think about what they did and how it went, which helps them gain both conceptual understanding and practical skills [22].

David Kolb, a psychologist, came up with his Theory of Learning Styles in 1984. He said that these styles are a result of our genes, our life experiences, and the needs of our current environment [23]. Learning style is a stable preference for learning that learners develop over time through long-term activities. It is an important factor that shows how different learners are [24], and it can also be a way for educators to implement personalized learning in the classroom [25].

With MDL approach, students accomplish their tasks at home. The help of their parents or guardians is indispensable and essential and has a positive impact towards their achievement as students perform better [26]–[28]. Moreover, family income is a factor to students' performance [29], [30].

DepEd Order 18, s. 2020 establishes the guidelines that will enable the department to provide Self-Learning Modules, as well as the release, utilization, and liquidation of supports and funds for the printing and delivery. As assessment is the bridge between teaching and learning, DepEd Order 31, s. 2020 has provided guidance on the assessment of student learning and on the grading scheme to be adopted this school year that will meaningfully support learner development and respond to varied context.

3. Methodology

This paper employed the descriptive correlational research design. In correlational research designs, researchers use the correlation statistical test to describe the degree of relationship between two or more sets of scores. They do not try to control or change the variables like they would in an experiment. Instead, they use the correlation statistic to link two or more scores for each person [31].

This study was conducted at a small public rural secondary school in mountainous central Philippines. Most of the students are residing in remote places where they travel to school by



walking. Fifty-two (52) randomly selected Grade 7 learners enrolled for Academic Year 2021-2022 served as respondents for the study.

These instruments are used in the study: Learner Enrollment and Survey Form (LESF); Visual, Auditory, Reading/Writing, Kinesthetic (VARK) Tool; and Test Questionnaire. The main enrollment tool used for the remote and drop box enrollment is the LESF. This is an enhanced version of the standard enrollment form, which collects the basic learner profile and asks pertinent survey questions aimed to profile the family's preparedness for distance education. The researcher used a validated VARK Tool in assessing student's learning style. The test questionnaire (summative assessment), a valid and reliable ($\kappa = 1.0$) researcher-made questionnaire which is of a 40- item multiple-choice type, was used to assess student's learned knowledge, skills, and attitudes from the Alternative Delivery Mode (ADM)-Module in Science 7 based on the Most Essential Learning Competencies (MELCs). In this study, the assessment covered the Science 7 Quarter 1 and Quarter 2 MELCs. Form 14 (Report of Test Result) with Mean Percentage Score (MPS) was used as basis for determining students' academic performance in the summative test taken.

After seeking approval from the school head, the 40-item questionnaire was distributed to the parents or guardians during the scheduled day of retrieval. This was returned a week after. The learners answered independently the instruments only aided by the modules given to them.

Descriptive problems were answered using Mean and standard deviation. Regression analysis using Spearman's rho and nominal by interval whichever was appropriate was used to determine predictors of performance in Science.

The researchers addressed the general principles of respect for persons, beneficence, and justice to ensure the ethical soundness of the study. These principles include social value, informed consent, the vulnerability of the research participants, risk and benefits, privacy and confidentiality, justice, transparency, adequacy of facilities, and community involvement.

4. Results and Discussions

Level of Students' Academic Performance in Science 7 Using Alternative Delivery Mode (ADM) Modules when taken as a Whole and when Grouped According to Variables

When taken as a whole, the Mean Percentage Score (MPS) of the students' scores in their summative test is low (Table 1). Also, the low standard deviation indicates that the scores of the students are close to the mean, which shows consistency.

Table 1. Level of Students' Academic Performance in Science 7 Using Alternative Delivery Mode (ADM)-Modules when taken as a Whole

Entire Group	Mean	SD	MPS	Interpretation
	15.37	5.43	38.43	Low

Note: 96-100 Mastered
86-95 Closely Approximating Mastery/Superior (CAM)
75-85 Meeting Standard (MS)
66-74 Moving Towards Mastery/Below Standard (MTM)
35-65 Low/Below Standard (LS)
0-34 Poor/Very Low (P)



Table 2 show primarily the level of students' performance per variable used in the study.

Table 2. *Level of Students' Academic Performance in Science 7 Using Alternative Delivery Mode (ADM)-Modules grouped according to Variables*

Variable	<i>f</i>	Mean	SD	MPS	Interpretation
Age					
12.00	17	17.47	5.55	43.68	Low
13.00	26	14.46	4.50	36.15	Low
14.00	7	14.57	7.89	36.43	Low
16.00	2	12.00	2.83	30.00	Low
Sex					
Male	25	15.56	5.97	38.90	Low
Female	27	15.19	4.99	37.98	Low
Learning Styles					
Auditory	15	15.87	5.42	39.68	Low
Kinesthetic	13	17.31	7.70	43.28	Low
Reading/ Writing	12	13.75	3.77	34.38	Low
Visual	12	14.25	3.39	35.63	Low
Academic Achievement in English (Q1)					
70-75	19	15.26	5.30	38.15	Low
76-80	18	15.11	3.27	37.78	Low
81-92	15	15.80	7.62	39.50	Low
Number of Gadgets					
1	26	15.35	5.76	38.38	Low
2	14	13.71	4.20	34.28	Low
3	10	17.50	6.21	43.75	Low
4	2	16.50	3.54	41.25	Low
Utilization of Gadget					
No	12	14.67	8.65	36.68	Low
Sometimes	37	15.30	4.12	38.25	Low
Always	3	19.00	3.61	47.50	Low
Father's Educational Attainment					
No Schooling	5	13.40	5.94	33.50	Low
Elementary	22	15.00	3.07	37.50	Low
Secondary	22	16.19	6.98	40.48	Low
Tertiary	3	15.33	7.23	38.33	Low
Mother's Educational Attainment					
Elementary	29	14.17	3.39	35.43	Low
Secondary	19	15.89	7.00	39.73	Low
Tertiary	52	21.50	5.80	53.75	Low
Family Income					
Low	48	15.10	5.04	37.75	Low
High	4	18.50	9.47	46.25	Low

In terms of age, the youngest students scored highest among others, and the oldest scored the lowest. The findings are supported by studies conducted in Kenya and Ghana [32], [33] but are negated by some studies where there is a very stable and predictable relationship in terms of age and academic performance from lower secondary students [34], [35].



As to sex, males perform better than females. This result is contrary to the findings in the Philippines [36], the United States [37], Lebanon [38], Australia [39], the Netherlands [40], and Nigeria [41] where female students exert more effort and outpace boys .

In terms of learning styles there are more auditory learners, but the kinesthetic learners are performing better. The standard deviation of the scores of visual learners is closest to the mean. However, the result for over-all performance is low. Comparing the performance of the different learning styles, it is therefore, the kinesthetic learners who have scored the greatest, in which they can learn better as they involve their physical aspects. The results are supported by the fact that learning styles impacts academic performance [42] and that the most preferred learning style is auditory for high school students [43] although in other studies kinesthetic students prevail [44]. While those students who are good in reading and writing perform low, one study have different findings wherein there was a significant relationship between reading and academic performance of students [45].

It is forwarded that learners performance in English might also impact Science achievement. Based on the results, most students have grades in English which belong to the 70 - 75 bracket. Those who have higher grades in English (81 - 92) perform better in Science presumably having an advantage to comprehend the concepts better. The better a person is at a language, the more they will be able to show that they know how to use it and the better they will do in school [46], [47].

Students who have three to four gadgets at home perform better and have the highest MPS of 43.75 among others, however, their performance is still considered low. In terms of gadget utilization, students who always use gadget in their studies have the highest MPS of 47.50 and have the lowest standard deviation indicating consistency of scores. In general, gadgets helped the students in their studies, and as more gadgets used, the better is the learning. However, in some countries, more students are using gadgets in their studies [48]. In Indonesia more students had better scores from the use of gadgets [49] as technology improves student learning and achievement on tests [50].

In the educational attainment of the students' parents, majority of fathers' attainment falls on elementary and secondary level. Students whose fathers' educational attainment is secondary perform better having an MPS of 40.48. Meanwhile, most of the students' mothers finished only elementary level (56%). Students whose mothers' educational attainment is on tertiary level has the highest MPS of 53.75 compared to others. In these variables, the MPS results are still low. The higher the educational attainment of parents, the better is the performance of their children in their studies. The results of the students' school examination are associated with parental involvement and their educational attainment [26]. Latino students do better in school when their parents have a higher level of education [27]. And parents with more education are more likely to push their children to do well in school [28].

For family income, 92% of the students' families have lower income. Students who belong to families with higher income perform better than those who have low income. Family income affects the performance of students. The higher and adequate income, students are more privileged and find no difficulty in their studies. Students from affluent homes acquire a higher level of academic success [29], [30].



Predictors of Students' Academic Performance in Science 7 using Alternative Delivery Mode (ADM) Modules

Table 3-A reveals a weak, negative but significant correlation between students' academic performance in Science 7 and age, $r = -0.349$, $p = 0.011$. This means that as the students grow older, the academic performance in Science 7 decreases. With this result, age is not a predictor of students' academic performance, and the null hypothesis is not rejected.

Table 3-A. *Regression Analysis of Predictors of Academic Performance (Spearman's rho).*

		Academic Perf
Age	Correlation Coefficient	-.349*
	Sig. (2-tailed)	.011
English Grade	Correlation Coefficient	.076
	Sig. (2-tailed)	.595
Number of gadgets	Correlation Coefficient	.167
	Sig. (2-tailed)	.237

*Correlation is significant at the 0.05 level (2-tailed).

This result, however, is negated where age had a significant effect on students' academic performance [32]–[35]

Table 3-A also reveals the data of students' academic performance and academic achievement in English. With the value of 0.076, the variables show no association. Academic Achievement in English is not associated with the students' academic performance in Science 7. This result contradicted in some studies as higher proficiency in English impacts students' academic performance [46] and a strong positive relationship between English and academic performance in other subjects is found [47].

The data in Table 3-B reflects the relationship between students' academic performance in Science 7 and sex using eta. It shows that there is a no association ($\eta = 0.035$) between students' academic performance in Science 7 and sex.

A good number of studies stated that performance varies among males and females and has a significant relationship to academic performance. So their results do not support this study [37]–[41].



Table 3-B. *Regression Analysis of Predictors of Academic Performance (Nominal by Interval)*

		Value
Eta	Academic Perf Dependent	.035
	Sex Dependent	.525
Eta	Academic Perf Dependent	.257
	Learning Style Dependent	.572
Eta	Academic Perf Dependent	.174
	Utilization of Gadget Dependent	.723
Eta	Academic Perf Dependent	.157
	Father's EA Dependent	.626
Eta	Academic Perf Dependent	.362
	Mother's EA Dependent	.726
Eta	Academic Perf Dependent	.168
	Family Income Dependent	.799

Table 3-B shows the data about the relationship between students' academic performance in Science 7 and learning styles. There is a weak association, with a value of 0.257, between the variables. Although the association is weak, a student's learning style can be considered predictor of academic performance. The learning style of a student is a predictor of academic performance.

In this new normal, where modules are used, learning styles have a correlation as emphasized in a study where deep and strategic style contribute significantly through a positive relationship [42]. There are differences in the performance of students in terms of learning styles, and that identification of the preferred learning styles may help instructors to differentiate the teaching process [43]. The students' academic performance correlated with the learning styles they preferred [44] and whatever the learning styles of the students, these enhance their academic performance [45].

In Table3-B, there is a negligible association between the variables with $\eta = 0.174$. So, the utilization of gadgets does not affect the academic performance of students in Science 7. The results are contradicted by some studies where it was found out that using of gadgets is a predictor to students' academic performance as these supplements the learning of students [48]–[51].

With $\eta = 0.157$, the father's educational attainment has a negligible association with the student's academic performance. This means that this is not considered a predictor. Mother's educational attainment has a weak association with the students' academic performance, with a value of 0.362, thus, not considered a predictor as well. The parents' educational attainment cannot predict learners' academic performance. These findings negated some studies where parents' educational attainment play an important role [26]–[28].

Lastly, family income of parents have a negligible association to Science performance with $\eta = 0.168$. With this result, this is not considered as predictor to students' academic performance. This contradicted some studies because the students' academic performance is affected by the income their family have [29], [30].



5. Conclusions

As no two students are alike, the learning style of a student may vary from one another, which affects the performance. Learning style can be a predictor of students' academic performance in Science 7.

On the other hand, sex, age, utilization of gadget, parents' educational attainment, and academic achievement in English are not considered as predictors.

The students' performance is not affected by their sex because the abilities of males and females may vary. Their abilities may develop as they age (Morin, 2021). But, in the case of these students resided at remote areas – hinterlands, and 92% of their families have low income, those who are older tend to work for money and help their parents in household chores as face-to-face classes are suspended because of the pandemic.

Regardless of the majority having low-income in which limited gadgets are used by the students, these do not affect their studies. In addition, 42% from the students' fathers have only finished elementary and secondary levels. On the other hand, 56% of the students' mothers have finished elementary level. With these achievements, the performance of students is not affected as well since they can also work independently.

Lastly, academic achievement in English does not solely affect the performance of students in Science 7 where English is used as medium of instruction because there are cases when modules may be answered correctly with no understanding depending on the type of test a lesson has.

6. Recommendations

Modular Distance Learning is very helpful and suitable in the case of a small rural school situated in central Philippines.

Teachers should come up with varied learning activities, that can cater the different learning styles of students, and therefore enhance the modules or learning activity sheets.

Parents must be encouraged to be always present, if possible, in any school activity and during the distribution and retrieval of modules for them to be instructed well, and for the teachers to be aware of the concerns of their children.

Stakeholders must also participate in any school activity for the school' progress.

The future researchers should come up with another variables affecting students' performance in Science 7 as there are still factors that can possibly affect; develop a new test material that would measure the students' learning using the modules; conduct examination composing of pre and post-test to compare the results.

References:

- [1] UNESCO, "Education: from school closure to recovery," 2020. [Online]. Available: <https://www.unesco.org/en/covid-19/education-response>
- [2] A. Essa Al Lily, A. Fathy Ismail, F. Mohammed Abunasser, and R. Hassan Alhajhoj Alqahtani, "Distance education as a response to pandemics: Coronavirus and Arab culture," 2020, doi: 10.1016/j.techsoc.2020.101317.
- [3] "Distance Learning at Oxbridge Academy."



- <https://www.oxbridgeacademy.edu.za/distance-learning/> (accessed Feb. 25, 2022).
- [4] B. Saputro, M. Saerozi, and F. Ardiansyah, "View of Philosophical Reflections: Critical Analysis of Learning Strategies for Science Practicum During the COVID-19 Pandemic," *Int. J. Recent Educ. Educ.*, vol. 1, no. 2, pp. 78–89, 2020, doi: <https://doi.org/10.46245/ijorer.v1i2.26>.
- [5] M. Llego, "DepEd Self-Learning Modules (SLM) for School Year 2020-2021 - TeacherPH," *DepEd Commons*, 2020. <https://www.teacherph.com/deped-self-learning-modules/> (accessed Feb. 25, 2022).
- [6] S. Vig, "Effectiveness of self learning modules in acquisition of process skills in relation to cognitive styles and study habits of IX class students," Panjab University, 2005. [Online]. Available: <http://hdl.handle.net/10603/81829>
- [7] S. Reader, "Self-Learning; Why it's Essential for You in the 21st Century," 2018. <https://medium.com/wondr-blog/self-learning-why-its-essential-for-us-in-the-21st-century-9e9729abc4b8> (accessed Feb. 25, 2022).
- [8] D. Wilson and M. Conyers, "Guiding Students to Be Independent Learners | Edutopia," *Edutopia*, 2018. <https://www.edutopia.org/article/guiding-students-be-independent-learners> (accessed Feb. 25, 2022).
- [9] C. Mullings, "Developing independent learning skills that improve outcomes," *IRIS Connect*. 2019. Accessed: Feb. 25, 2022. [Online]. Available: <https://blog.irisconnect.com/uk/blog/9-tips-for-encouraging-students-to-become-independent-learners/>
- [10] Department of Science and Technology and University of the Philippines - National Institute for Science and Mathematics Education Development, *Science Framework for Philippine Basic Education*. 2011. [Online]. Available: <http://www.sei.dost.gov.ph>
- [11] V. J. Vanuiter, M. J. Kennedy, J. E. Romig, and L. M. Carlisle, "Enhancing Science Vocabulary Knowledge of Students With Learning Disabilities Using Explicit Instruction and Multimedia," *Learn. Disabil. A Contemp. J.*, vol. 18, no. 1, pp. 3–25, 2020.
- [12] T. S. Harsha, "Learning Science Through Distance Education- a Challenge At Karnataka State Open University," vol. 5, no. 1, pp. 62–65, 2017, Accessed: Feb. 25, 2022. [Online]. Available: www.tojdel.net
- [13] J. Obana, "What Will Schools Look Like Under The 'new Normal'? – The Manila Times," *The Manila Times*, 2020. <https://www.manilatimes.net/2020/05/13/business/columnists-business/what-will-schools-look-like-under-the-new-normal/724556/> (accessed Feb. 26, 2022).
- [14] B. Magsambol, "Fast Facts: DepEd's Modular Learning.," <https://www.rappler.com/newsbreak/iq/things-to-know-deped-modular-learning>, 2020. <https://www.rappler.com/newsbreak/iq/things-to-know-deped-modular-learning/> (accessed Feb. 26, 2022).
- [15] J. Bernardo, "DepEd rejects calls for 'academic freeze,'" *ABS-CBN News*, 2020. <https://news.abs-cbn.com/news/09/09/20/deped-rejects-calls-for-academic-freeze> (accessed Feb. 26, 2022).
- [16] C. Mocon-Ciriaco, "The impossible is possible : Covid shut down schools , but learning goes on," *Business Mirror*, 2020. Accessed: Feb. 26, 2022. [Online]. Available:



- <https://businessmirror.com.ph/2020/10/08/the-impossible-is-possible-covid-shut-down-schools-but-learning-goes-on/>
- [17] P. Manlangit and A. Me. Paglumotan, “‘Tagapagdaloy’: How Filipino parents can help ensure successful modular distance learning - FlipScience - Top Philippine science news and features for the inquisitive Filipino,” *Flip Science*. 2020. Accessed: Feb. 26, 2022. [Online]. Available: <https://www.flipscience.ph/news/features-news/tagapagdaloy-modular-distance-learning/>
- [18] M. Fatih Ayaz and H. Şekerci, “The Effects of the Constructivist Learning Approach on Student’s Academic Achievement: A Meta-Analysis Study,” *TOJET Turkish Online J. Educ. Technol.*, vol. 14, no. 4, 2015.
- [19] D. Adom, A. Y. Attah, and K. Ankrah, “Constructivism Philosophical Paradigm: Implication for Research, Teaching and Learning,” *Glob. J. Arts Humanit. Soc. Sci.*, vol. 4, no. 10, pp. 1–9, 2016.
- [20] C. Hendrick, “What do we mean by Independent Learning?,” 2016. <https://learning.wellingtoncollege.org.uk/what-do-we-mean-by-independent-learning/> (accessed Feb. 26, 2022).
- [21] S. Hartikainen, H. Rintala, L. Pylväs, and P. Nokelainen, “The concept of active learning and the measurement of learning outcomes: A review of research in engineering higher education,” *Educ. Sci.*, vol. 9, no. 4, pp. 9–12, 2019, doi: 10.3390/educsci9040276.
- [22] J. Strobel and A. van Barneveld, “3.6 Experiential learning: learning by doing (2),” *Interdiscip. J. Probl. Learn.*, vol. 3, no. 1, Apr. 2015, doi: 10.7771/1541-5015.1046.
- [23] K. Cherry, “Experiential Learning Theory of David Kolb,” 2020. <https://www.verywellmind.com/experiential-learning-2795154> (accessed Feb. 26, 2022).
- [24] B. Zhang, C. Chai, Z. Yin, and Y. Shi, “Design and Implementation of an EEG-Based Learning-Style Recognition Mechanism,” *Brain Sci. 2021, Vol. 11, Page 613*, vol. 11, no. 5, p. 613, May 2021, doi: 10.3390/BRAINSCI11050613.
- [25] “Learning Styles: Fact or Fiction? What This Decades-Old Theory Can Teach Us | Waterford.org.” <https://www.waterford.org/education/learning-styles-theory/> (accessed Feb. 26, 2022).
- [26] I. Prakhov, O. Kotomina, and A. Sazhina, “Parental involvement and the educational trajectories of youth in Russia,” *Int. J. Educ. Dev.*, vol. 78, p. 102252, Oct. 2020, doi: 10.1016/J.IJEDUDEV.2020.102252.
- [27] J. C. Araque, C. Wietstock, H. Cova, and S. Zepeda, “Impact of Latino Parent Engagement on Student Academic Achievement: A Pilot Study.,” *Sch. Community J.*, vol. 27, no. 2, pp. 229–250, 2017.
- [28] R. Muhammad, “The influence of Parents Educational level on Secondary School Students Academic achievements in District Rajanpur,” *J. Educ. Pract.*, vol. 6, no. 16, pp. 76–79, 2015.
- [29] H. Sohn, by Hyojong Sohn, M. Markell, and C. Jerry Wellik Hsueh-I Lo, “Culminating Projects in Special Education Department of Special Education The Relationship Between Family Factors and Academic Achievement Levels Among Hispanic Immigrant Students in the U.S. Part of the Special Education and Teaching Commons Recommended ,” 2018, [Online]. Available:



- https://repository.stcloudstate.edu/sped_etds://repository.stcloudstate.edu/sped_etds/58
- [30] C. H. Machebe, B. N. Ezegebe, and J. Onuoha, “The Impact of Parental Level of Income on Students’ Academic Performance in High School in Japan,” *Univers. J. Educ. Res.*, vol. 5, no. 9, pp. 1614–1620, Sep. 2017, doi: 10.13189/UJER.2017.050919.
- [31] J. W. Creswell, T. C. Guetterman, and V. L. Plano Clark, *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Pearson, 2019.
- [32] J. M. Momanyi, J. Too, and C. Simiyu, “Effect of Students’ Age on Academic Motivation and Academic Performance among High School Students in Kenya,” *Asian J. Educ. e-Learning*, vol. 03, no. 05, pp. 2321–2454, 2015, [Online]. Available: www.ajouronline.com
- [33] A. Abaidoo, “Factors contributing to academic performance of students in a Junior High School,” GRIN VERLAG, 2018. Accessed: Feb. 26, 2022. [Online]. Available: <https://www.grin.com/document/450284>
- [34] S. C. Andersen, M. Gensowski, S. G. Ludeke, and O. P. John, “A stable relationship between personality and academic performance from childhood through adolescence. An original study and replication in hundred-thousand-person samples,” *J. Pers.*, vol. 88, no. 5, pp. 925–939, Oct. 2020, doi: 10.1111/JOPY.12538.
- [35] E. Goñi, I. Ros, and O. Fernández-Lasarte, “Rendimiento académico e implicación escolar en relación al origen, al sexo y la edad del alumnado de Secundaria,” *Eur. J. Educ. Psychol.*, vol. 11, no. 2, pp. 93–105, Nov. 2018, doi: 10.30552/EJEP.V11I2.224.
- [36] R. Manzanares and J. Linaugo, “Proficiency Level in Biology among Grade 9 Entrants in a Public Secondary School,” *Tech. Soc. Sci. J.*, vol. 38, pp. 142–150, 2022, doi: 10.47577/tssj.v38i1.7920.
- [37] J. Workman and A. Heyder, “Gender achievement gaps: the role of social costs to trying hard in high school,” *Soc. Psychol. Educ.*, vol. 23, no. 6, pp. 1407–1427, Dec. 2020, doi: 10.1007/S11218-020-09588-6/TABLES/5.
- [38] K. M. Sarouphim and N. Issa, “Investigating Identity Statuses Among Lebanese Youth,” <https://doi.org/10.1177/0044118X17732355>, vol. 52, no. 1, pp. 119–138, Sep. 2017, doi: 10.1177/0044118X17732355.
- [39] P. Cole, G. Jane, D. Suggett, and C. Wardlaw, “Performance and Past Research: Gender Differences in Years 6-7 literacy and numeracy Transition Outcomes,” no. November, pp. 1–21, 2016, [Online]. Available: <https://www.education.vic.gov.au/Documents/school/principals/transition/GenderPerformance.pdf>
- [40] L. A. Wijsman, M. J. Warrens, N. Saab, J. H. van Driel, and P. M. Westenberg, “Declining trends in student performance in lower secondary education,” *Eur. J. Psychol. Educ.*, vol. 31, no. 4, pp. 595–612, Oct. 2016, doi: 10.1007/S10212-015-0277-2/FIGURES/2.
- [41] T. Oluwatelure and Abayomi, “Gender Difference in Achievement and Attitude of Public Secondary School Students towards Science ,” *J. Educ. Pract.*, vol. 6, no. 2, pp. 87–92, 2015, [Online]. Available: www.iiste.org
- [42] D. D’Alise., “The Relationship among Learning Styles, Academic Self-Efficacy and Motivation. An empirical study during Covid-19.,” *Univ. Naples Federico II*, no. August,



- pp. 1–7, 2020, [Online]. Available:
https://www.researchgate.net/publication/343417870_The_Relationship_among_Learning_Styles_Academic_Self-Efficacy_and_Motivation_An_empirical_study_during_Covid-19
- [43] A. Mašić, E. Polz, and S. Bećirović, “The Relationship between Learning Styles, GPA, School Level and Gender,” *Eur. Res.*, vol. 11, no. 1, Mar. 2020, doi: 10.13187/er.2020.1.51.
- [44] J. N. Njoku and † ---Basiru Abdulhamid, “Preference of Learning Styles and its Relationship with Academic Performance among Junior Secondary School Students in Dutse Local Government Area, Jigawa State, Nigeria,” *Int. J. Educ. Pract.*, vol. 4, no. 3, pp. 127–133, Apr. 2016, doi: 10.18488/JOURNAL.61/2016.4.3/61.3.127.133.
- [45] O. A. -BethelEke and M. Eremie, “Learning Styles and Academic Performance of Junior Secondary School Student in Rivers State : Implications for Counselling,” *Int. J. Innov. Dev. Policy Stud.*, vol. 5, no. 3, pp. 52–61, 2017.
- [46] L. Grisso, “The Relationship between English Language Proficiency and Academic Achievement for English Language Learners,” *Dr. Diss. Proj.*, Aug. 2018, Accessed: Feb. 26, 2022. [Online]. Available: <https://digitalcommons.liberty.edu/doctoral/1832>
- [47] G. Ozowuba, “Relationship Between English Proficiency and Academic Achievement of Nigerian Secondary School Students,” *Walden Diss. Dr. Stud.*, Jan. 2018, Accessed: Feb. 26, 2022. [Online]. Available: <https://scholarworks.waldenu.edu/dissertations/5243>
- [48] A. R. Bayanova *et al.*, “Student performance interrelation with gadget use at lessons,” *J. Environ. Treat. Tech.*, vol. 7, no. 3, pp. 432–437, 2019, Accessed: Feb. 26, 2022. [Online]. Available: <http://www.jett.dormaj.com/docs/Volume7/Issue 3/html/Student Performance Interrelation with Gadget Use at Lessons.html>
- [49] D. Ratnasari and H. Haryanto, “Analysis of Utilization of Gadgets as Effective Learning Media in Innovation Education to improve Student Learning Achievement,” *KnE Soc. Sci.*, vol. 2019, pp. 460–467–460–467, Jun. 2019, doi: 10.18502/KSS.V3I17.4671.
- [50] M. Kaur and S. Prasad, “The Future Demands of Education in Fijian Classrooms,” *IOSR J. Humanit. Soc. Sci.*, vol. 22, no. 03, pp. 54–58, 2017, doi: 10.9790/0837-2203015458.
- [51] J. Zambrano and G. Londoño, “Study Habits And Mobile Devices,” *Edulearn17 Proc.*, vol. 1, pp. 10210–10213, Jul. 2017, doi: 10.21125/EDULEARN.2017.0932.