EFFECTIVENESS OF PROJECT ERUDITE IN INCREASING THE ACADEMIC PERFORMANCE OF LEARNERS

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Abstract

Learners of the 21st century are very much engaged in the use of technology, internet, and smartphones and this prompted the use of e-learning environment to help them increase their academic achievement. The research assessed the effectiveness of the Project Educational Reinforcement Under Digital Instructions Thru E-learning (ERUDITE) in increasing the level of academic performance of the learners of the public secondary schools, Aringay, La Union during the school year 2016-2017. The study involved a total of 432 learners distributed as control and experimental groups from Grades 7 to 10. Results revealed that the control and experimental groups demonstrated satisfactory in pretests and outstanding in the posttests. The ERUDITE showed effectiveness among the experimental group of learners as it generated higher results as reflected by the significant difference of t-values at 0.05 margin of error over the control group. Along the level of academic performance, Filipino is very satisfactory while English, Mathematics, and Science are satisfactory. The ERUDITE, as an innovative e-learning platform, exhibited effectiveness in increasing the academic performance of the learners. With these results, expansion programs and/or contingency plans are recommended to improve the features of the ERUDITE.

Keywords: academic performance, e-learning, education technology, learner management system, Project ERUDITE, technological trends

1. Introduction

The internet has created a big impact in the different aspects of human existence and with the invention of ‘internet-oriented’ gadgets such as computers, smartphones, tablets, laptops, and other devices, it gave rise to various innovations using education technologies.

The rise in the global popularity of this so-called education technology, through different forms of media, greatly helped in the progress of education (Richey, 2008). So with this scenario, Jenkins (2009) aptly reiterates that the traditional teaching styles are no longer effective in today’s modern times since learners of today no longer appreciate them. Mariani (2016) also stresses that many learners nowadays prefer using online modules and more and more schools have been encouraging its use. As part of the advancements of this online modules, 21st century learning innovations paved way to the creation of e-learning environments.

Going further into its concepts, e-learning goes deep into the use of electronic technologies in learning environments to access educational curriculum outside the bounds of a traditional classroom. In addition, e-learning could also be a course or a program conveyed through online modes and its trending use as a curriculum standards have been garnering much attention from education curriculum and policy makers worldwide (Stockley & Derek, 2003).

In addition to the meaning of e-learning, Julian (2014) gives emphasis that e-learning systems are now claimed as an appropriate pedagogical tool to be used on learners in today’s modern times. Relative to this, Kulik (2014) found out that learners learn faster when they use education technology like e-learning platforms. It further revealed that learners manifest more positive attitudes in learning using technology-based setups like blended learning and virtual learning environments. Furthermore, recent study shows that achievement gaps between fast learners and slow learners are lessened as revealed by pretests and posttests conducted on classes using blended learning via e-learning platforms (Schramm, 2011).

The claims are evident as more and more learners in schools are deeply immersed in the use of the internet and their internet-oriented gadgets as part of recreation and at same time learning. This is the picture of today’s millennial learners.

With these, the researchers believe that the use of the e-learning platform via internet to capture interests of learners has a great potential in increasing the academic performance. The idea of putting up an e-learning catering to blended learning was conceived and Project ERUDITE (Educational Reinforcement Under Digital Instructions Through E-Learning), was designed.

The Project ERUDITE is primarily rooted on the idea that better learning environment and a higher level of academic performance could be achieved through the use of blended learning delivered through e-learning platform. Taking advantage of students' skills in the use of technology would greatly increase their engagement to learn as well as increase their academic achievements and performance (Driscoll & Carliner, 2005).

2. Method

2.1. Research Design

The study utilized the pretest-posttest experimental research design. Shuttleworth (2017) gives a clear concept on the use of this design stating that true experimental designs should utilize the method as it aims to compare participant groups and further measure the degree of changes arising from the use of treatments or interventions. The pretest-posttest experimental research design in this study is used to determine the effectiveness of the Project ERUDITE, an e-learning platform designed to raise the level of academic performance of learners.

2.2. Participants

The study involved 432 learners from Grades 7 to 10 classified into experimental group (EG) or the ERUDITE class, and the control group (CG) exposed to the traditional classroom setting. The groupings considered equal footing on the grade point averages of the learners, thus academic performances were at equal for both groups. The ERUDITE group used the e-learning platform through smartphones, laptops, and internet-capable gadgets while the control group focused on the traditional delivery methods. There is a need to group the learners between control and experimental groups to be able to determine the effectiveness of the ERUDITE in actual learning scenario.

A total of 92 Grade 7 learners evenly distributed at 46 learners for each group participated. The Grade 8, with a total of 90 learners, were distributed at 45 learners for each group. Likewise, the Grade 9 learners were also evenly distributed with 44 learners in each group. However, the 162 Grade 10 learners were divided into six groups: three groups spread at 44, 21, and 16 for control and experimental, respectively.

2.3. Instrumentation

The ERUDITE contains modular instructions adopted from the Department of Education modules under the K to 12 Curriculum standards. These modules are called learning packages. Each learning package is divided into major topics. Each topic is subdivided into pretests, lectures and discussions, activity files, supplemental files, summative tests, and the posttests. The pretest and posttest results are automatically uploaded to a scoreboard accessible to both the learners and the ERUDITE teachers.

The researchers compared the results of pretests and posttests of the experimental group at the end of every learning package which was taken from their ERUDITE accounts. The researchers also compared the pretest and posttest of the control group at the end of every learning package from the E-class records. The significant difference between the results of pretests between the experimental and the control group in the different learning packages across the four major subjects was taken also for analysis and interpretation. The first and second quarter grades of both the experimental and control groups were analyzed and interpreted for the significant difference as to the effectiveness of the ERUDITE as a blended learning environment.

2.4. Data Analysis

The treatment of comparisons between pretests and posttests taken along the subject areas Filipino, English, Mathematics, and Science was measured through Pearson Product Moment of Correlation at 0.05 degree of significance. The t-test on significant differences between the pretest and posttest results of the experimental and the control groups was also determined. The formula was adopted in the analysis and interpretation on the comparisons of pretests only on the experimental and control groups; also on the analysis and interpretation on the comparisons of posttests only of the two groups. Likewise, the same formula and treatment were given on the comparisons along the levels of academic performances of both the experimental group and control group in the first and second quarters along the four major academic subjects.

3. Results

3.1 Significant Difference between the Pretest-Posttest Results of the Control Group

Table1 presents the comparison between the pretest and posttest results of the control group. The table manifests that there was a significant difference between the results of the pretests and posttests across all the learning areas as manifested by the results of the t-tests. Science subject generated the highest mean in both the pretests and posttests given. However, English and Mathematics garnered relatively low pretest and posttest results, respectively.

Table 1. Significant Difference between the Pretest-Posttest Results of the Control Group

	Means		t-values	
Subjects	Pretests	Posttests	Calculated	Tabulated
Filipino	83.15	86.97	13.983	1.337
English	80.51	81.84	7.194	5.930
Mathematics	82.40	80.64	3.077	0.035
Science	84.00	84.80	3.812	0.425

3.1a. Significant Difference between the Pretest-Posttest Results of the Experimental Group

On the other hand, Table 1.A shows the comparison on the pretest and posttest results of the experimental group. Significant differences were evident across all the learning areas except for Mathematics, although it generated the highest mean values in both the pretests and posttests given. Science, on the other hand, generated the lowest mean results in both the pretests and posttests.

Table 1a. Significant Difference between the Pretest-Posttest Results of the Experimental Group

	Means		t-values	
Subjects	Pretests	Posttests	Calculated	Tabulated
Filipino	87.63	88.70	3.417	0.139
English	86.68	89.52	8.045	4.083
Mathematics	90.54	90.59	0.144	0.889*
Science	85.75	86.91	4.565	4.415

3.2. Significant Difference between Pretest Results of Control and Experimental Groups

Table 2 reflects the comparison between the pretest results taken by both the control and experimental groups. The table reveals that significant difference was evident across all the disciplines as reflected by the t-tests given. The table also reflects the experimental group generating higher mean values over the controlled counterpart. Mathematics generated the highest mean value in the pretests given.

Table 2. Significant Difference between Pretest Results of Control and Experimental Groups

	Means		t-values	
Subjects	Control Group	Experimental Group	Calculated	Tabulated
Filipino	83.15	87.63	8.217	2.783
English	80.51	86.68	11.772	6.909
Mathematics	82.40	90.54	12.243	1.914
Science	84.00	85.75	2.076	0.439

3.3. Significant Difference between Posttest Results of Control and Experimental Groups

Table 3 shows the comparison on the posttests taken by both the control and experimental groups. Just like the pretest results, significant differences as gleaned from the t-test results and higher mean values across all the disciplines is evident. Mathematics once again topped the posttest results.

Table 3. Significant Difference between Posttest Results of Control and Experimental Groups

	Means		t-values	
Subjects	Control Group	Experimental Group	Calculated	Tabulated
Filipino	86.97	88.70	4.403	1.681
English	81.84	89.52	13.560	6.112
Mathematics	80.64	90.59	14.439	6.896
Science	84.80	86.91	3.299	2.018

3.4. Academic Performance of Control Group in the First and Second Quarters

Table 4 indicates the academic performance generated by the control group in the first and the second quarters. The results manifest very satisfactory in Filipino ranging from 85.00 to 89.00 and satisfactory along English, Mathematics, and Science with grades ranging from 80.00 to 84.00.

Table 4. Academic Performance of Control Group in the First and Second Quarters

Grade Level	Quarter	Filipino		English		Math		Science	
		Mean	**DR**	**Mean**	**DR**	**Mean**	**DR**	**Mean**	**DR**
7	***First***	88.52	VS	83.15	S	83.35	S	80.20	S
	Second	87.26	VS	83.46	S	83.26	S	81.02	S
8	***First***	86.11	VS	83.57	S	82.39	S	84.04	S
	Second	90.02	O	83.57	S	82.72	S	84.89	S
9	***First***	89.84	VS	82.80	S	83.86	S	87.00	VS
	Second	90.98	O	87.40	VS	86.14	VS	85.68	VS
10	***First***	85.23	VS	84.16	S	85.86	VS	82.30	S
	Second	84.83	S	85.36	VS	85.89	VS	84.00	S

3.5. Academic Performance of the Experimental Group in the First and Second Quarters

Table 5 presents the academic performance of the experimental group in the first and second quarters along Filipino, English, Mathematics, and Science. As reflected, the experimental group had very satisfactory performance in Filipino, English, Mathematics, and Science with average grades ranging from 85.00 to 89.00.

Table 5. Academic Performance of the Experimental Group in the First and Second Quarters

Grade Level	Quarter	Filipino		English		Math		Science	
		Mean	DR	Mean	DR	Mean	DR	Mean	DR
7	***First***	87.11	VS	83.48	S	82.91	S	80.96	S
	Second	85.50	VS	83.59	S	83.17	S	82.43	S
8	***First***	88.09	VS	85.60	VS	80.72	S	82.41	S
	Second	91.43	O	85.28	VS	84.15	S	88.78	VS
9	***First***	88.39	VS	84.14	S	82.04	S	86.71	VS
	Second	90.13	O	88.93	VS	83.47	S	86.33	VS
10	***First***	86.52	VS	86.45	VS	87.34	VS	85.28	VS
	Second	86.65	VS	88.22	VS	87.41	VS	85.11	VS

3.6. Significant Difference between the GPAs along the Four Subject Areas of Grade 7 CG & EG in the First & Second Grading Periods

Table 6 reveals the first and second quarter period grade point averages (GPAs) along the four subject areas of the control and the experimental groups in the Grade 7. It can be gleaned from the results that the calculated t-value of 0.61 is higher than the tabulated t-value at 0.59, therefore the intervention of ERUDITE had a significant effect on the average grades of the experimental group in the first grading period. In addition, results gleaned in the second grading period showed a calculated t-value of 1.03 higher than the tabulated at 0.41, therefore the intervention of ERUDITE had a significant effect on the academic performance of the experimental group.

Table 6. Significant Difference between the GPAs along the Four Subject Areas of Grade 7 CG & EG in the First & Second Grading Periods

	Academic Performance		t-values	
Grading Period	Control Group	Experimental Group	Calculated	Tabulated
First Quarter	83.81	83.61	0.617	0.599
Second Quarter	83.75	83.67	1.033	0.409

3.7. *Significant Difference between the GPAs along the Four Subject Areas of Grade 8 CG and EG in the First & Second Grading Periods*

Table 7 indicates the significant difference between the GPAs of the Grade 8 control and experimental groups along the four subjects in the first and second grading periods. The result of 0.85 calculated t-value is higher than the tabulated t-value of 0.49, therefore the intervention of ERUDITE had a significant effect on the academic performance of the learners in the first grading period. The same results were manifested in the second grading period. Generally, the experimental group showed higher academic performance over the control group as averages range from ‘satisfactory’ to ‘very satisfactory’ as compared to the control group being ‘satisfactory’ only.

Table 7. Significant Difference between the GPAs along the Four Subject Areas of Grade 8 CG & EG in the First & Second Grading Periods

	Academic Performance		t-values	
Grading Period	Control Group	Experimental Group	Calculated	Tabulated
First Quarter	83.95	84.02	0.846	0.486
Second Quarter	85.30	87.41	3.013	0.094

3.8. Significant Difference between the GPAs along the Four Subject Areas of the Grade 9 CG & EG in the First & Second Grading Periods

Table 8 indicates the significant difference between the academic performance of the Grade 9 experimental and control groups along the four core subjects in the first and second grading periods. The calculated t-value of 0.28 is lower than the tabulated t-value at 0.80, making the effect of the intervention of ERUDITE not significant among the experimental group in the first quarter period. However, results in the second quarter came out significant as the calculated t-value of 0.91 rendered the intervention of ERUDITE as effective on the academic performance of the experimental group.

Table 8. Significant Difference between the GPAs along the Four Subject Areas of the Grade 9 CG & EG in the First & Second Grading Periods

	Academic Performance		t-values	
Grading Period	Control Group	Experimental Group	Calculated	Tabulated
First Quarter	85.88	85.32	0.281	0.804
Second Quarter	87.21	87.55	0.910	0.127

3.9. Significant Difference between the GPAs along the Four Subject Areas of Grade 10 CG & EG in the First & Second Grading Periods

Table 9 indicates the significant difference between the academic performance of the Grade 10 control and the experimental groups along the four core subjects in the first and second grading periods. It can be gleaned from the results of the first and second quarters that the calculated t-values were way far higher than the tabulated t-values, therefore the intervention of ERUDITE was able to make a significant effect on the grades of the experimental group.

Table 9. Significant Difference between the GPAs along the Four Subject Areas of Grade 10 CG & EG in the First & Second Grading Periods

	Academic Performance		t-values	
Grading Period	Control Group	Experimental Group	Calculated	Tabulated
First Quarter	84.39	86.15	8.122	0.148
Second Quarter	85.02	86.85	3.463	0.742

4. Discussion

4.1 Significant Difference between the Pretest-Posttest Results of the Control Group

The results on the significant difference between the pretest and posttest of the control groups presented in Table 1 imply the effectiveness of the teachers in delivering the competencies to the learners. Though traditional face-to-face delivery mode was used and limited technological interventions were used, the learners managed to get high results in the tests given. Conclusively, these results reflect that although many educators look at traditional classrooms styles to be outdated, its effectiveness could not be disregarded. In a three-year-spanned study conducted by Hubackova and Semradova (2013) on the comparison between e-learning teaching and face-to-face teaching, learners still manifested high interest to traditional classroom teaching delivered personally by a teacher.

4.1a. Significant Difference between the Pretest-Posttest Results of the Experimental Group

The outcomes in Table 1A generally indicate that the use of ERUDITE as an e-learning platform in delivering blended learning is effective among the learners although one subject area, Mathematics, was not able to render ERUDITE to be effective in delivering the competencies along the various subject areas. The result along Mathematics could be attributed to the fact that there were some learning packages that were not restricted entry in the platform because of limitations of the system. Thus, the teachers delivered the lessons at an almost same environment like the control group. This was unforeseen during the beta testing of system. Snehal (2016), an e-learning designer, reiterates that e-learning is highly dependent on technology and that technical skills of learners as well as teachers together with the tech-capacity of the system are very important considerations for its success.

4.2. Significant Difference between Pretest Results of Control and Experimental Groups

The results in Table 2 manifests that the use of ERUDITE along the four core subjects has made a significant effect. In addition, the results manifested a renewed interest among learners, looking at the potentials and benefits derived from the ERUDITE. Taking into consideration the study of Rajaee (2015) which focused on learners' motivation through e-learning, the study showed that learner engagement was successful and that learners achieved higher learning objectives in the e-learning platform. Israel (2015) also agrees with such results as significant difference in learning Mathematics manifested significant differences. In addition, Renata and Jana (2012) came to the results that Science learning, specifically along Physics had resulted to renewed interest and motivation to study the concepts and topics of the subject.

4.3. Significant Difference between Posttest Results of Control and Experimental Groups

The results in Table 3 along the posttests taken by both the control and the experimental group show that the use of the ERUDITE as an alternative instruction delivery on the four disciplines made a significant effect among the learners. Conclusively, the posttest result of the experimental group is a manifestation of the system's effectiveness of the systems design, compatibility and appropriateness to the needs and interests of the learners who are classified as millennial generation. Arkorful and Abaidoo (2014) agree with these factors as reflected in their study conducted along the pros and cons in the use of e-learning in education. The authors stressed that learning packages and materials in e-learning platforms must be age-appropriate and readiness-appropriate to the learners aside from the importance of the materials and packages validation. The authors further emphasized that teachers' role in the e-learning environment is also imperative.

4.4. Academic Performance of Control Group in the First and Second Quarters

The level of academic performance of the control group in Table 4 is categorized along the four subject areas. The mainstream subjects using English as the medium of the instruction generated satisfactory levels while the Filipino subject generated very satisfactory to outstanding results. Since the ERUDITE intervention was not used to this group, the results could be attributed to language barriers. Sagucio (2016) in her study along content area effectiveness between English and Filipino languages as medium of instruction pointed out that Science and Mathematics get low grades due to language factor. She reiterates that teacher should gauge methods and techniques in the process of teaching Science, Mathematics and even English itself in order to raise the performance level of learners.

4.5. Academic Performance of the Experimental Group in the First and Second Quarters

Table 5, on the other hand, manifests that the ERUDITE was able to yield effectiveness on its influence as a learning environment thereby causing an increase in the academic achievement of the learners. The experimental group, with ERUDITE as intervention, had an increased level of academic performance as it generated very satisfactory to outstanding results. Corroborating with these result is a study conducted by the US Department of Education (USDE Report, 2010) where results showed that learners performed better in e-learning environment as compared with those in the traditional teaching mode of face-to-face interactions.

4.6. Significant Difference between the GPAs along the Four Subject Areas of Grade 7 CG & EG in the First & Second Grading Periods

Table 6 manifested that there is significant difference in the GPAs generated by the control and experimental groups. Though the GPAs were consistent at 83 percent average, decimal considerations were taken thus resulting to higher calculated t-value over the control group generating lower values. The GPAs were generally 'satisfactory' only. These results could be attributed to the idea on the preparedness of the Grade 7 learners who were entered under the ERUDITE group. This corroborates with the findings of the study of Simonds and Brock (2014) wherein it was revealed that multiple logistic regression analyses generated outcome whereby different age groups respond differently to online learning methods. In this research, the Grade 7 manifested lack of preparedness attributed to age though they are technically 'digital natives' as they are called.

4.7. Significant Difference between the GPAs along the Four Subject Areas of Grade 8 CG and EG in the First & Second Grading Periods

Table 7 implies the effectiveness of the ERUDITE as an intervention and alternative instruction delivery among learners. This further indicates that the learners could achieve more if they are in a virtual learning environment. Though the GPAs were not as distant as to dispersion, the experimental group was still higher over the control counterparts. The results on the significant difference through t-test reveals effectiveness of the ERUDITE in increasing academic performance.

4.8. Significant Difference between the GPAs along the Four Subject Areas of the Grade 9 CG & EG in the First & Second Grading Periods

Table 8 shows that there was a low-to-high trend in the GPAs for the first and the second quarters. It further indicates no significant effect was made by the ERUDITE in the first quarter period. However, a rebound on the academic performance is evident in the second quarter as it rendered significant difference manifested by the calculated t-value higher over the tabulated. This downward-upward in the performance in both the control and experimental group is due to some inevitable circumstances. Three out of the four teachers assigned were not able to execute their responsibilities. One took her early leave due to critical pregnancy. The other had to take at least 3-month leave due to motorcycle accident and the last one went on Study Leave. Immediate teacher-substitutes were not given trainings thus ERUDITE classes were compromised in the first quarter period. This is what Navani and Ansari (2016) reiterated in there study claiming that there are readiness to be met in both the learners and teachers when engaging in e-learning environment. Considerations must be given to 'technological skills' readiness, 'online learning' readiness, 'attitude' readiness, 'environmental' readiness and even 'cultural' readiness.

4.9. Significant Difference between the GPAs along the Four Subject Areas of Grade 10 CG & EG in the First & Second Grading Periods

Table 9 manifests that ERUDITE is an effective innovation for learning among the Grade 10 learners. The table further implies that the Grade 10 learners happen to have gained the highest GPAs across the four learning areas as compared to the lower grade levels. This result could be attributed to the online readiness and experiences of the learners which Navani and Ansari had reiterated in their study along e-learning readiness.

The results of the study on the effectiveness of the ERUDITE is further strengthened by theories made by Spiro on Cognitive Flexibility, Lave and Wenger on Situated Learning, Bruner on Discovery Learning, and Vygotsky on Social Development Theory (Haythornwaite, et al, 2007; Garrison & Anderson, 2003). Furthermore, studies agreed to the results that e-learning could raise the level of academic performance as stated by Driscoll and Carliner (2005) that education technology, especially those appearing online, is indeed a beneficial factor to learners that could greatly increase academic achievement.

Lastly, to corroborate with Jenkins (2009), the ERUDITE was seen as a new learning style by the learners. Jenkins strongly claimed that learners are no longer confined to the usual tried-and-tested teaching methodologies.

5. Conclusion

The Project ERUDITE exhibited effectiveness in both pretest and posttest performances of the experimental group over their controlled counterparts. The increased academic performance was evident. Though the ERUDITE manifested its effectiveness in increasing the academic performance, the results also manifested that teachers play a crucial role as to its success in the blended learning environment. Thus, teachers' training in education technology is highly important. In addition, the learners' tech trend experiences and age appropriateness also play a vital role in the success of the ERUDITE. The results manifested by the big gap in the results of significant difference between the grades of the control group and experimental group in Grade 7 and Grade 10 is an evidence proving that age and experience are factors to be considered in using blended learning models and e-learning platforms.

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