ABSTRACT
Research shows that Problem Based Learning, critical thinking and service learning creates a balance of flexibility, quality and cultural sensitivity for the student at higher education. The student in an online and on the ground environment must become decisive, resourceful, investigative, and a self-directed and independent learner. Problem Based Learning (PBL) is relatively new in the realm of learning. Textbooks and lectures are often barriers to learning for many students. Critical thinking is the benchmark in determining the success of teaching techniques in a course. The deductive method includes a present assessment. The Table of Contents structures student learning. An experimental study, a trilogy of articles was designed to test for (no) preferences of student courses aids with respect to critical thinking, learning and assessment. The aids included the text, lectures, subject handouts, specific and of course paper table of contents, and sample (rubric) paper. A survey questionnaire was administered to cohort groups of business/health care undergraduate and graduate students. The course delivery format was on the ground for under graduate and on line/computer for graduate students. The text book was definitely considered an outlier. The Chi Square Goodness of Fit test results suggested there is a significant difference in student learning aid preferences/assessments at alpha a priori < .05 percent. E-reading should be specifically named as a choice of preferred learning aids to further substantiate that a hard copy text is out of vogue and therefore does not aid in PBL. Furthermore, optimizing higher education for the professional student and practicing cultural sensitivity can be accomplished through Service Learning “SERVE trips” where students serve and work with other cultures such as Native Americans. SERVE trips (e.g., for a Gerontology and Diversity course) are very effective in teaching cultural diversity in any settings. This paper presents a trilogy of articles (national and international) of students preferences in course aids for Problem Based Learning assessments.

KEYWORDS: Assessment, Critical thinking, PBL, Problem Based Learning, Student preferences

The first article in a trilogy presents an overview of student preferences in course aids for Problem Based Learning (PBL) assessments. It looks at a variety of student aids and also references a variety of assessment instruments. The paper focuses on critical thinking and student course papers. Problem Based Learning (PBL) is relatively new in the realm of learning, use of learning aids, and assessments (Thomas, 2003). PBL supports critical thinking in that it requires product design/course paper completion, research/citations in support of the student statements, and specific parameters of the paper (the minimum of sub topics to be covered). PBL requires that someone, other than the learner, is responsible for both the learning situations and management of the assessments. Teaching and learning are directly tied to educational theories. These theories are benchmarks in determining both the success of teaching techniques and proof of learning.
The survey findings, as a time series of cohort groups, are also applicable to the following learning theories:

- Grow’s theory of Self Directed Development is closely matched to actual/existing situations. The student must become decisive, resourceful, investigative, critical thinkers based on assigned objectives in the course, self-directed and independent learners. As students gain the skills needed for self-direction, the teacher becomes less directive (Grow, 1991, pp. 124-149).
- Curriculum Design theory: a similar progression towards self-directed learning can be applied to a course curriculum.

**Approaches**

The learning theories are interrelated to two teaching and learning methods. The methods are *inductive* and *deductive*. In inductive methods the teacher exposes the learner to many topic situations. The student will learn by *trial* and *error*. This is known as the stimulus-response result in behaviorist habit forming theory. The deductive method includes a preset formula for the assessment. Rules structure student learning. The student’s critical thinking becomes a guided and/or self-guided learning process. This is the constructivist pattern process in learning (Thomas, 2003, p. 3).

A survey questionnaire was administered to cohort groups of Health Care Major students. A sample of 120 online students were surveyed and 84 students responded. Chi Square Goodness of Fit testing, at alpha *a priori* < .05 results were statistically significant regarding student preferences of learning aids.

**Ho:** The categories of student materials/work are equally likely to aid student learning (Students do not have a clear/significant preference of course learning aids)

\[ H_0: p_0 = p_1 = p_2 = p_3 = p_4 = p_5 \]

**H1:** (Ha) Students do have a preference of course materials to aid their learning

Chi Square Goodness of Fit Testing Formula =

\[
\chi^2 = \frac{\sum (O - E)^2}{E}
\]

- degrees of freedom
- \( k - 1 \) = number of categories
- always a right tailed test
Course objectives generally drive the assessments in learning. Assessments are expected by the learner and they are both competitive and non-competitive tools. Criterion testing is non-competitive. Norm referenced tests compare one learner to another in past or current situational events.

PBL is closely matched to actual/existing situations. The students must be decisive, resourceful, investigative, critical thinkers based on assigned objectives, self-directed, and independent learners. They should (will) find solutions. Often the solutions are found online in the topic fields of Business, Healthcare management, Human resources, Policy and Social Sciences.

Multimedia benefits enhance the student’s decisive and critical thinking based on assigned objectives of self-directed and independent learners. Evidence suggests that lectures can present barriers to learning for many students, but online multimedia materials could offer many benefits for learning and teaching; thus, the potential to alleviate barriers in PBL (Wald, 2008).

Furthermore, to support this agreement, Wald cited for example, Speech Recognition (SR) potentially benefit all learners automatically and cost-effectively, which provides synchronized captions and transcripts of live or recorded speech (Bain et al., 2005). Even though Bain’s research focused on how interacting with multimedia can inform developments in using automatically synchronized speech recognition, any resulting benefits transcend to preferred learning and teaching styles that could influence PBL.

Those surveyed preferred ownership and problem solving in learning. Paper/case assessment, to include online research, were the methods of assessments used and often required solutions, selection choices, regarding situational practices/problems.

It is important to nurture these health workers through training activities during their program of study (Baker, 1989). The ideal student might become the ideal “professional”. They would have a sense of self-worth, respect others, be loyal to their sponsor, maintain the highest of standards in their field, give care that is honest, accurate and gentle, consider the patient on the whole as body, mind, and spirit and will also, by role modeling, encourage growth of their ranks (Brown-West, 1991; Carnevale, Villet, Holland, 1990; Fauser, 1992; McMillan, Reed, 1994.

Educators have to address any or all of the following issues: retraining of displaced workers; content expansion; theory and methodology of instruction. Increased education in licensed occupations will enhance the image and expand the arena of adult education. Required continuing education will increase development of testing and certification (Bell, 1988; Buzzell, 1986; Daggett, 1991; Dole, 1989; Gupta, Konrad, 1992; Schroeder, 1993).
A survey questionnaire was administered to cohort groups of Health Care Major students. There were 120 students surveyed and 84 responses. The study was designed to test for (no) preferences of student course aids with respect to critical thinking, learning and assessment. The aids included the text, lectures, subject handouts, specific end of course paper, table of contents, and a sample (rubric) paper. The expected tally for no preference of course aids was 20% per category.

The course delivery format varied to include traditional on ground, blended and/or Video Teleconferencing Technology (VTT).

Chi Square Goodness of Fit Testing suggested that a given/provided Table of Contents for the end of course, a paper, as an assessment, was most preferred by more than 90% of the responders. A clear winner for student second choice of aid was a rubric paper. It should be noted that 96% of the responders ranked the text book last of course aids.

**EVALUATION OUTCOMES: THE FIRST IN A TRILOGY**

All responders reported that course aids (used in the cohort courses) were also helpful in their “follow on” courses. All students self-reported grade point averages of B of higher. Thirty six students reported A grades.

These five course aids are (in rank of order):

1. Preset/given paper table of contents
2. Rubric/sample report
3. Subtopic lectures
4. Student sharing/group work
5. Text book

The Chi Square results suggest that there is a significant difference in student learning aid preferences and assessments. The investigation was also to understand effect of PBL and student research. We suggest that electronic reading (e-reading) is more efficient that traditional textbook reading.

**STUDENTS AND LEARNING PREFERENCES: THE SECOND IN A TRILOGY**

A survey questionnaire was administered to cohort groups of Health Care Major, online graduate, students. There were 60 students surveyed and 52 responses. The study was designed to test for (no) preferences of student course aids with respect to critical thinking, learning and assessment. The aids included the text, lectures, subject handouts, specific end of course paper, table of contents, and a sample (rubric) paper. The expected tally for no preference of course aids was 20% per category. The course delivery format (in this experiment) was to online only cohort groups of graduate students.

Chi Square Goodness of Fit Testing suggested that a given/provided Table of Contents for the end
of course a paper, as an assessment, was most preferred by more than 90% of the responders. A clear winner for student second choice of aid was a rubric paper. It should be noted that 86% of the responders ranked the text book last of course aids.

**EVALUATION OUTCOMES - THE SECOND IN A TRILOGY**

All graduate responders reported that course aids (used in the cohort online courses) were also helpful in their “follow on” courses. All students self-reported grade point averages of B of higher. These five course aids (in preferred rank order) are:

1. Preset/given paper table of contents
2. Rubric/sample report
3. Subtopic lectures
4. Student sharing/group work
5. Text book

The Chi Square results suggest there is a significant difference in student learning aid preferences and assessments.

**STUDENTS AND LEARNING PREFERENCES: THE THIRD IN A TRILOGY**

A survey questionnaire was administered to cohort groups of Social Work and/or Nursing students. There were 145 students surveyed and 104 responses. The study was designed to test for (no) preferences of student course aids with respect to critical thinking, learning and assessment. The aids included the text, lectures, subject handouts, specific end of course paper table of contents, and a sample (rubric) paper. The expected tally for no preference of course aids was 20% per category. The course delivery format (in this experiment) was to online only cohort groups.

Chi Square Goodness of Fit Testing suggested that a given Table of Contents/Tree flow diagram, as the course Mid Term assessment, was most preferred by more than 96% of the responders. A clear winner for student second choice of aid was a rubric paper.

**EVALUATION OUTCOMES: THE THIRD IN A TRILOGY**

All graduate responders reported that course aids (used in the cohort online courses) were also helpful in their “follow on” courses. All students self-reported grade point averages of B of higher. These five course aids (in preferred rank order) are:

1. Preset/given paper table of contents
2. Rubric/sample report
3. Subtopic lectures
4. Student sharing/group work
5. Text book
The Chi Square results suggest there is a significant difference in student learning aid preferences and assessments at .05 percent.

**E-READING: WHAT VALUE TO ONLINE EDUCATION?**

The technology age has ushered in unprecedented information capabilities. This means reading is not exempted from this trend. There are many choices of devices on which to read e-books. Readers appear to want easier access to e-books. For instance, some students make course choices partly based on availability of e-books to allow them to e-read anywhere. There is a plethora of options as the market searches for best solutions. Many schools are actually part of the pilot program as their students provide feedback along the way. Many of these schools, especially the online (or blended ones) have in some way announced winning solutions tailored to both their schools and students.

**BEYOND THE CLASSROOM LEARNING: SERVICE LEARNING AND SERVE TRIPS**

What is Service Learning? “Service Learning is defined as an experiential learning where the student works to meet the needs of the community while addressing academic requirements” and it is connected with academic coursework service to the community. Service Learning encompasses a variety of settings including community agencies (e.g., public health agencies, hospitals, nursing homes, schools) etc. just to name a few. Not only students benefit by providing service to the community, but also academic institutions benefit through the collaboration and contacts it makes with community partners (Ross, 2012).

What is the goal of Service Learning and SERVE trips?
The goal of Service Learning and SERVE trips is simply to give students the opportunity to use their theoretical knowledge in real-world, hands-on situations. In addition, to motivate students to become life-long learners and to make learning a joyful experience “an adventure”.

What are the basic ingredients of Service Learning and SERVE trips?
First, the project must meet the need of a community (locally, nationally or internationally). The question to start with is: Who needs what and where?
Second, how can the school, college, or university SERVE Others? Not every Service Learning and SERVE trip needs to be research driven.
Third, any project should be integrated with the knowledge and skills thought in the classroom. Students enjoy learning if they know the purpose for it. Problem based learning becomes second nature for students who are involved in Service Learning. Furthermore, critical thinking and the use of creativity are the hallmark in planning and executing projects. It is essential to motivate and encourage students to become leaders in their future professions and leadership skills can be accomplished through SERVE trips. People skills can be practiced through communication and networking within a specific community.

Service Learning in general has many benefits such as making students better citizen and more attractive employees. When students get involved in their communities people view them as
resources and educational settings become part of a community small or large. Service Learning helps students achieve higher educational results by integrating theoretical knowledge and real-life and world experiences. It also helps educators to integrate teaching, research and outreach (Koci, 2013).

SERVE trips can also be planned as part of any course work and curriculum (e.g., Diversity, Gerontology). For example, the Council of Social Work Education and the National Association of Social Workers promote social justice and cultural competence especially on Native American Cultures since their life expectancy is far below the average life expectancy of the US-population. All departments, especially social work, and all students can be part of the project by participating and planning of Native American events; by visiting Native American pueblos and serving the community through planting gardens.

**Conclusions**

Problem Based Learning (PBL) is relatively new in the realm of learning, use of learning aids and assessment. The teaching and learning theories (inductive and deductive) and critical thinking are the benchmarks in determining the success of teaching techniques in a course. The Table of Contents is the hallmark of preferred learning aids for students. Textbooks and lectures can, and are, barriers to learning for many students. Therefore, they are a hindrance to success. The learning aids surveyed included the text, lectures, subject matter handouts, a specific end of course paper table of contents, and sample (rubric) paper. The course delivery format varied to include online, traditional on ground, blended and or video teleconferencing (VTT). The textbook was definitely considered an outlier. The Chi Square Goodness of Fit test results suggested there is a significant difference in student learning aid preferences and assessments at alpha a priori <.05 percent. Future research suggests additional studies, such as a time series, is indicated. E-reading should be specifically named as a choice of preferred learning aids to further substantiate that a hard copy text is out of vogue and therefore does not aid in Problem Based Learning. Service Learning in general has many benefits such as making students better citizen and more attractive employees. When students get involved in their communities people view them as resources and educational settings become part of a community small or large. Service Learning helps students achieve higher educational results by integrating theoretical knowledge and real-life and world experiences.
APPENDIX

This survey, based on your candid responses, will assist university faculty in the design of course work assignments with respect to course delivery settings. The survey is brief, just nine questions, and will not take much of your time.

Please check all that apply for each question.

1. What is your current student status?

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<th>Status</th>
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<td>Freshman</td>
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2. Have you ever help a health care registry/certification? Yes _____  No  ______

3. If yes, which one?  _______________________________________________

4. Have you taken HCA/HCM 402 Community Health (Epidemiology) Yes _______ No __________

5. If yes, which delivery setting were you in?  

- Traditional in class
- Distance/VTT
- E-learning
- Blended

6. Have you taken HCA/HCM 498 Policy and Planning? Yes _______ No __________

7. If yes, which delivery setting were you in?  

- Traditional in class
- Distance/VTT
- E-learning
- Blended

8. Were the other students at your site helpful?  

- Encouraging
- Willing to tutor others
- Shared by “show and tell”

9. Rank in order what was helpful regarding learning and course aids:

- Preset/given paper table of contents
- Drafting section pages in class by groups
- Sample report
- Sub topic lectures
- Text book

10. Did any above named activities aid you in “follow on” courses? Yes _____ No _______

Thank you for both your time and valued input.

If interested in the survey results, please contact the surveyors at __________@saintleo.edu

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