DLSU ARCHERS 2023
ANNUAL RESEARCH CONGRESS FOR HIGH SCHOOL AND ELEMENTARY TEACHERS, RESEARCHERS, AND SCHOLARS
Connecting Education and Sustainability:
Mobilizing SDGs in Basic Education and Research
MAY 25-26, 2023
https://www.facebook.com/dlsuarchers/ archers@dlsu.edu.ph

Interdisciplinary Contextualization, Students' Conceptual Understanding and Achievement in Mathematics

Charlene A. Aquilesca
Anilao National High School
**corresponding author: charlene.aposaga@deped.gov.ph*

Abstract: The low level of understanding in mathematics has become a significant concern in the country. The Common Core Standards in Mathematics emphasize the importance of conceptual understanding as a key component of mathematical expertise. Moltz (2010) identified interdisciplinary contextualization as one of the features of the K to 12 Curriculum, viewing it as a form of deep learning that occurs through linking ideas and concepts across courses. McLendon (2014) added that this approach helps students find and create meaning through experience, drawing from prior knowledge to build upon existing knowledge. Thus, to maintain quality education in the country, teachers should be flexible in adapting to educational trends that best address the needs of the learners. This quasi-experimental study aimed to determine the effectiveness of Interdisciplinary Contextualization (ICON) on conceptual understanding and achievement in mathematics. The study involved 48 Grade-7 students from two intact classes. The toss coin method was used to randomly assign classes. A validated and reliability-tested 40-item researcher-made achievement test, a 20-item conceptual understanding test, and adapted conceptual understanding rubrics were used to gather data. Results revealed that students' level of conceptual understanding and mathematics achievement was "very low" and "low," respectively, and did not significantly differ before the intervention. After the six-week intervention, both students' conceptual understanding and mathematics achievement, when exposed to Interdisciplinary Contextualization (ICON), increased to an "average" level, while those in the traditional approach remained "low." Although both groups showed a significant increase in their level of conceptual understanding, no significant difference was observed in mathematics achievement. However, the mean gain score of students exposed to ICON was significantly higher compared to that of students exposed to the traditional teaching approach. Thus, the findings of the study highlight the superiority of Interdisciplinary Contextualization (ICON) over the traditional method in improving students' conceptual understanding and achievement in mathematics.

Keywords: interdisciplinary; contextualization; conceptual understanding; achievement in mathematics

1. INTRODUCTION

Throughout most of history, standards for mathematics were set locally, by individual schools or teachers, depending on the levels of achievement that were relevant to, realistic for, and considered socially appropriate to their students. To meet the demands of tomorrow, children today need to learn not only to apply mathematics in the present environment but also to develop skills and procedures which will enable them to solve new problems that arise in the present

complex society (Penuela, 1999, as cited in Brillantes, 2011).

The low understanding level in mathematics has become great concern for our country, parents, educators and government. Furthermore, student's limited vocabulary may affect their comprehension and understanding of any topic just like students who have never had an actual understanding of the basics in geometry are going to be lost. Research results have pointed that geometry instruction through traditional methods does not have a positive influence over students' success in learning (teaching math with creativity blog, 2010). The Common Core Standards in Mathematics stress the importance of conceptual understanding as a key component of mathematical expertise. Conceptual understanding reflects a student's ability to reason in settings involving the careful application of concept definitions, relations, or representations of either. (Balka et al., nd).

Section 5 of Republic Act 10533 or the Enhanced Basic Education Act of 2013 states one of the features of K to 12 Curriculum which is contextualization. One of the goals and effects of a contextualized approach is to capture a student's attention by illustrating the relevance of the learning experience. According to McLendon (2014) this approach helps students find and create meaning through experience, drawing from prior knowledge in order to build upon existing knowledge. It also motivates and increases willingness to engage (Tabach & Friedlander, 2008) and provides real or concrete meaning to math (Perin et al., 2009; Heid et al., 1995). Contextualization can be seen as a form of deep learning‖ that comes about through linking ideas and concepts across courses (interdiscipline) (Moltz, 2010).

According to Perin et al. (2010) contextualization is also used in discipline area instruction without a basic skills dimension. Integrated instruction would be the province of discipline-area instructors in both academic and career and technical areas. In this iteration, content area teachers contextualize instruction by referring to authentic practices related to the topics being taught to other discipline to deepen domain knowledge. The coexistence of different modes of integration, perhaps even in the same classroom, could potentially maximize the strength of each strategy while compensating for some of their natural limitations. This was supported by Helmke (2003) where he describes the complex relations in which instruction and learning are integrated. Instruction is regarded as an offer and students may choose to benefit from this offer.

This study was conducted to determine the effectiveness of one type of contextualization which is Interdisciplinary Contextualization (ICON) among grade 7 students and to the level of conceptual understanding and mathematics achievement of students.

2. METHODOLOGY

This study is anchored to the underlying theories related to learning and student cognition of Jean Piaget's Seminal Work in Cognitive Development, Bruner's Constructivist Theory of Learning, and Thorndike's Connectionism. In the present study the preceding theories imply the following; First, Piaget's cognitive development implies the conceptual understanding of students in mathematics based on their life experiences and what they learned from their grade school. Second, Thorndike's theory of connectionism explains how this conceptual knowledge in mathematics connects or associates not only on things but to other disciplines. Lastly, Bruner's theory of learning explains how learners do with that knowledge after connecting it to other disciplines, whether they retain it or not. Thus, it will explain or discuss the results in determining the effectiveness of Interdisciplinary Contextualization (ICON) to the improvement of student's conceptual understanding and achievement in mathematics.

This study employed the quantitative research methodology. Quantitative research described the conceptual understanding and achievement in mathematics of students. The method of investigation was quasi-experimental which aimed to determine the effectiveness of Interdisciplinary Contextualization (ICON) on the conceptual understanding and mathematics of the seventh grade students of San Enrique National Comprehensive High School. The dependent variables in this study were the conceptual understanding and mathematics achievement while the independent variables were the teaching approaches: Interdisciplinary Contextualization (ICON) and Traditional Method. The pretest-posttest control group design was employed in this investigation. According to David (2002) (as cited in

Magno 2005), this is used to determine the effects of intervention introduced to group of subjects.

The subject of the study came from 127 students of the two intact section/classes which are 7-Mars and 7-Mercury of San Enrique National Comprehensive High School of the school year 2017-2018. Since match pairing was done based on sex and on their third quarter grade in mathematics, only 48 students composed of 24 students from each intact class were considered as subjects of the study. The two classes were randomly assigned into two groups; experimental or ICON Group and control group or the traditional group through tossing a coin.

All students were given pretest which is validated and reliability-tested 40-item researcher-made achievement test and 20-item conceptual understanding test with adapted conceptual understanding rubrics. Then, they were exposed to two teaching approaches where the same teacher which is the teacher-researcher taught the two groups and utilized 2 hours per day for six weeks duration of the experiment. The same textbook and curriculum guide were used but differ in teaching strategies. The lesson plan using traditional method used the non-contextualization approach of teaching while Interdisciplinary Contextualization (ICON), the activities in the lesson were integrated to other discipline such as MAPEH, Social Studies, English, Values and were contextualized according to the everyday life and experiences of the students that can be found either in motivation, presentation, application or evaluation on the lesson plan. After six weeks, they were given posttest. All students were used during the study but only the results of twenty-four students from each section were considered in the analysis.

3. RESULTS AND DISCUSSION

The first specific objective of this investigation is to determine the level of conceptual understanding of students before and after their exposure to Interdisciplinary Contextualization (ICON) and Traditional Method.

Table 4 shows summary of data that were gathered on the level of conceptual understanding before and after exposure to the two teaching approaches. Before the intervention was conducted, the data gathering instrument for conceptual understanding was administered as pretest to both groups. Both groups had a "very low" conceptual understanding in mathematics reflected on the following results, for group under ICON (M=11.79, SD=8.45) and for Traditional (M=7.92, SD=4.56). This indicates that the respondents in both groups had more or less the same level of conceptual understanding before their exposure to Interdisciplinary Contextualization (ICON) and Traditional method as a teaching approach. Furthermore, both groups were found to have a little understanding on the various concepts in mathematics prior to the intervention. This result is supported by the study of Subong, et. al. (1993) which revealed that the decline in producing competent mathematics students and the increase in the number of students having poor mathematics performance is due to the fact that mathematics teaching has been taken for granted by teachers, parents, employees, and institutions.

After the intervention, the conceptual understanding of the students exposed to Interdisciplinary Contextualization (ICON) rose to "average" (M=40.83, SD=17.57), while on the students in traditional group were found to have "low" conceptual understanding (M=20.69, SD=10.45). Based on the results of standard deviation of the two groups, it shows that students exposed to Interdisciplinary Contextualization have heterogeneous responses than those on traditional approach of teaching.

The result also shows that there was a higher increase in the mean gain scores of students exposed to Interdisciplinary Contextualization (29.04) than the increase in the mean gain scores of students exposed to traditional approach of teaching (12.77). The result discloses the fact that Interdisciplinary Contextualization (ICON) as an approach in teaching mathematics helps the students to internalize the concepts and ideas better than those in the traditional group.

The present results supported by the study of De La Paz (2005), where he created a learning community of sorts by pairing instruction in social studies and English

language arts for eighth graders. The intervention group showed greater gain than the comparison group on measures of essay length, persuasive quality, the number of arguments included in the essay, and historical accuracy.

Table 4

Level of Conceptual Understanding of Students Before and After Exposure to Interdisciplinary Contextualization (ICON) and Traditional Method of Teaching

Group	M	SD	Interpre-tation
ICON	11.79	8.45	Very Low
Traditio-nal	7.92	4.56	Very Low
	Post-test		
	M	SD	Interpre-tation
ICON	40.83	17.57	Average
Traditio-nal	20.69	10.45	Low

Note: The interpretation was based on the following scale: 80.00-100.00 – very high, 60.00- 79.99 – high, 40.00-59.99 – average, 20.00-39.99 – low, 0-19.99 – very low

The second objective of this investigation is to determine the mathematics achievement of students before and after their exposure to Interdisciplinary Contextualization (ICON) and Traditional Method.

Table 5 below shows the mathematics achievement of students exposed to Interdisciplinary Contextualization (ICON) and Traditional method. Before the intervention was conducted, both groups had a "low" mathematics achievement reflected on the following results, for group under Traditional approach (*M*=12.88, *SD*=3.55) while for Interdisciplinary Contextualization (*M*=14.79, *SD*=4.47). The results have been due to the fact that the students had little prior knowledge on the topics on Undefined terms, Subsets of a Line, Angles, Angle Pairs, Perpendicular and Parallel Lines, Parallel Lines cut by a Transversal, Polygons, and Circles due to the spiral progression style of the K-12 curriculum where the mathematical concepts presented varies every quarter (K-12 Curriculum Guide, 2013).

After the intervention, the mathematics achievement of students who were exposed to Interdisciplinary Contextualization (ICON) increased to "average" (*M*=18.54, *SD*=5.19), while those students on the traditional group still had "low" mathematic achievement (*M*=15.00, *SD*=3.62). Students exposed to Interdisciplinary Contextualization (ICON) have heterogeneous response in mathematics achievement than those exposed to traditional approach of teaching.

The result shows that a notable increase was observed in the mean gain scores of mathematics achievement of students exposed to Interdisciplinary Contextualization (3.75) than those exposed to traditional approach of teaching (2.12). The mean score of Interdisciplinary Contextualization is higher than the traditional.

The present results supported the study of Heinze et al. (2005) which shows that the development of an individual student's achievement between grade 7 and grade 8 depends on the achievement level of the specific classroom and therefore on the specific mathematics instruction. This also supports Perin's (2011) claim that contextualization, can be seen as a form of "deep learning" that comes about through linking of ideas across courses.

Table 5

Mathematics Achievement of Students Before And After Exposure to Interdisciplinary Contextualization (Icon) And Traditional Method Of Teaching

Group	M	SD	Interpre-tation
ICON	14.79	4.47	Low
Traditio-nal	12.88	3.55	Low
	Post-test		
	M	SD	Interpre

			-tation
ICON	18.54	5.19	Average
Traditio-nal	15.00	3.62	Low

Note: The interpretation was based on the following scale: 32.00-40.00 – very high, 24.00- 31.99 – high, 16.00-23.99 – average, 8.00-15.99 – low, 0-7.99 – very low

The third objective of this investigation is to determine whether the conceptual understanding of students differs before assigning to Interdisciplinary Contextualization (ICON) and Traditional Method.

The t-test for independent samples result revealed that there is no significant difference in the pre-test scores on conceptual understanding of students on both groups, $t(46)=1.98$, $p=0.054$ as shown in Table 6. This means that the level of the students' conceptual understanding in mathematics was statistically comparable prior to the intervention. Thus, students on both groups have more or less the same ability to demonstrate a grasp of the relationships that explain the physical world and relate the observable to more abstract or general concepts. Items may require students to provide examples to illustrate general concepts; compare/contrast and classify objects, materials and organisms; use diagrams or models; relate underlying concepts to observed or inferred properties/behaviors; extract/apply textual, tabular or graphical information; find solutions to problems involving the direct application of concepts; and provide explanations (Neidorf & Garden, 2003).

This result supported the study of Rivalvo (1999) as cited by Orteza (2006), that students encountered difficulty in mathematics because they lack the computational skills, analysis in solving problems and logical thinking. This also supports GAVE- Gabinete de Nailacao Educacional,(2001) which abundant empirical studies demonstrated that many students do not understand some concepts essential to mathematics, that they have difficulty in applying basic knowledge, and that they lack proficiency in decision making and in resolving real life problems.

Table 6

Difference in the Pretest Scores in Conceptual Understanding between Traditional and Icon Groups

Group	M	Mean Difference	$t(46)$	p
ICON	11.79	3.87	1.98	.054

The fourth objective of this investigation is to determine whether the mathematics achievement of students differs before assigning to Interdisciplinary Contextualization (ICON) and Traditional Method.

As shown in Table 7, result of the t-test for independent samples showed no significant difference in mathematics achievement of the students before their exposure to Interdisciplinary Contextualization (ICON) and Traditional method, $t(46) = 1.64$, $p = 0.107$. Results showed that students in terms of mathematics achievement in two treatments were statistically comparable before the intervention. This revealed that students have acquired more or less the same amount of prior knowledge about the topics on Mathematics 7, specifically on Undefined terms in Geometry, Subsets of a Line, Angles, Angle Pairs, Perpendicular and Parallel Lines, Parallel Lines cut by a Transversal, Polygons, and Circles.

Group	M	Mean Difference	$t(46)$	p
ICON	14.79	1.916	1.64	.107
Traditional	12.88			

This is supported by the study of Saritas and Akdemir (2009) which revealed that students need to be well-equipped with higher-order mathematical knowledge. With this they added that instructional design is an effective way to alleviate problems related to the quality of teaching and learning mathematics. Thus, interdisciplinary contextualization was

introduced as intervention to help improve student's achievement in mathematics.

Table 7

Difference in the Pretest Scores in Mathematics Achievement between Traditional and ICON Groups

Group	Mean Gain	Mean difference	$t(46)$	p	d_c
ICON	29.04	16.27	5.17	.000	1.53
Traditional	12.77				

The fifth objective of this investigation is to determine whether the mean gains on the conceptual understanding of students differ after their exposure to Interdisciplinary Contextualization (ICON) and Traditional Method

As shown in Table 8, results of t-test for independent samples showed that the mean gain scores of students on conceptual understanding significantly differ after their exposure to Interdisciplinary Contextualization (ICON) and Traditional method, $t(46)=-5.17$, $p=.000$. The comparison of the two groups' mean gain scores showed large effect sizes ($d_c= 1.53$). Thus, it implies that students exposed to Interdisciplinary Contextualization (ICON) better learned the concepts in mathematics and were able to demonstrate a grasp of the relationships that explain the physical world and relate the observable to more abstract or general concepts compared to students who were exposed to traditional teaching.

This is supported by the study of Vaughn et al. (2009) which revealed that the writing quality scores of the experimental group were 25 percent better than those of the control group. Superior gains for the treatment group were seen for every writing quality variable except writing conventions. The intervention group also showed greater gain than the control group on content knowledge. Similar to Bulgren et al. (2009) and Tilson et al. (2010) taught an experimental science unit that integrated literacy instruction. The treatment group showed statistically significantly greater gain from pre to post than the control group on all of the writing measures except vocabulary usage and quality of conclusion. This only implies that interdisciplinary contextualization was indeed a helpful aid in improving students' conceptual understanding based on the results of the two studies mentioned above and the present result of the study.

Table 8

Differences in the Mean Gain Scores in Conceptual Understanding between Traditional and ICON Groups

The sixth objective of this investigation is to determine whether the mathematics achievement of students differs after their exposure to Interdisciplinary Contextualization (ICON) and Traditional Method.

The t-test for paired samples result shows that there was no significant difference on mathematics achievement of students after they have been exposed to Interdisciplinary Contextualization (ICON) and traditional method of teaching $t(46)=1.51$, $p=.138$ as shown in Table 9. The comparison of the two groups' mean gain scores showed large effect sizes ($d_c= 0.80$). The result shows that the mean gains of the students do not greatly vary regardless of their exposure to Interdisciplinary Contextualization or Traditional method. Thus, it is suffice to say that both interventions are effective as each other in terms of mathematics achievement.

This result is supported by the study of Stone et al. (2006) where he reported in his study that there is no statistically significant difference between students' scores before and after enhancing the curriculum.

Table 9

Differences in the Mean Gain Scores in Mathematics Achievement between Traditional and ICON Groups

` Group	Mean Gain	Mean difference	$t(46)$	p	d_c
ICON	3.75	1.62	1.51	.138	0.80
Traditional	2.13				

The seventh objective of this investigation is to determine whether the conceptual understanding of students differs before and after their exposure to Interdisciplinary Contextualization (ICON) and Traditional Method.

The t-test for paired samples results as reflected in Table 10 revealed significant difference in the pre-test and post-test mean scores in conceptual understanding of students exposed to Interdisciplinary Contextualization (ICON) ($t(23) = 10.96$, $p = 0.000$) and traditional approach of teaching $t(23) = 7.53$, $p = 0.000$. The result entails that regardless of the teaching approach used, the students' conceptual understanding significantly improved after the intervention. However, although the results showed that both experimental and control group have improved in their conceptual understanding after the invention, yet looking into the t-value results showed that the students exposed to Interdisciplinary Contextualization (ICON) have a better grasp of conceptual understanding than the students exposed to traditional method.

Furthermore, effect size between the pre-test and post-test scores of students exposed to Interdisciplinary Contextualization (d=2.24) was much larger than the effect size between the pre-post test scores of students exposed to traditional approach of teaching (d=1.57) suggesting that the contextualized instruction is indeed much effective approach.

The results supported De La Paz (2005) in his study where he created a learning community of sorts by pairing instruction in social studies and English language arts for eighth graders. The comparison of the two groups' post-test scores showed moderate to strong effect sizes suggesting that the contextualized writing instruction was an effective approach.

Table 10

Differences in Pretest and Posttest Mean Scores in Conceptual Understanding of Traditional and ICON Groups

Group	Mean Difference	d_c	$t(46)$	p
ICON	29.04	2.24	10.96	.000
Traditional	12.77	1.57	7.53	.000

The eighth specific objective of this investigation is to determine whether the mathematics achievement of students differs before and after their exposure to Interdisciplinary Contextualization (ICON) and Traditional Method.

As shown in Table 11, the t-test paired samples results revealed significant difference in the pre-test and post-test mean scores on mathematics achievement of student who have been exposed to Interdisciplinary Contextualization ($t(23)=4.06$, p=.000), and traditional method ($t(23)=3.82$, p = .001). Results showed that there was a significant increase in the mean score on mathematics achievement from pre-test to post-test regardless of the teaching approach employed.

This describes that the students exposed to Interdisciplinary Contextualization (ICON) gained more knowledge and perform better in various topics, specifically, on Undefined terms on Geometry, Subsets of a Line, Angles, Angle Pairs, Perpendicular and Parallel Lines, Parallel Lines cut by a Transversal, Polygons, and Circles. Moreover, based on the results both group gained more knowledge about mathematics yet among the two interventions, Interdisciplinary Contextualization (d=.83) have larger effect size on student's achievement in mathematics than traditional approach of teaching (d=.78).

The results supported Grouws and Cebulla (2000) in their research findings that the quality of the implementation of a teaching practice also greatly influences its impact on student learning. It indicates that certain teaching strategies are methods are worth careful consideration as teachers strive to improve the achievement of students.

Table 11

Differences in Pretest and Posttest Mean Scores in Mathematics Achievement of Traditional and ICON Groups

Group	Mean Difference	d_c	$t(46)$	p
ICON	3.75	0.83	4.06	.000

Traditional	2.12	0.78	3.82	.001

4. CONCLUSIONS

Based on the results and findings of the study the following generalizations are drawn; however, these may not be true to other students when applied to different groups.

The intervention introduced for each group of learners seems to have better effect on the conceptual understanding and achievement in mathematics. This seems to support the fact that students learn in many ways regardless of any teaching approach used as long as it caters their needs and they are ready to learn.

Using interdisciplinary contextualization as one of the teaching approach could significantly raise the conceptual understanding and achievement in mathematics.

Letting the students discuss the problem and concepts to be learned in order to come up with better ideas or results and giving them series of activities lead them to become more engaged in the content process. Thus, integrating the concept to other discipline cater the issue of varied activities when it comes to the learning needs and capacity of every learner.

Mastery of subject matter, well-planned students' activities, good delivery of the lessons, and sufficient ideas on the implementation of interdisciplinary contextualization are the other factors that contribute to the increase on the level of conceptual understanding and achievement in mathematics.

5. ACKNOWLEDGMENTS

The researcher wished to express her profound gratitude and appreciation to those who in one way or another have contributed in the success of this research.

Mr. Cesar P. Aposaga and Mrs. Arlene P. Aposaga, the researcher's parents, for believing in her and for their overwhelming support and inspiration;

Dr. Dolly Rose F. Temelo, research adviser, for sharing her time, motivation, and encouragement which made this study possible. Her technical advice, research expertise, and unending patience have made the researcher a better student and teacher;

Dr. Emellie G. Palomo(+), panel chairperson, for the continuous and endless words of encouragement and expertise for the improvement of this study;

Dr. Roberto Sagge Jr., statistician, for his valuable suggestions, assistance, and expertise in validating the results of the research instruments.

Dr. Lourdes N. Morano, outside expert, for patiently and willingly accommodating the researcher. Her expertise makes her gain more learnings and experiences;

Dr. Alona M. Belarga, subject expert, for her assistance, expertise and suggestions to improve this study;

Dr. Elizabeth M. Magallanes, Dr. Alexander J. Balsomo, Dr. Francis O. Pantino and Mrs. Michelle Bales, validators, for their genuine kindness and expertise in the field of mathematics in validating the research instruments;

Also, the researcher would not have completed and presented this paper if not for his family. To my husband, Mark Kynn A. Aquilesca and to my sons; Clark Benedict A. Aquilesca and Calen Beau A. Aquilesca for the love, support and inspiration.

Last but not the least, the one above all of us, God, for answering my prayer, for giving the strength, knowledge and confidence, divine guidance and wisdom and for being the source of everything

6. REFERENCES

Brillantes, A. (2011). Students' Conceptual Understanding of Selected Topics in Physics through Students' and Pre-Service Teacher's Generated Questions. West Visayas State University, La Paz, Iloilo City. pp.4-8

De La Paz, S. (2005). Effects of historical reasoning instruction and writing strategy mastery in culturally and academically diverse middle school classrooms. Journal of Educational Psychology, 97(2), 139–156

Grouws, D. & Cebulla, K. (2000). Improving Student Achievement in Mathematics. Educational Practices –4. https://eric.ed.gov/?id=ED445925

Heid, K. (1995). The Interplay of Mathematical Understandings, Facility with a Computer Algebra Program, and the Learning of Mathematics in a Technologically Rich Mathematics Classroom. 17th PME-NA, Columbus, OH, October 21-24, 1995.

Heinze, A. Reiss, K. & Franziska, R. (2005). Mathematics Achievement and Interest in Mathematics from Different Perspective. ZDM The International Journal on Mathematics Education, 37(3), 212-220.

Magno, C. (2008). Reading strategy, amount of writing, metacognition, metamemory, and apprehension as predictors of English written proficiency. Asian EFL Journal. 29, 15-48.

Moltz, D. (2010, November 11). Encouraging deep learning. Inside Higher Ed. http://www.insidehighered.com

Neidorf, T. & Garden, R. (2003). Chapter 2: Developing the TIMSS 2003 Mathematics and Science Assessment and Scoring Guides. TIMSS & PIRLS International Study Center, Lync School of Education , Boston College.

Perin, D. (1997). Workplace literacy assessment. Dyslexia, 3(3), 190–200.

Perin, D. (2001). Academic -occupational integration as a reform strategy for the community college: Classroom perspectives. Teachers College Record, 103(2), 303–335.

Perin, D. (2005). Institutional decision making for increasing academic preparedness in community colleges. New Directions for Community Colleges, 129,27–38.

Perin, D., & Charron, K. (2006). Lights just click on every day. In T. Bailey & V. S.

Perin, D., Crocco, M., Marri, A., Riccio, J., Rivet, A., and Chase, B. (2009). Integrating literacy in content classrooms. Academic Exchange Quarterly, 13(2), 97–105.

Perin, D., Hare, R. J., Peverly, S. T., and Mason, L. H. (2010). Contextualized written summarization by academically-underprepared community college students. Unpublished manuscript.

Perin, D., Keselman, A., & Monopoli, M. (2003). The academic writing of community college remedial students: Text and learner variables. Higher Education, 45(1), 19–42.

Saritas, T. & Akdemir, O. (2009). Identifying Factors Affecting the Mathematics Achievement of Students for Better Instructional Design. http://www.itdl.org/journal/dec_09/article03.htm. Retrieved on September 16, 2018.

Tabach, M. & Friedlander, A. (2008). Understanding Equivalence of Symbolic Expressions in a Spreadsheet-Based Environment. International Journal of Computers for Mathematical Learning. https://eric.ed.gov/?id=EJ791531

Tilson, D., Lyytinen, K. and Sorensen, C. (2010). Research Commentary-Digital Infrastructures: The Missing Is Research Agenda. Information Systems Research. 21, 748-759. https://doi.org/10.1287/isre.1100.0318