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## Universal Design for Learning: Its Impact on Enhanced Performance

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### ABSTRACT

This study examined the learning performance in General Psychology of 297 freshmen of the CPSU-Main through the Pre and Post Tests. The instructional intervention via Universal Design for Learning (UDL) was applied to 33% (97 out of 297) of these freshmen as the Treatment Group while 67% (200) belonged to the Control Group for traditional instructions. Statistical inferences utilized one-way Analysis of Variance for mean differences; Pearson R Correlations for bivariate relationships, and; Factor Analysis for significant components that contributed most to the Universal Design for Learning instructions. Findings showed very high levels of students' acquired UDL skills. Results in the pre-test in General Psychology, respectively, were low and average when grouped into low and high achievers. There was no significant mean difference in the acquired nine UDL components when categorized into seven colleges to generalize that they were on the same very high levels between colleges. Significant differences were found in three test areas in General Psychology in eight colleges whose students in the College of teacher education taking the lead in the learning performance. Significant differences were also traced in the post test in favor of the students in the treatment group. This proved that UDL really impacted the learning performance of the low-achieving students. Significant correlations were revealed between the components of UDL and General Psychology. There were twenty-four significant itemized components that contributed most to UDL instructional interventions. Implications were emphasized to maximize the principles of UDL with the contention of thoughtful planning related to the four curricular pillars of UDL: (a) instructional goals, (b) instructional delivery methods, (c) instructional materials, and (d) student assessments.

### INTRODUCTION

Universal Design for Learning (UDL) is a set of principles for creating instructional goals, assessments and materials that work with flexible design, easy to personalize and adjust to meet students' needs (CAST 2004). Such services designed for learning efficiently support students' academic success (Curtis *et al.*, 2004).

NASP (2006) reports that students come to school with complex and diverse learning and developmental needs that often create barriers to learning. Aside from poverty and health problems, emotional and behavioral issues are the most difficult to overcome, adversely affecting students' ability to focus and learn in school (Golday, 2014). Kuh (2007) finds teachers in General Psychology often fail to use learning design to improve their teaching, much as to improve students' performance.

Chew (2005) reveals that those prevalent in school settings are lazy students and school teachers who do not care or have the proper resources. Haris (2008) cites that only 37% of teachers report using computer instructionally with students daily. And only 90% of them have participated in fewer than 24 hours of professional development on technology per year even if it needs only 30 hours annually to change professional practices.

The aforementioned conditions are not remote to Central Philippines State University (CPSU), with Dullness ratings in General Intelligence of the senior students in three Colleges as found in the research of Garsula (2014).

The students have Low level learning outcomes in Social Sciences based on the results of the study conducted by Villafuerte (2014). The teachers' average level ratings in critical thinking ability are rated by their students (Adolfo, 2014). The existing gaps imply UDL deficiencies and worthwhile to conduct this kind of study.

### METHODOLOGY

The implementation of the Universal Design for Learning to enhance the scores of the students in General Psychology followed proper research methodology via research design, locale and respondents of the study, the validity and reliability of the instrument. Included were the data gathering procedure and statistical tools used for data analyses.

### Research Design

This research was directed at enhancing the scores of the freshmen students taking General Psychology through the intervention of Universal Design for Learning (UDL) by applying quasi-experimental design. The influential relationships of these three variables in terms of multiple means of Representation, Expression and Engagement were treated with factor analysis.

The students under this study were categorized into Treatment and Control Groups. The Treatment Group consisted of students with Grade Percent Average (GPA) from 75% to 84% while those that belong to the Control

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Group had the GPA from 85% to 95%. Only the students in the Treatment Group received the instructions using UDL. Students in the Treatment Groups rated the survey questionnaire and both Groups participated in taking the Pre and Post tests in General Psychology.

This strategy provided information that despite the absence of the Universal Design for Learning approach to the students in the Control Group, the instructor's teaching effectiveness was assumed inherent and embedded with him. This assumption qualified for the inclusion of the High Achieving students to be part of the takers of the General Psychology tests.

### Locale of the Study

This study was conducted in Central Philippines State University (CPSU) - Main Campus in Kabankalan City, Negros Occidental.

### Respondents of the Study

The participants of this study were the 297 first-year Students in CPSU-MAIN Campus across the eight colleges with the exemption of the students in College Engineering. The Universal Design for Learning instructional intervention was only applied to the Low Achievers in seven colleges with the exclusion of the students in College of Teacher Education as they belonged to the Control Group where the researcher was teaching General Psychology. There were a total of 97 low achieving students in the Treatment Group in seven colleges.

### Research Instrument

There were two sets of research instruments used in this study. The first was the Universal Design for Learning (UDL) Survey Questionnaire with three components that will be rated in terms of: 1. Multiple Means of Representation; 2. Multiple Means of Action and Representation, and; 3. Multiple Means of Engagement. Each of these three components had 30 item-statements, ten for each three subcomponents. These statements served as the major guidelines of the researcher in implementing Universal Design for Learning (UDL) to the General Psychology lectures in its four key basic foundation areas.

The implemented instructions were reflected in the questionnaire that were also rated by the students in the Treatment Group after their Post Test. The Scales and descriptive levels were as follows: 4.21-5.00: Very High (VH) Universal Design for Learning (UDL) intervention level; 3.41-4.20: High (H); 2.61-3.40: Average (A); 1.81-2.60: Low (L); and, 1.00-1.20: Very Low (VL) UDL intervention level.

The second instrument was the Tests in General Psychology. These are the Pre and Post Tests in four areas to wit: 1. Emotions: Types and Components; 2. Theories of Emotions; 3. Theoretical Perspectives of Emotions, and; 4. Diversity of Approaches to Emotions.

In each test area there ten questions with scales and levels: 8.21-10.00 Very High (VH) level of learning in General

Psychology; 6.41-8.20: High (H); 4.61-6.40: Average (A); 2.81-4.60: Low (L); 1.00-2.80: Very Low (VL) level of learning in General Psychology.

### Validity and Reliability of the Instrument

The Universal Design for Learning Survey Questionnaire was a modified one based on the Standardized Questionnaire from CAST (2011), however, for applicability in CPSU-Main Campus, the Construct Validity was tested through Factor Analysis based Keyser-Meyer-Olkin (KMO)=.89 through the Chi-Square Test of significance (Appendix A.2). Only a coefficient of .60 and above with p-value of less than .05, for its significance, would qualify validity of its construct, this showed the validity of the UDL instrument.

The computed Cronbach's Alpha was .93 for its Internal Consistency Reliability. The coefficient of at least .60 and above also was acceptable for a modified questionnaire (Anderson *et al.*, 2002). The Questionnaire for the General Psychology Tests were standardized from free sample tests found in Internet. Sources were cited in the test paper that serve as the valid and reliable instrument.

### Data Gathering Procedure

The experiment was done on third week of September with the institution of Pre Test by the Researcher. This was followed by Universal Design for learning (UDL) instructional interventions up to the first week of October 2014 with the administration of the Post Test. The Survey questionnaire for Universal Design for Learning was given to students in the Treatment Group two days after the administration of the Post Test.

### RESUL AND DISCUSSION

The profile of the first year students in General Psychology when grouped according to Colleges Types of Achievers and Gender was determined through percent distributions.

The levels of students' acquired Universal Design for Learning from their teacher when categorized in Colleges and Gender were computed through descriptive statistics with levels indicated in the research instrument.

The levels of students' Pre and Post Tests perform in General Psychology when Categorized into Colleges and Types of Achievers were also determined by computation of their means with the corresponding descriptive levels.

The significant difference in students' Universal Design for Learning when grouped according to Colleges and Gender were dealt by one-way analysis of Variance (ANOVA) with Post Hoc measures.

The significant differences of students' Pretest and Posttest in General Psychology when treated according to Colleges, Types of Achievers and Gender were also solved using one-way ANOVA with Bonferroni Post Hoc.

The significant bivariate relationships between the components in Universal Design for Learning and General Psychology were calculated using Pearson R correlations.

The significant extracted components that contributed

most to students acquired skills in Universal Design for Learning interventions were performed through Factor Analysis with maximum variance rotation. The instructional interventions using the Universal Design for Learning in General Psychology is applied to the first year students. The analyses and interpretations of the data sets are presented in this section.

**The Profile of the first year students in General Psychology when grouped according to Colleges, Types of Achievers and Gender**

Table 1 posts the number of students as takers in the Pre and Post Tests in General Psychology when grouped according to Colleges, and Gender. There are 297 first year students who have participated in

**Table 1:** Profile of the Students When Grouped According to Colleges and Gender

Colleges	Types of Achievers				Total
	Low		High		
	Male	Fem	Male	Fem.	
Agriculture	13	3	5	5	26
Animal Science	10	1	6	2	19
Arts & Sciences	2	4	3	16	25
Business Educ.	5	11	1	14	31
Computer Science	4	6	5	10	25
Crim. Justice Educ.	17	8	5	5	35
Forestry	8	5	2	7	22
Teacher Education	0	0	21	93	114
Sub Total	59	38	48	152	297
<b>Total</b>		<b>97</b>		<b>200</b>	<b>297</b>

taking the pre and post tests in General Psychology for its learning outcomes in this subject. This group of students comprises 200 High Achievers as the Control Group and 97 Low Achievers as the Treatment Group.

The students in Treatment Group receive the Universal Design (UDL) for Learning instructional interventions to enhance their learning in General Psychology. This informs that only 97 students or 33% out 297 students have received the instructional remediation through UDL. This percentage (33%) of respondents is in consonance with the study conducted by Davies *et al.* (2013) in measuring the effectiveness of the principles of UDL and techniques for its implementation. It does so by comparing student instructor teaching methods, as measured by a UDL questionnaire to the intervention group. A total of 29% to 33% reported a moderate to

very high degree of UDL to six instructors teaching nine psychology classes in the intervention group that received UDL training. This suggests relevant information that usually this percent share in students population with learning disabilities comprises to the same percentage range (29\* to 33%) as cited in Crawford and Gross (2014).

**The Levels of Students' Acquired Universal Design for Learning Skills from their teacher when Categorized into Colleges and Gender**

Table 2 shows the levels of Universal Design for Learning (UDL) in terms of Perception (PC), Language and Symbols (LS), Comprehension (CM), Physical Action (PA), Expression and Communication (EC), Executive Functions (EF), Recruiting Interest (RI), Sustaining Effort and Persistence (SEP) and Self Regulation in

**Table 2:** Mean and Level Distributions of Students' UDL According to Colleges

Colleges	Pc	Ls	Cm	Pa	Ec	Ef	Ri	Sep	Sr	Total
	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl
Agriculture	4.51	4.53	4.53	4.54	4.51	4.55	4.65	4.93	4.61	4.6
Animal Science	4.58	4.55	4.64	4.47	4.55	4.61	4.44	4.56	4.63	4.56
Arts & Sciences	4.13	4.38	4.53	4.33	4.28	4.12	4.23	4.23	4.17	4.27
Business Education	4.57	4.66	4.63	4.62	4.64	4.666	4.61	4.63	4.62	4.63
Comp. Ed.	4.51	4.52	4.51	4.69	4.56	4.54	4.6	4.63	4.45	4.56
Criminal Just. Education	4.52	4.56	4.5	4.43	4.55	4.58	4.46	4.58	4.6	4.53
Forestry	4.58	4.54	4.62	4.6	4.63	4.6	4.62	4.63	4.64	4.61
<b>Total</b>	<b>4.49</b>	<b>4.53</b>	<b>4.57</b>	<b>4.52</b>	<b>4.53</b>	<b>4.52</b>	<b>4.6</b>	<b>4.6</b>	<b>4.53</b>	<b>4.54</b>
	<b>VH</b>	<b>VH</b>	<b>VH</b>	<b>VH</b>	<b>VH</b>	<b>VH</b>	<b>VH</b>	<b>VH</b>	<b>VH</b>	<b>VH</b>

colleges, language and gender. Columns contain the seven Colleges, the corresponding Mean (Mn) and the descriptive Level (Lvl).

Figures in Table 2 reveal an overall mean rating of 4.54 described as Very High (VH) level. This manifests that students in the Treatment Group have expressed their experience to this very high level with the teacher as regards Universal Design for Learning (UDL) instructional intervention. The consideration of seven out of nine Colleges in CPSU-Main implies that the students in Teacher Education and Engineering Colleges are High Achievers.

Apparently, each of the seven components of the UDL across the seven Colleges registers also Very High levels, namely: Provide Options for Perception (PC) at 4.49; Language and Symbols (LS) is 4.53; Comprehension (CM) has 4.57; for Multiple Means of Expression through Physical Action (PA) is at 4.52; Expression and Communication (EC), 4.53; Executive Functions (EF), 4.52; Recruiting Interest (RI), 4.60; Sustaining Effort and Persistence (SEP), 4.60; and Self Regulation has 4.53.

Such impressive expressions of low achieving students support the UDL framework emphasized by the following:

1. Higher Education Opportunity Act 2008 that expresses: A scientifically valid framework for guiding educational practice that: (a) provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the ways students are engaged; and (B) reduces barriers in instruction, provides appropriate accommodations, supports, and challenges, and maintains high achievement expectations for all students, including students with

learning disabilities (NACUA, 2008).

2. Kotering *et al* (2008) elaborated findings on student perceptions of individual interventions based on the principles of universal design for learning (UDL). They showed that relative to their other academic classes, both groups of students had high levels of satisfaction and expressed similar themes as to what they perceived to be the best and worst parts of the interventions and ideas for improvement. Both groups also reported near unanimous agreement as to wanting their teachers to use more UDL interventions. The reported perceptions and subsequent comparison forms the basis for discussing the implications of UDL in high school settings.

3. Ralabate (2011) observes that students in her classrooms are very much appreciative of the UDL approaches she has applied because they are provided with flexible, responsive curriculum that reduces or eliminates barriers to learning. With UDL, more of her students are: Engaged in their education. Learning in greater breadth and depth. Achieving at higher levels. Motivated to continue learning.

**The Levels of Students’ Pretest and Posttest Performance in General Psychology When Categorized into Colleges, Control and Treatment Groups and Gender**

Table 3 reflects the students’ pretest performance levels in General Psychology in terms of: Emotions: Types and Components (ETC); Theories of Emotions (TE); Theoretical Perspectives of Emotions (TPE), and; Diversity of Approaches to Emotions (DAE) according to Colleges, Types of Achievers and Gender.

**Table 3:** Students’ Pretest Performance Levels in General Psychology According to Colleges, Types of

Students’ Pretest Performance in General Psychology										
Colleges	High Achievers (Control Group)					Low Achievers (Treatment Group)				
	ETC	TE	TPE	DAE	TOTAL	ETC	TE	TPE	DAE	TOTAL
	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl
Agriculture	2.4	5.5	7.3	7	5.55	2.31	3.88	2.63	2.4	2.81
Animal Sci.	2.5	5.38	4.38	4.38	4.16	3.64	4.54	2.55	1.36	3.02
Arts & Sci.	2.83	6.11	6.11	6.32	5.34	2.17	4.33	3.17	2.83	3.13
Business Ed.	2.38	6.06	6.06	6.56	5.27	2.63	4	2.75	2.87	3.06
Comp. Ed	3.86	5.53	5.83	6.67	5.47	3	4.2	2.7	2.9	3.2
Crim. Just. Ed.	3	4.33	4.33	6.44	4.53	3	4.4	2.52	2.56	3.12
Forestry	3.11	5.78	5.78	7	5.42	2.31	4.54	3	2.38	3.06
Teacher Ed.	3.38	5.83	5.83	6.12	5.29					
<b>Total Mean &amp;</b>	2.93	5.57	5.7	6.31	5.13	2.72	4.27	2.76	2.47	3.06
<b>Level</b>	L	A	A	A	A	L	A	L	L	L

Notations: Mn: Mean; Lvl: Level L(Low): 2.81-4.60; A (Average): 4.61-6.40

**Achievers and Gender**

The pre test results in the four areas of General Psychology indicate a total mean of 5.13 as Average level

for the High Achievers while 3.06 or Low for the Low Achievers in eight Colleges; and have three Low ratings in areas like: Emotions: Types and Components; Theoretical

Perspectives of Emotions, and; Diversity of Approaches to Emotions. Except for Theories of Emotions with Average level in eight colleges.

However, High Achievers (Control Groups) in Animal Science and Criminal Justice Education have total Low level ratings respectively at 4.16 and 4.53. For the test areas, only Emotions: Types and Components register Low level mean scores in eight colleges and the other three have Average level ratings.

In comparing the pre test performance of the two groups, it shows that High Achievers have an edge over the Low Achievers by one level only. This informs that in a natural fashion and most often these high achieving students would always take the lead in getting better scores in any given examination (Fazal *et al.*, 2012).

These evidences conform to Alam's (2006) findings that high achieving students always get scores on the lead in any examinations because of their positive attributes to succeed. They have high self-esteem; aside from the fact that they have already the advanced prior knowledge that is innate within them, they have also the inherent characteristics and the drive to excel.

This coincides also to the concluding statements of Jabeen and Khan (2013) that high achievers always maintain high scores in examinations than the low achievers because

they have high self-confidence, competitive and strive to achieve high scores in every test; while low achievers are not and hardly bothered to have better grades.

This suggests that teachers must take initiatives in modifying instructions so that the learning of these low achieving students must be enhanced. The teachers must not provide instructions that would place the students with learning deficiencies into a more appalling situation. In line with this, this implies following the recommendations sets by OSUPG (2015). This recommends Universal Design for Learning (UDL) instructional classroom intervention; since this is an approach designing course instruction, materials, and content to benefit people of all learning styles without adaptation or retrofitting.

Universal design as OSUPG (2015) continues; provides equal access to learning, not simply equal access to information. Universal Design does not remove academic challenges; it removes barriers to access. Universal Design for Learning is just good teaching (OSUPG, 2015)

Table 4 illustrates the students' Post Test performance levels in General Psychology in terms of: Emotions: Types and its Components (ETC); Theories of Emotions (TE); Theoretical Perspectives of Emotions (TPE), and; Diversity of Approaches to Emotions (DAE) according to Colleges, Types of Achievers and Gender.

**Table 4:** Students' Posttest Performance Levels in General Psychology According to Colleges Types of Achievers

Students' Pretest Performance in General Psychology										
Colleges	Control Group; High Achievers					Control Group: Low Achievers				
	ETC	TE	TPE	DAE	TOTAL	ETC	TE	TPE	DAE	TOTAL
	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl	Mn: Lvl
Agriculture	4.40	6.8	7.80	4.90	5.98	6.56	5.88	7.50	5.88	6.46
Animal Sci.	4.63	5.88	7.38	6.25	6.04	6.09	5.18	7.91	6.18	6.34
Arts & Sci.	4.61	7.32	7.56	5.47	6.24	7.83	6.83	9.33	6.33	7.58
Business Ed.	4.50	6.19	6.88	5.13	5.68	6.62	6.25	7.69	6.13	6.67
Comp. Ed	5.33	6.40	6.33	5.07	5.78	6.70	5.89	8.50	6.30	6.85
Crim. Just. Ed.	3.56	6.67	6.33	6.11	5.67	6.48	5.36	8.00	5.48	6.33
Forestry	5.44	8.22	7.22	6.11	6.75	7.15	7.08	9.07	6.46	7.44
Teacher Ed.	5.56	7.30	8.04	6.46	6.84					
<b>Total Mean &amp; Level</b>	4.75	6.85	7.19	5.69	6.12	6.78	6.07	8.29	6.11	6.81
	A	H	H	A	A	H	A	VH	A	H

Notation: Mn: Mean; Lvl: Level L(Low): 2.81-4.60; A (Average): 4.61-6.40; H(High): 6.41-8.20

Post Test performance levels of the students in the Control and Treatment Groups are respectively Average (6.12) and High (6.81). It informs that the performance of the Low Achievers is enhanced by two level ratings after they have received the Universal Design for Learning (UDL) instructional interventions for their general psychology classes. This gives the edge and advantage to the students in the Treatment Group.

High Achievers' performance only reflects a little improvement in points 5.13 in the Pre Test to 6.12 in the Post Test which is on the same Average level range. This

is one limitation of the study to drive conclusions in this regard since the traditional instructions delivered to them is done by the same Teacher in the Treatment Group.

Considering each test area for each college's performance, it is apparent that the Average ratings of the low achieving students in Theories of Emotions and Diversity of Approaches to Emotions are in the upper ranges (6.07 and 6.11 respectively). And the Very High scores for Emotions: Types and Components at 6.78 and, Theoretical Perspectives of Emotions with 8.29 have made it to have this High level rating (6.81). This further

implies greater benefits, generally, that using UDL would really improve the learning outcomes specifically to Low Achievers with learning disability. Results further attest that UDL interventions really have offered greater learning impacts in General Psychology by two levels, from Low to High. In conformity with the findings this study reveals however, several studies have shown considerable improvements in points the students have obtained with this kind of intervention, namely:

1. Handelsman *et al.* (2005) report that student engagement is considered an important predictor of student grade particularly with students highly engaged in classroom lessons.

2. Individuals with Disabilities Education Improvement Act's stress on improved performance in general education with UDL that offers a promising future to these students (Kortering *et al.*, 2006).

3. Authorities have directed attention to general approaches, all of which relate to UDL, to improve the performance and school completion rates of students

with high incidence disabilities. One approach involves changing teacher behaviors (Bost & Riccominni, 2006).

4. Researchers at the University of Kansas stressed the importance of helping teachers to change how they plan and actually teach their content area classes. Their UDL research establishes the effectiveness of getting teachers to adopt new teacher routines (Bulgren & Schumaker, 2005).

**The Significant Difference in Students' Universal Design for Learning According to Colleges and Gender**

Table 5 outlines the analysis of variance of the students' acquired Universal Design for Learning in terms of Colleges and Gender

Analyses of variance in students' acquired UDL Skills according to Colleges and Gender show no significant difference in seven colleges with Female and Male students to infer that the nine UDL components are at same Very High levels that range from 4.49 (Options for Perception) to 4.60 (Options for Recruiting Interest, and; Sustaining Effort and Persistence).

**Table 5:** Analysis of Variance in Students' Acquired Universal Design for Learning Skills When Grouped According to Colleges and Gender

Universal Design for Learning Components	Colleges			Gender		
	Df	F	Sig.	Df	F	Sig.
Perception	6	1.48	1.93	1	2.11	0.15
Language and Symbols	6	0.7	0.65	1	0.3	0.59
Comprehension	6	0.75	0.61	1	1.1	0.3
Physical Action	6	1.07	0.39	1	0	0.98
Expression and Communication	6	1.19	0.32	1	0.61	0.44
Executive Function						
Recruiting Interest	6	1.86	0.1	1	0.04	0.84
Sustaining Effort and Persistence	6	1.33	0.25	1	1.69	0.2
Self regulation	6	2.03	0.07	1	0.11	0.74

**The Significant Differences of Students' Pretest and Posttest in General Psychology When Treated According to Colleges, Treatment and Control Groups, and Gender**

Table 6 employs one way analysis of variance for the significant mean difference of students' performance in the pretest when treated according to Colleges, Control and Treatment Groups; and, Gender

Significant mean differences in the Pre Test in General Psychology when grouped according to eight colleges are found in the four test areas. Post Hoc test by Bonferroni (Appendix F) indicates College of Arts and Sciences performs better in Diversity Approaches of Approaches to Emotions in Animal Science with a mean difference of 3.45 and, Criminal Justice Education (2.37). The College of Business Education is a better performer than Animal

**Table 6:** Significant Differences in the Pretest According to Colleges, Control and Treatment Groups, and, Gender

General Psychology Pretest areas	Colleges			Control and Treatment Group			Gender		
	df	F	Sig.	df	F	Sig.	df	F	Sig.
Emotions: Types and its Components	7	2.179	.04	1	2.7	0.101	1	0.44	0.51
Theories of Emotions Theoretical Perspectives	7	16.13	0	1	60.87	0	1	25.15	0
of Emotions Diversity of Approaches	7	4.69	0	1	506	0	1	43.53	0
to Emotions	7	16.69	0	1	201.5	0	1	15.51	0

Science (2.24). Computer Science to Animal Science with a mean difference of 2.53. And the College of Teacher Education leads against the five colleges, such as: Animal Science (4.32), Business Education (2.07), Computer Education (1.79), Criminal Justice Education (3.23) and Forestry (2.40).

In Theories of Emotions, the College of Education edges with Agriculture (1.38), and, Criminal Justice Education (1.47). Arts and Sciences performs better in Animal Science (2.84) and Criminal Justice Education (1.47). College of Teacher Education tops in six colleges, namely: Agriculture (2.52), Animal Science (2.63), Business Education (2.20), Computer Education (1.89), Criminal Justice Education (3.26), and Forestry (2.04). Summarizing the overall results, the high achieving students in College of Teacher Education has emerged as the best learners in Theories of Emotions, though, they have not intervened with UDL yet the effectiveness in teaching General Psychology in this college is inherent to this teacher-researcher.

There are significant mean differences in three pre test areas in General Psychology when categorized in

Treatment and Control Groups favoring the Control Group (High Achievers) to take the lead against the Treatment Group, as follows: 1. Theories of Emotions giving the lead points by 1.30 [(based on Table 3; (HA)5.57-4.2 (LA)]; 2. Theoretical Perspective of Emotions by an edge of 2.94[ (HA)5.70-2.76(LA)], and; 3. Diversity Approaches to Emotions with a mean difference of 2.47 [(HA) 6.31-2.47(LA)]. These significant mean differences in the stipulated three test areas provide a plausible generalization that the High Achievers (Control Group) score higher than those in the Treatment Group (LOW Achievers).

The same is true when grouped into Females and Males favoring the former (Females) to have higher scores than the Males in the High Achievers Group as they dominate in number by 152 versus 48 (HIGH Achievers group). Therefore it can be generalized the female students in the Control Group have the better performance level than their male counterpart.

Table 7 pictures the significant mean difference of students' performance in the pretest when treated according to Colleges, Control and Treatment Groups; and, Gender.

**Table 7:** Significant Differences in the Posttest According to Colleges, Control and Treatment Groups; and, Gender

General Psychology Pretest areas	Colleges			Control and Treatment Group			Gender		
	df	F	Sig.	df	F	Sig.	df	F	Sig.
Emotions: Types and its Components	7	.76	.62	1	41.59	.00	1	.008	.93
Theories of Emotions Theoretical Perspectives	7	7.63	.000	1	28.66	.000	1	11.71	.001
of Emotions Diversity of Approaches	7	1.40	.21	1	4.95	.027	1	2.92	.089
to Emotions	7	3.43	.002	1	.05	.83	1	.005	.943

There are highly significant mean differences in the Post Test under Theories of Emotions; Theoretical Perspectives of Emotions, and; Diversity of Approaches to Emotions paving the way to the students in the Treatment Group to advance across the seven colleges.

Post Hoc by Bonferroni test reveals College of Teacher Education to dominate with the best scores in the Post Tests in Theories of Emotions and Diversity of Approaches of Emotions; and in seven colleges as well.

**The Significant Correlations Between Universal Design for Learning and General Psychology**

Table 8 depicts the bivariate relationships of the UDL in terms of Representation (REP), Expression (EXPR), Engagement (ENG); and General Psychology Posttest in Emotions: Types and their Components (ETC), Theories of Emotions (TE), Theoretical Perspectives of Emotions (TPE) AND Diversity of Approaches to Emotions (DAE).

**Table 8:** Significant Correlations Between Universal Design for Learning and General Psychology Components

		ETC	TE	TPE	DAE	REP	EXPR
ETC	Pearson Cor.						
	Sig.						
	N						
TE	Pearson Cor	.736(**)					
	Sig.	.000	.				
	N	97					
TP	Pearson Cor	.586(**)	.696(*)				
	Sig.	.000	.000				
	N	97	97				
DAE	Pearson Corr	.433(**)	.358(*)	.551(**)			
	Sig.	.000	.000	.000			
	N	97	97	97			

REP	Pearson Cor	-.080	-.173	-.051	.069		
	Sig.	.434	.090	.623	.502		
	N	97	97	97	97		
EXPR	Pearson Corr	-.054	-.068	.014	.071	.798(**)	
	Sig.	.599	.510	.890	.492	.000	
	N	97	97	97	97	97	
ENG	Pearson Corr	.034	-.025	.123	.089	.756(**)	.843(**)
	Sig.	.739	.806	.229	.385	.000	.000
	N	97	97	97	97	97	97

\*\* Correlations are significant at  $p=.01$

Moderately strong and highly significant correlations are found between the test areas in General Psychology such as in Theories of Emotions and Theoretical Perspectives of Emotions at .74; Theories of Emotions and Theoretical Perspectives of Emotions with .59 as well as for Theories of Emotions at .70 to reject the null hypotheses and infer that there are increasing trend of the directions of the ratings of the students in these pair of components. This suggests that higher the scores these students get in the Theories of Emotions there corresponds the higher scores in Theoretical Perspectives.

The three major components of UDL show high and positive strengths of correlations among them. That gives plausible generalizations that the students rated the UDL interventions consistently at very high levels. This implies the highest confidence levels of 99% that they really appreciate the important benefits that they have acquired with the applied modified instructions.

There is none significant correlation extracted between UDL and the General Psychology components to show that this bivariate relationships are not causal. When the pair of components happens to behave in a flatter trend in terms of the scores between these two pairs, then it is expected that no significant correlations would come out. The no significant relationships cannot be interpreted that the UDL instructional approaches do not give any impact to the enhanced learning of the students in General Psychology. It is very apparent that there is a remarkable improvement in the part of the Low Achievers from the Pre Test to the Post Test performances from Low to High levels because of the UDL remediation.

The implications on the no correlations lead to understand how the four curricular pillars of Universal Design for Learning implementation (i.e., goals, instruction, materials, and assessment) are applied in different instructional contexts (Curry *et al.*, 2006). The principles of UDL should be considered alongside thoughtful planning related to the four curricular pillars of UDL: (a) instructional goals, (b) instructional delivery methods, (c) instructional materials, and (d) student assessments (Meyer & Rose, 2005).

Consideration of these four pillars means that instruction is flexible enough to address the needs of diverse learners. Teacher educators and professional developers must be thoughtful and purposeful in their instruction of the three principles of the UDL framework.

### Significant Extracted Components that Contribute Most to the Universal Design for Learning Interventions

Table 9 stipulates the significant items based on Factor Loading (FL) and maximum variances contributory to students' adapted Universal Design for Learning (UDL) skills that are extracted using factor analysis with varimax rotation. These components with their respective Eigenvalues or the Extraction's Sums of Squared Loadings are the specific significant items that are extracted from the ten itemized activities in each of the nine UDL variables. The Rotation's Sums of the Squared Loadings are the maximum percent variances during the rotation process.

There are 24 or 27% significant components out of 90 that contribute most to the Universal Design for Learning (UDL) itemized activities applied to the student for proper interventions leading to enhanced learning in General Psychology. This 27% of significant items are very promising for a feasible implementation of such approaches with the maximum cumulative variances after the rotation from 41% in Recruiting Interest to 66% in Sustaining Effort and Persistence both under Engagement.

Outstanding components based on the loading coefficients and maximum Eigenvalues or the sums of square loadings are found in the following sampled items, as follows:

1. In Representation through Perception, item 8: Invites guest speakers to share their perspectives on the topic at hand; uses technology to connect them with students via an online discussion with factor loading at .83 and the variance of 38%.
2. Representation: Language and Symbols; Item 15 Adopts instructional technologies that help achieve learning opportunities with .80 maximum loading and 30% variance.
3. Representation through Comprehension: Item 24 Guides information processing, visualization, and manipulation: maximizes transfer and generalization with .78 maximum factor loading and maximum variance of 30%.

The above-indicated significant components are worthwhile to be sustained and the rest of the 73% of the total items that are not significant must be given due

**Table 9:** Significant Components that Contribute Most to Students’ Acquired Skills in Universal Design for Learning General Psychology

Variables with Significant Components	FFL	Eigenvalues/ Extraction Sums of Sq. Loadings		Rotation Sums of Sq. Loadings	
	Coef	% Var.	Cum. %	%Var	Cum%
<b>Representation through Perception</b>					
PERC 8 Invites guest speakers to share their perspectives on the topic at hand; uses technology to connect them with students via an online discussion.	0.83	37.81		21.08	
PERC 7 Relates new and abstract concepts with concrete examples from his own experiences to students’ lives & the lives of those affected.	0.81	11.88	49.47	19.71	49.47
<b>Representation: Language and Symbols</b>					
LANG 15 Adopts instructional technologies that help achieve learning opportunities.	0.8	29.89		19.78	
LANG 12 Makes handouts I say or write new English words several times.	0.87	12.04		15.14	
LANG 20 Develops assessments directly from the objectives, even before designing course content.	0.86	11.39		15.08	
LANG 14 Develops a list of frequently asked questions for students and provides clear expectations and feedback.	0.86	10.93	64.26	14.26	64.26
<b>Representation through Comprehension</b>					
COMP 24 Guides information processing , visualization, and manipulation: maximizes transfer and generalization.	0.78	30.68		24.53	
COMP 26 Assigns activities online and allows assignments to be submitted electronically	0.8	13.62		15.69	
COMP 29. Guides information processing, visualization, and manipulation through electronically produced and colored handouts	0.8	11.52	55.8	15.28	55.8
<b>Expression: physical Action</b>					
PHYS 4 Communicates high expectations while expressing his willingness to make “appropriate accommodations” for all students with disabilities.	0.78	33.04		23.36	
PHYS 7 Considers a “learner- centered” approach to teaching. Structures classes so that students take on multiple roles: facilitator, recorder, presenter, etc.	0.79	13.38	46.42	23.05	46.42
<b>Expression and Communication</b>					
EXP 18 Creates a glossary of terms for your course and link to it from the content pages of your website.	0.79	33.36		21.46	
EXP 17 For writing assignments, allows for drafts and revisions; considers peer review.	0.81	13.13		19.21	
EXP 15 Allows the student to tape record lectures or provide him/her with a copy of your notes.	0.76	10.52		16.33	57.01
<b>Expression: Executive Functions</b>					
EXEC 27 Considers formative vs summative assessment. Considers authentic assessment with “ with real-world “ products (e.g. plays, video productions)	0.78	41.49	57.01	28.39	52.92

EXEC 24 Keeps information organized and accessible with graphic organizers, embedded prompts, checklists, note-taking guides and software tools.	0.87	11.43		24.53	
<b>Engagement: Recruiting Interest</b>					
REC 1 Becomes familiar with student resources on campus, including the Assistive technology resource Center & the Learning Assistance Center	0.77		52.92	41.28	41.28
<b>Engagement: Sustaining Effort and Persistence</b>					
SUST 17 Fluctuates instructional illustrations, handouts, auditory and visual aids.	0.74		41.28	20	65.56
SUST 11 Provides assessments that measure students' achievement of the learning objectives, as they are stated on the syllabus.	0.78	32.44		18.08	
SUST 14 Have students' related new concepts and information to their own lives and those whose lives are affected.	0.83	11.91		14.46	
SUST 13 For experiential learning activities , explores growth in the "affective domain" through reflection papers .	10.79			59.72	
<b>Engagement: Self-Regulation</b>					
SELF 23 Develops self-assessment , reflection and challenges students with meaningful assignments.	0.81	37.18	65.56	20.39	59.72
SELF 29 Provides charts and checklists that enable students to monitor their own behaviors and progress overtime.	0.83	11.01		13.02	
SELF 25 Assesses the significance of learner differences in home experiences, background knowledge, learning skills and learning pace in General Psychology.	0.8	10.2		21.69	

attention to be strengthened to register significance in the instructional interventions based on the priority needs of the low achievers.

This suggests to strategize the UDL approaches in line with available facilities that may suit to the practicality of utilization in the part of the students benefitting this design. Teacher educators and professional developers can use the UDL framework to facilitate inclusion by enabling teachers to reduce barriers to learning while maintaining high expectations for all learners.

This implies further that UDL allows teachers to consider learner differences, preferences, and needs at the onset of planning and instruction rather than after lessons have been developed for typical learners and then modified to address individual students' needs (Edyburn, 2010).

### Summary of Findings

There were 297 freshmen as participants of this study in Central Philippines State University with 97 or 33% percent of them belonged to the Treatment Group and the 200 High Achievers in the Control Group. The levels of the nine components in UDL were Very High.

The levels of students Pretest in General Science was Low for the Treatment Group and Average for the Control

Group. While in the Post Test there was an overall total mean level of Average for the Control Group and High for the Treatment Group.

Results provided evidence of the positive impact of the UDL interventions to students in the Treatment Group with two-level increase in performance from Low to High levels. This further implies greater benefits, generally, that using UDL would really improve the learning outcomes specifically to Low Achievers.

There was no significant difference in students' acquired UDL skills when categorized into seven Colleges and Gender to generalize that both groups were on the same very high levels. In terms of the significant difference in the Pre Test in General Psychology, there were highly significant differences in eight colleges attesting the students in College of Teacher Education to be the best performers in majority of the colleges.

There were highly significant differences in the Post Test under Theories of Emotions and Diversity of Approaches to Emotions paving the way advance in favor of the students in the Treatment Group across the seven colleges. Post Hoc by Bonferroni test reveals College of Teacher Education to dominate larger.

Moderately strong and highly significant correlations are

found between the test areas in General Psychology such as in Theories of Emotions and Theoretical Perspectives of Emotions at .74; Theories of Emotions and Theoretical Perspectives of Emotions with .59 as well as for Theories of Emotions at .70 to reject the null hypotheses and infer that there are increasing trend of the directions of the ratings of the students in these pair of components. This suggests that higher the scores these students get in the Theories of Emotions there corresponds the higher scores in Theoretical Perspectives.

There were 24 significantly extracted itemized components that contribute extracted significant extracted itemized component that contributes most to UDL instructional intervention based on the maximum variances. These components deserved to be sustained particularly these impacted the improved learning outcomes of the first year students in General Psychology. While the rest that were not significantly contributing to UDL will be strengthened to support the priority needs of the students with respect to their contribution for better learning outcomes.

## CONCLUSIONS

Based on the results that were inferentially analyzed, the following conclusions were drawn:

Significant differences in the learning outcomes during the pre test in General Psychology gave feasibility of the Universal Design for Learning to really be applied in all of the academic major fields of specializations. As the Low Achievers really received the best of the benefits from such approaches so there would top priority considerations of applying this design to all students regardless of their learning capabilities.

Positive correlations among the UDL components as well as to and the Test Components in General Psychology allowed educators to give more training and assessment programs leading to the implementation of the UDL. Especially so with considerable significant variables at 27% contributory most to the UDL design.

## RECOMMENDATIONS

The following recommendation are given based on the following conclusions.

Teacher educators and professional developers can use the UDL framework to facilitate inclusion by enabling teachers to reduce barriers to learning while maintaining high expectations for all learners.

Teachers must be allowed to utilize UDL to consider learner differences, preferences, and needs at the onset of planning and instruction rather than after lessons have been developed for typical learners and then modified to address individual students' need.

Teachers must use the UDL framework to structure their lessons to make, making them accessible and engaging for all learners. If teachers consider the UDL framework in how they address instructional goals, planning, materials, and progress monitoring, they will meet the needs of a wider range of learners

The principles of UDL should be considered alongside

thoughtful planning related to the four curricular pillars of UDL: (a) instructional goals, (b) instructional delivery methods, (c) instructional materials, and (d) student assessments. Consideration of these four pillars means that instruction is flexible enough to address the needs of diverse learners.

Specific guidelines are hereby recommended also:

Instructional goals address learning outcomes for all learners. For example, teachers have clearly defined goals that maintain high expectations for all learners, but the goals are differentiated to be appropriate for a wide range of learners.

A variety of methods and materials are used in instruction that provides flexibility to address the needs of all learners. For example, teachers make use of multimedia materials, e-text, and other resources that support learning within their instruction.

The assessments used to evaluate student learning are flexible enough to allow students to demonstrate their learning in an accurate manner not hindered by their disabilities. For example, if a student has difficulty with written expression, a paper-and-pencil assessment requiring written expression will not assess subject understanding.

Although these curricular processes may be taught within teacher educators and professional developers to embed these curricular pillars in their instruction of UDL and provide examples across grade levels and content areas because UDL-based instruction will look different across instructional contexts; this typically occurs because each content area has its own disciplinary mode of thinking and its own text structures and discourse

Teacher educators and professional developers must be thoughtful and purposeful in their instruction of the three principles of the UDL framework.

Three research problems are recommended: 1. Universal Design of Instruction Across Disciplines. 2. Universal Design of Transition for Highly Analytical Courses. 3. Universal Design for Learning (UDL) and Response to Intervention (RTI) as Applied to Social Sciences.

## REFERENCES

- Alberto, P. & Troutman, A. (2003) Applied behavior analysis for teachers (6th ed.). Columbus, OH, USA: Prentice-Hall-Merrill.
- Anderson, Sweeny, and Williams (2002). *Statistics for Business and Economics*. 8th Edition. South-Western. Thomson Learning
- Academia (2013). Case Against Standardized Testing and Parental Involvement. [http://www.academia.edu/...ainst\\_Standardized\\_Testing\\_and...](http://www.academia.edu/...ainst_Standardized_Testing_and...)
- American Psychological Association, APA (2014). Specialty Guidelines for Forensic Psychology <http://www.apa.org/...ce/guidelines/forensic-psychology.aspx>
- ACCESS, CSU (Colorado State University) (2011). UDL: A Concise Introduction - The ACCESS Project. <http://www.accessproject.colostate.edu/...>

- introduction/d\_udl
- ASCD (2013). Student Motivation, Engagement, and Achievement. <http://www.ascd.org/...ion,-Engagement,-and-Achievement.aspx>
- Adolfo, S.Z. (2014). Critical Reading and Writing Skills as Determinants for Critical Thinking Ability. Unpublished Masteral Thesis. Central Philippines State University. Kabankalan City, Negros Occidental.
- American Psychological Association (2014). How instructors' emotional expressions shape students' learning performance: The roles of anger, happiness, and regulatory focus. *Journal of Experimental Psychology: General* - 43(3).
- Annett, L., S. Anthony & S. Schmeer (2012). Using online assessments to enhance student engagement with biological psychology. 2012 Higher Education Academy
- Barcelona, R. (2009). Pressing the online learning advantage: Commitment, content, and community. *Journal of Continuing Higher Education*, 57, 193–197.
- Brand, S.T. and E. M. Dalton (2009). Universal Design for Learning: Cognitive Theory into Practice for Facilitating Comprehension in Early Literacy. Unpublished thesis. University of Rhode Island.
- Berry, J. W., & Chew, S. L., (2008). Improving learning through interventions of student-generated questions and concept maps. *Teaching of Psychology*, 35, 305-312.
- Bost, L., & Riccominni, P. (2006). Effective instruction: An inconspicuous strategy for dropout prevention. *Remedial and Special Education*, 27, 301–315.
- Biggs, J and Tang, C. (2007). Teaching for Quality Learning at University, Open University Press, Maidenhead, UK.
- Bulgren, J. A., & Schumaker, J. B. (2005). Teaching practices that optimize curriculum access. In D. D. Deshler & J. B. Schumaker (Eds.), Teaching adolescents with disabilities: Accessing the general education curriculum, Thousand Oaks, CA: Corwin Press. 79–120.
- Burgstahler, S. (2007). Equal access: Universal design of instruction. Seattle: University of Washington
- Burgstahler, S. E. (2008). Universal design in higher education. In S. E. Burgstahler & R. C. Cory (Eds.), Universal design in higher education: From principles to practice. Cambridge, MA: Harvard Education Press, 3-20.
- CAST (2008). Universal Design for Learning Guidelines Version 1.0. Wakefield, MA: Author.
- Center for Applied Special Technology, CAST (2011). Universal Design for Learning Guidelines version 2.0. Wakefield, MA: Author.
- Center for Applied Special Technology, CAST (2011a). CAST Timeline: One mission, many innovations, 1984-2010. Wakefield, MA: CAST
- CAST (2012). Universal Design for Learning: Framework and Principles. CAST Copyright 2012. Harvard Mills Square, Suite 3 Wakefield, MA 01880.
- Chew, S. L. (2005). Seldom in doubt but often wrong: Addressing tenacious student misconceptions. In D.S. Dunn, & S.L. Chew, (Eds.), Best practices in teaching general psychology Mahwah, NJ: Erlbaum, 211-223.
- Chew, S. L. (2007). Study more! Study harder! Students' and teachers' faulty beliefs about how people learn. *General Psychologist*, 42, 8-10.
- Cameron, J.; Pierce, W. D.; Banko, K. M. & Gear, A. (2005). Achievement-based rewards and intrinsic motivation: A test of cognitive mediators. *Journal of Educational Psychology*, 97, 641–55.
- Center for Applied Special Technology, CAST (2006). Response-to-Instruction and Universal Design for Learning: How Might They Intersect in the General Education Classroom? The Access Center: Washington DC.
- Colorado State University, CSU (2014). How do you teach? ACCESS. Colorado State University
- CAST (2012). Universal Design for Learning Checkpoints. [http://www.cast.org/...guidelines/UDL\\_Checkpoints\\_6.3.08.doc](http://www.cast.org/...guidelines/UDL_Checkpoints_6.3.08.doc)
- Center for Applied Special Technology, CAST (2011b). UDL Questions and Answers. Wakefield, MA: CAST.
- Center for Applied Special Technology, CAST (2011c). What is universal design for learning? Wakefield, MA: CAST. <http://www.cast.org/udl/index.html>
- Center for Applied Special Technology, CAST (2014). Provide multiple means of action and expression: Strategic , goal-directed learners. <http://bookbuilder.cast.org/>
- City Takers (2014). New Teaching Methods Improve the Educational Process. <http://citytakersnetworkonline.blogspot.com/...3/10/3-new..>
- Council for Exceptional Children. (2011). New Guidelines for Universal Design for Learning Provide a Roadmap for Educators and Educational Publishers (WebPage). <http://www.cec.sped.org/AM/Template>.
- Cox, A. J. (2007). Understanding the eight pillars of executive control. <http://www.dradamcox.com/pdf/EightPillars.pdf>
- Colorado State University (2014). Universal Design for Learning. <http://www.accessproect.colostate.edu/udl/award>.
- Crawford, E. and & K. Gross (2014). Preventative Programs Targeting Aggression among College Students. <http://artifactsjournal.missouri.edu/2014/08/preventative-programs-targeting-aggression-among-college-students/>
- Davies, P. L., C. L. Schelly and C. L. Spooner (2013). Measuring the Effectiveness of Universal Design for Learning Intervention in Postsecondary Education. <http://www.files.eric.ed.gov/fulltext/EJ1026883.pdf>
- Durham College (2014). Multiple means of expression. [http://www.cafe.durhamcollege.ca/...tiple\\_means\\_of\\_Expression...](http://www.cafe.durhamcollege.ca/...tiple_means_of_Expression...)
- Eilam, B. (2012). Teaching, Learning, and Visual Literacy The Dual Role of Visual Representation. Cambridge University Press.
- Elizabeth M. Dalton, E.M. and P.V. Sherlock (2011). Universal Design for Learning and teacher

- preparation: What teachers need to know and be able to do to implement UDL in their classrooms, and what this means for system change. SETSIG/ISTE Webinar.
- El Mansour, B. (2007). Students' positive and negative experiences in hybrid and online classes. *College Student Journal*, 41, 242–248.
- Ewing, A.N. (2007). Increasing Classroom Engagement Through the Use of Technology. Unpublished thesis. Mesa Community College.
- Education (2014). Using Positive Student Engagement to Increase Student Achievement. [http://www.education.com/...rence/article/Ref\\_Using\\_Positive](http://www.education.com/...rence/article/Ref_Using_Positive)
- Education World (2014). Assistive Technology. [http://www.educationworld.com/special\\_ed/assistive](http://www.educationworld.com/special_ed/assistive)
- Fazal, S., S. Hussain, M. Majoka, M. Iqbal and S. Shawana (2012). The role of study skills in academic achievement of students: A closer focus on gender. [https://www.questia.com/library/journal/1P3-2684801161/the-role-of-study-skills-in-academic-achievement-of-Fredricks, Blumenfeld and Paris \(2004\). Quantifying School Engagement](https://www.questia.com/library/journal/1P3-2684801161/the-role-of-study-skills-in-academic-achievement-of-Fredricks, Blumenfeld and Paris (2004). Quantifying School Engagement)
- Fredricks, Blumenfeld and Paris (2004). Quantifying School Engagement. <http://www.schoolengagement.org/...istry/Admin/Resources> /...
- Free Library (2014). A comprehensive approach to RTI: Embedding universal design for Learning. <http://www.thefreelibrary.com/...nsive+approach+to+RTI%3a...>
- Frank C, Land WM, Schack T (2013). Mental representation and learning: The influence of practice on the development of mental representation structure in complex action. *Psychol Sport Exerc* 14: 353–361. <https://doi.org/10.1016/j.psychsport.2012.12.00>
- Frank, C., C. F. Land, C. Popp, T. Schack (2014). Mental Representation and Mental Practice: Experimental Investigation on the Functional Links between Motor Memory and Motor Imagery. *PLoS ONE* 9(4), e95175. <https://doi.org/10.1371/journal.pone.0095175>
- Gray, P. (2013). Free to Learn. Basic Books. Boston College
- Garsula, L. D. (2014). Emotional Intelligence, Intelligence Quotient and the Selected Factors to Predict Students' Academic Achievement. Unpublished Masteral Thesis. Central Philippines State University. Kabankalan City, Negros Occidental.
- Grant, K. (2014). Universal Design for Learning. [http://etec.cctl.ubc.ca/510wiki/Universal\\_Design\\_for\\_Learning](http://etec.cctl.ubc.ca/510wiki/Universal_Design_for_Learning)
- Goliday, A. (2014). Barriers to learning factors. <http://www.ehow.com/info.827750/-barriers-effective-learning.html>.
- GRCC (2013). Universal Design and Accessible Course Content. [http://www.grcc.edu/.../docs/teachexcellence/fld2013\\_Kaut..](http://www.grcc.edu/.../docs/teachexcellence/fld2013_Kaut..)
- Handelsman, M.M., W. Briggs, N. Sullivan, A. Towler (2005). A measure of college student course engagement. Unpublished thesis. University of Colorado at Denver.
- Higher Education Opportunity Act, HEOA (2008). Universal Design for Learning.
- Howard University (2014). Universal Design for Learning: A Rubric for Evaluating Your Course Syllabus. <http://www.udluniverse.com/>
- Hinshaw, R. E. and S.S. Gumus (2013). Universal Design for Learning principles in a hybrid course: Perceptions and practices. <http://sgo.sagepub.com/content/3/1/2158244013480789>
- Harris, J. (2008). One size doesn't fit all: Customizing educational technology professional development. *Learning and Leading with Technology*. 18-23.
- Harvard Graduate School Education, GSE (2014). Universal Design for Learning: Reaching All Learners. Harvard Graduate School of Education. Cambridge, MA 02138
- Haslam, G. (2007). A School Teacher's Diary. <http://www.livingarchives.ca/...ving-archives/sep-25-2007/88>
- Individuals With Disabilities Education Act, IDEA (2004). Universal Design for Learning Principles. <http://idea.ed.gov/>
- Israel, M., & Ribuffo, C., & Smith, S. (2014). Universal design for learning: Recommendations for teacher preparation and professional development (Document No. IC-7). Retrieved from University of Florida, Collaboration for Effective Educator, Development, Accountability, and Reform Center. <http://ceedar.education.ufl.edu/tools/innovation-configurations/>
- Jabeen, S. And M.A. Khan (2013). A study on need achievement of high and low achievers <http://www.iiste.org>
- Jacobs, J. (2013). Universal Design for Learning <http://www.joannejacobs.com/...universal-design-forlearning>
- Jackson, M., & Helms, M. (2008). Student perception of hybrid courses: Measuring and interpreting quality. *Journal of Education for Business*, 84(1), 7–12.
- Jackson, S. (2012). Engagement. <http://www.custom-essay-writing.org>.
- Kortering, L. J., T. W. McClannon AND P. M. Braziel (2008). Universal Design for Learning A Look at What Algebra and Biology Students With and Without High Incidence Conditions Are Saying.
- Kuh, G. D. (2007). What student engagement data tell us about college readiness. *Peer Review*, 9, 4-8.
- Kortering, L., McClannon, T., & Braziel, P. (2006). Universal design for learning: A look at what students have to say [Research Brief]. Minneapolis: University of Minnesota, National Center on Secondary Special Education.
- Lawless, K. A. and Pelligrino, J. W. (2007). Professional development in integrating technology into teaching and learning. Knowns, unknowns, and ways to pursue better questions and answers. *Review of Educational Research*, 77, 575-614.
- Maryland Learning Links (2014). Universal Design for Learning (UDL). <http://www.marylandlearninglinks>.

- org
- McGoey, K. E. & DuPaul, G. J. (2000) Token reinforcement and response cost procedures: Reducing the disruptive behavior of preschool children with attention-deficit/hyperactivity disorder. *School Psychology Quarterly*, 15, 330–43.
- McGuire, J. M., Scott, S. S., & Shaw, S. F. (2006). Universal design and its applications in educational environments. *Remedial and Special Education*, 27(3), 166-175. Meyer, A. D. H. Rose, and D. Gordon (2012). Universal Design for Learning: Theory & Practice. BOOKS & MEDIA Copyright 2014 CAST Professional Publishing.
- Marx, J. (2014). What Are Psychological Barriers? <http://www.ehow.com>
- McLeod, S. (2007). Cognitive Psychology. <http://www.simplypsychology.org/>
- Michigan State University (2014). Universal Design for Learning (UDL) <http://www.msu.edu/>
- NCLB (2006). Universal Design Q&A for Educators and Administrators. <http://www.nclb.org/...versal-design-qa-educators-administrators>
- NACUA (2008). Higher Education Opportunity Act. 2008. <http://www.nacua.org/documents/heoa.pdf>
- Nelson, L. L. and D. H. Rose (2013). Design and Deliver. Planning and Teaching Using Universal Design for Learning. Paul H. Brookes Publishing Co.
- National Center on Universal Design for Learning, NCUDL, (2014). UDL Questions and Answers. National Center on Accessible Instructional Materials.
- NASP (National Association of School Psychologists) (2006). Supporting Student Success: Remediating the Shortage of School Psychologists 4340 East West Highway #402, Bethesda, MD 20814. <http://www.nasponline.org>
- National Center on Universal Design for Learning, NCUDL, (2014). What is Universal Design for Learning? <http://www.udlcenter.org>.
- NCLD (2013). A Parent's Guide to Universal Design for Learning (UDL). <http://www.ncl.org/...Publications/AdvocacyBriefs/Parent...>
- Ohio State University Partnership Grant (2011). Improving the Quality of Education for Students with Disabilities. (2011). Universal Design for Learning: Elements of Good Teaching. <http://ada.osu.edu/resources/fastfacts/Universal-Design-FF.pdf>
- OSUPG (Ohio State University Partnership Grant) (2015). Elements of Good Teaching. <http://ada.osu.edu/resources/fastfacts/>
- Pierce, W.D. & Cameron, J. (2002). A summary of the effects of reward contingencies on interest and performance. *The Behavior Analyst Today*, 3, 222–26. ABO
- Personalize Learning (2014). UDL for All Learners. <http://www.personalizelearning.com/2014/03/udl-for-all-learners.html>
- Psychology Wikia (2013). Introduction to educational psychology-Psychology Wiki [http://www.psychology.wikia.com/...ion\\_to\\_educational\\_psychology](http://www.psychology.wikia.com/...ion_to_educational_psychology)
- Regents of the University of Minnesota (RUMN, 2014). Universal Design for Learning. <http://www.cast.org>
- Rowland, C., Mariger, H., Siegel, P. M., & Whiting, J. (2010). Universal design for the digital environment: Transforming the institution. *EDUCAUSE Review Online*, 45(6). <http://www.educause.edu/ero/article/universal-design-digital-environment-transforming-institu>
- Rose, S. (2014). Good ways to implement Universal Design for Learning in the Classroom. <http://www.udltechtoolkit.wiki.spaces.com>
- Riffell, S., & Sibley, D. (2005). Using Web-based instruction to improve large undergraduate biology courses: An evaluation of a hybrid course format. *Computers & Education*, 44, 217–235.
- Roediger, H. L., III, & Karpicke, J. D. (2006). Test-enhanced learning: Taking memory tests improves long-term retention. *Psychological Science*, 17, 249-255.
- Rose, D. and A. Meyer (2003). Teaching Every Student in the Digital Age: Universal Design for Learning. CAST and Access Center: Washington DC.
- Ralabate, P. K. (2011). Universal Design for Learning: Meeting the Needs of All Students. The ASHA Leader.
- Reading Rockets (2014). Universal Design for Learning: Meeting the Needs of All Students...<http://www.readingrockets.org/article/51118>
- Regents of the University of Minnesota (RUMN, 2014). Universal Design for Learning. <http://www.cast.org>
- Sage (2013). The Principles of 1 Developmental Psychology. [http://www.sagepub.com/upm-data/9397\\_008824ch1.pdf](http://www.sagepub.com/upm-data/9397_008824ch1.pdf)
- San Francisco State University, SFSU (2014). Universal Design for Learning. <http://www.sfsu.edu>
- Schelly, C. L., Davies, P. L., & Spooner, C. L. (2011). Student Perceptions of Faculty Implementation of Universal Design for Learning. *Journal of Postsecondary Education and Disability*, 24(1), 17-28.
- Science Direct (2014). The effects of high impact learning experiences on student engagement. <http://www.sciencedirect.com/...rticle/pii/S1877042811002291>
- SONOMA (2014). UDL-Universe: A Comprehensive Universal Design for Learning Faculty <http://www.enact.sonoma.edu/friendly.php?s=udl>
- Schmid, R. F., Bernard, R. M., Borokhouski, E., Tamim, R., Abrami, P. C., Wade, C. A., Lowerison, G. (2009). Technology's effect on achievement in higher education: A stage I meta-analysis of classroom applications. *Journal of Computation in Higher Education*, 21, 95–109.
- San Francisco State University, SFSU (2014). Universal Design for Learning. . <http://www.sfsu.edu>
- Science Direct (2014). Cognitive Science: History International. <http://www.sciencedirect.com/...rticle/pii/B008043076701442X>
- Simply Psychology (2013). Psychology perspectives . <http://www.simplypsychology.org/perspective.html>

- Theodore, L.A.; Bray, M.A.; Kehle, T.J. & Jenson, W.R. (2001). Randomization of group contingencies and reinforcers to reduce classroom disruptive behavior. *Journal of School Psychology, 39*, 267–77.
- Udcenter (2013). National Center On Universal Design for Learning. [http://www.udcenter.org/.../ementation/examples/examples3\\_2](http://www.udcenter.org/.../ementation/examples/examples3_2)
- University of California (2014). Psychology. <http://www.ucsd.edu/catalog/curric/PSYC-ug.html>.
- Udcenter (2013). National Center On Universal Design for Learning [http://www.udcenter.org/.../ementation/examples/example\\_s3\\_2](http://www.udcenter.org/.../ementation/examples/example_s3_2)
- UDL-Universe (2014). A Comprehensive Universal Design for Learning Faculty Development Guide. <http://www.udl-universe.com>
- United Nations (2006). Convention on the Rights of Persons with Disabilities <http://www.un.org/...ilities/convention/conventionfull.shtml>
- University of California (2014). Psychology. <http://www.ucsd.edu/catalog/curric/PSYC-ug.html>.
- University of Nebraska-K (2014). Running head: Student course engagement. <http://www.webcms.unk.edu/...romoting%20Student%20Engagement.doc>
- USCD (2014). Psychology Courses-University of California, San Diego <http://www.registrar.ucsd.edu/catalog/11-12/courses/PSYC.html>
- Villafuerte, E.G. M. (2014). Cultural Diversity and Students' Learning Outcomes in Social Science. Unpublished Masteral Thesis. Central Philippines State University. Kabankalan City, Negros Occidental.
- Whitley, B.E., Jr., M. E. Kite (2013). *Principles of Research in Behavioral Science*. Third Edition. Routledge.