8-2011

The Impact of Team-Based Learning's Readiness Assurance Process on Virtually Isolated Adults

Matthew W. Barclay

Utah State University

Follow this and additional works at: https://digitalcommons.usu.edu/etd

Part of the Management Information Systems Commons

Recommended Citation

Barclay, Matthew W., "The Impact of Team-Based Learning's Readiness Assurance Process on Virtually Isolated Adults" (2011). All Graduate Theses and Dissertations. 1025.
https://digitalcommons.usu.edu/etd/1025

This Dissertation is brought to you for free and open access by the Graduate Studies at DigitalCommons@USU. It has been accepted for inclusion in All Graduate Theses and Dissertations by an authorized administrator of DigitalCommons@USU. For more information, please contact digitalcommons@usu.edu.
THE IMPACT OF TEAM-BASED LEARNING’S READINESS ASSURANCE PROCESS ON VIRTUALLY ISOLATED ADULTS

by

Matthew W. Barclay

A dissertation submitted in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Instructional Technology and Learning Sciences

Approved:

Byron R. Burnham, Ed.D. Matthew J. Taylor, Ph.D.
Major Professor Committee Member

J. Nicholls Eastmond, Ph.D. Brian R. Belland, Ph.D.
Committee Member Committee Member

Scot M. Allgood, Ph.D. Mark R. McLellan, Ph.D.
Committee Member Vice President for Research and
Dean of the School of Graduate Studies

UTAH STATE UNIVERSITY
Logan, Utah

2011
ABSTRACT

The Impact of Team-Based Learning’s Readiness Assurance Process on Virtually Isolated Adults

by

Matthew W. Barclay, Doctor of Philosophy

Utah State University, 2011

Major Professor: Dr. Byron R. Burnham
Department: Instructional Technology and Learning Sciences

The purpose of this study was to test the effectiveness of the readiness assurance process of team-based learning (TBL) in virtually isolated settings. Many Internet sites offer courses for adults to use on their own without access to mentors or other learners. However, educational theory suggests that people learn better with others than by themselves. The focus of this investigation was whether the inclusion of the readiness assurance process would increase participants’ levels of learning based on Bloom’s revised taxonomy within the limits of virtual isolation.

In this study an experimental pretest-posttest design was employed. Using a 2-day mini-course about listening in marriage, 117 participants were randomly assigned to three groups. In the TBL group, married couples worked together following the principles of the readiness assurance process. In the independent group, one spouse from a marriage worked alone, also following the principles of the readiness assurance process.
In the baseline group, one spouse from a marriage took the pretest and posttest only.

The first posttest, called posttest-L, measured lower levels of learning (remembering and understanding). The second posttest, called posttest-D, measured deeper learning (applying and evaluating). Using ANCOVA with the pretests as the covariates, results showed a statistically significant difference in learning gains between the TBL group and the independent group for lower levels of learning ($ES = .39$).

However, statistical significance was not achieved for deeper learning. Moreover, TBL scores and independent scores were no different from the baseline scores for measures of deeper learning. Along with explanations for these results, limitations of the study are described and suggestions for future research are offered.

(146 pages)
ACKNOWLEDGMENTS

In any endeavor of consequence, we usually encounter others along the way who make an impact for good on that endeavor. We tend to remember best, I think, those who really cared about our thoughts, our feelings, and our progress. I was fortunate to associate with many people who showed this kind of caring that directly impacted for good my efforts to complete this doctorate degree. I express publicly my thanks to them here.

I first mention Virginia, for her unfailing support, encouragement, and patience. There is not enough space to describe my appreciation for her.

Next are Liesel, Joel, Kira, Genny, Anna, Noelle, who constantly encouraged and believed in daddy. I also thank Alex and Kathryn, Tom and Odette, Melissa, Tom and Barb, Doug and Ginger, Ben and Sarah, Lorraine Wynn, Lavon Barclay Dabel, Nancy Calverly, and Onizieme Durepos.

Others were Byron Burnham, an outstanding mentor. Matt Taylor, the stats guru. Scot Allgood, a perceptive and genuine person. Nick Eastmond, a down-to-earth friend. Brian Belland, a colleague and advisor who helped me see other views. Joanne Bentley, who gave me opportunities. David Merrill, who inspired me and included me. David Wiley, who gave me an assistantship. Laurie Nelson, who helped me get my bearings in the world of instructional technology. Sheri Haderlie, who hired me. Martha Whitaker, who encouraged me and who was a delight to work with. Preston Parker, a good friend, even though he beat me to it. Brooke Robertshaw, another good friend. Maxine Rowley, who believed in and inspired me. Scott Baird, who also inspired me and saw more in me.
than I saw in myself. Maureen Ellis, a true friend. The Instructional Technology office staff—Melanie Bodily, Launa Julander, and Roger Karren.

Finally, I express thanks to the Almighty, who loves and helps us all, whether we acknowledge Him or not.

Matthew W. Barclay
CONTENTS

Page

ABSTRACT .................................................................................................................. iii

ACKNOWLEDGMENTS ......................................................................................... v

LIST OF TABLES ................................................................................................. ix

LIST OF FIGURES .......................................................................................... xi

CHAPTER

I. INTRODUCTION ............................................................................................... 1

  Definition of Learning Levels ............................................................................ 3
  Research Question ............................................................................................. 3

II. REVIEW OF LITERATURE ................................................................................ 5

  Sources ............................................................................................................... 5
  Learning with Others: Terms in the Literature .............................................. 6
  Team-Based Learning ....................................................................................... 7
  Research on TBL ............................................................................................... 16

III. METHODS ....................................................................................................... 24

  Design ............................................................................................................... 30
  Variables .......................................................................................................... 32
  Instruments ....................................................................................................... 32
  Participants ....................................................................................................... 43
  Analysis ............................................................................................................. 48

IV. RESULTS .......................................................................................................... 45

  Demographics ................................................................................................... 49
  Posttest-L Results ............................................................................................ 53
  Posttest-D Results ............................................................................................ 62

V. DISCUSSION ...................................................................................................... 74

  Lower-Level Learning ...................................................................................... 74
LIST OF TABLES

Table | Page
--- | ---
1. Participant Groups and Treatments for the Study | 31
2. Participant Demographics by Group: Age and Years Married | 50
3. Participant Demographics by Group: Previous Marriage, Listening, and Counseling | 51
4. Means and Standard Deviations for Test L (out of 40) | 54
5. Correlation Matrix for Test L | 55
6. Test for Homogeneity of Regression Posttest-L | 57
7. Analysis of Covariance for Lower Learning Levels | 59
8. Pairwise Comparisons Between Groups on Posttest-L | 59
9. Means and Standard Deviations for Adjusted Test L (out of 48) | 61
10. Correlation Matrix for Adjusted Test L | 61
11. ANOVA for Adjusted Posttest-L | 62
12. Means and Standard Deviations for Test D (out of 40) | 63
13. Correlation Matrix for Deeper Learning | 64
14. Homogeneity of Regression for Deeper Learning | 65
15. Analysis of Covariance for Deeper Learning Levels | 66
16. Pairwise Comparisons for Deeper Learning | 66
17. Correlation Matrix for Deeper Learning | 67
18. Analysis of Covariance Posttest-D Adjusted Scores | 68
19. Depth of Participant Engagement with Readiness Assurance Tests | 69
<table>
<thead>
<tr>
<th></th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.</td>
<td>Participant Reports of Readings</td>
<td>71</td>
</tr>
<tr>
<td>21.</td>
<td>Participant Reading Detail</td>
<td>71</td>
</tr>
<tr>
<td>22.</td>
<td>Participant Closing Comments by Theme</td>
<td>72</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>TBL instructional activity sequence with focus on the readiness assurance process</td>
<td>15</td>
</tr>
<tr>
<td>2.</td>
<td>Listening in Marriage log-in screen</td>
<td>35</td>
</tr>
<tr>
<td>3.</td>
<td>Listening in Marriage welcome screen</td>
<td>35</td>
</tr>
<tr>
<td>4.</td>
<td>Listening in Marriage day 1 activities for TBL participants</td>
<td>36</td>
</tr>
<tr>
<td>5.</td>
<td>Recruitment flyer</td>
<td>44</td>
</tr>
<tr>
<td>6.</td>
<td>Random assignment of participants into groups</td>
<td>45</td>
</tr>
<tr>
<td>7.</td>
<td>Pretest to posttest regression lines by group</td>
<td>58</td>
</tr>
<tr>
<td>8.</td>
<td>Estimated marginal means for posttest-L</td>
<td>59</td>
</tr>
<tr>
<td>9.</td>
<td>Regression lines for posttest-D</td>
<td>65</td>
</tr>
</tbody>
</table>
A few years after the World Wide Web was extensively adopted, Wilson and Lowry (2000) predicted, “The Web will increase its value as a learning resource to the extent that it can bring people together rather than isolate them” (p. 85). This statement about the vital role of people learning together in online environments is based upon educational theory which claims that collaborating with others often leads to greater learning outcomes than does independent study (Chapman, Ramondt, & Smiley, 2005; Jonassen, Peck, & Wilson, 1999; Merrill & Gilbert, 2008; Vygotsky, 1978).

Even though theory supports collective effort for improved learning, there are millions of adults today who use the Internet as a “learning resource” but who are isolated in doing so. As incongruous as that sounds in our connected world of globalized interaction, there is much web-based instruction (WBI) that does not and may never provide learners with tools to collaborate on the web. This is because the organizations that publish this e-learning do not provide collaborative tools on their websites. Their reasons for this may be financial, logistical, or otherwise, but their services do not include online tutors, discussion boards, or other virtual tools for learning with others. There is potentially, therefore, a significant gap between the learning outcomes adults achieve when they work alone in virtually isolated courses and the progress they could make if they were to work with others.

The most prominent example of virtually isolated courses may be those of the popular OpenCourseWare (OCW) movement (see www.ocwconsortium.org). OCWs
typically do not offer options for online collaboration. MIT is the only exception with their recent pilot initiative called OpenStudy (MIT OCW, 2010a). Of the 2000 courses in MIT OCW, the 10 most popular are in an experiment phase of online study groups (MIT OCW, 2010a). As of this writing, the initiative is still in trial mode and it remains to be seen whether this new effort for collaboration will succeed and be implemented widely. It also remains to be seen whether the other 200 university-based OCW movements (MIT OCW, 2010b) will implement similar collaborative measures.

Beyond OCW, there are other online courses where learners are virtually isolated. Examples include online tutorials for learning website development tools, continuing medical education (see for example Kühne-Eversmann, Eversmann, & Fischer, 2008), and family life education sites. Some of these sites are accessible at no cost while others are available for a fee. However, they all share the element of virtual isolation.

Team-based learning (TBL) is an instructional strategy (Fink, 2004) that has been used to teach students of different disciplines in face-to-face settings (Michaelsen, Bauman Knight, & Fink, 2004). TBL combines direct instruction and social constructivism in a specific sequence of instructional and learning events for each unit of a course. The instructional sequence begins with the readiness assurance process, wherein students read articles or chapters about the main concepts of a unit and then, during the first class period of that unit, they take independent and group evaluations of preliminary learning based on the readings. These evaluations are called readiness assurance tests (RATs). I will describe TBL, and the readiness assurance process,
including the RATs, later in this document. I was interested in finding out whether the readiness assurance process of TBL can be implemented to leverage the advantages of collaboration for virtually isolated adult learners within the limits of virtual isolation.

**Definition of Learning Levels**

For this research, lower-level learning refers to remembering and understanding, the first two levels of Bloom’s Revised Taxonomy (Anderson et al., 2001; Krathwohl, 2002). Deeper learning refers to applying and evaluating in the upper levels of Bloom’s revised taxonomy.

**Research Question**

The research question of this study is, “Does the integration of team-based learning’s readiness assurance process significantly improve learning outcomes for virtually isolated pairs of adults (married couples) working side-by-side with web-based instruction compared to those studying the same online material independently?”

**Null Hypotheses**

The null hypothesis of this study is that there will be no significant difference between the learning outcomes of those who use the readiness assurance process of TBL with a spouse in an online course and those who take the course alone or who just take the pretest and posttest.
Expected Outcomes

There were four hypotheses in this study

1. People who take the web-based instruction about listening in marriage will obtain a statistically significant higher mean score on lower-level test items than those who do not take the course but who take the pretest and posttest.

2. Spouses who take the web-based course about listening in marriage and follow the readiness assurance process of team-based learning will reach a statistically significant higher mean score on lower-level test items than people who take the web-based course alone.

3. People who take the web-based instruction about listening in marriage will obtain a statistically significant higher mean score on test items of deeper learning than those who do not take the course but who take the pretest and posttest.

4. Spouses who take the web-based course about listening in marriage together and follow the readiness assurance process of team-based learning will achieve a statistically significant higher mean score on test items of deeper learning compared with people who take the course without any collaboration.
CHAPTER II
REVIEW OF LITERATURE

There are different instructional strategies that prescribe how to bring people together for effective learning. I chose TBL because it carries significant claims to powerful learning but the research to verify those claims is still limited. Moreover, almost all of the research on TBL has been conducted in face-to-face classrooms. Its use in digital settings is largely unexplored, especially with respect to learning alone on the Internet.

The review has four main parts, which are: (a) sources, (b) meaning of collaboration, (c) introduction to TBL, and (d) review of TBL research.

Sources

The sources referenced in this review came from several searches, including scholarly educational databases such as Digital Dissertations, Ebscohost (psychology and behavioral sciences collection), ERIC, Google Scholar, PsychInfo, Social Science Citation Index, and Wilson Web. Other sources include Utah State University’s general library catalog, journal articles, books, conference reports and the reference lists of the articles and books that the original searches produced.

In all my searching, when an article or book appeared applicable based on the title, I read the abstract or chapter description. When the abstract or chapter description proved pertinent, I reviewed the entire text of the article or book chapter to include those references that were relevant.
Finally, the official TBL website (teambasedlearning.org) contains a bibliography of research on TBL. I consulted this list for information relevant to this dissertation in the same manner that I searched the other sources.

**Learning with Others: Terms in the Literature**

**Using the Term “Collaboration”**

There are several terms in the literature used to describe learning with others. Some are very similar in meaning while others differ significantly in terms of instruction and learning. "Collaboration" is a popular, generic word that is used to signify learning with others. Some people mistakenly use collaboration when they refer to a specific type of group learning. Others use the word thinking that it carries its own specific guidelines for group learning. Such is not the case. Collaboration is a general term that should be used as such. When referring to a specific collaborative approach to teaching and learning, it is better to identify the approach by name rather than to obscure it with the label “collaboration.”

It is important to specify one’s meaning but in the literature the word collaboration is often left ambiguous or is used when a more specific approach to teaching and learning is described. In this document, I use the word collaboration in the generic sense to suggest the idea of people working together. I name specific collaborative structures and strategies when referring to them.

Terms used to describe learning with others that are often seen in the instructional design literature and related areas are: Collaboration, collaborative learning,
constructivism, cooperative learning, problem-based learning, and social constructivism. For an informative review of terms and approaches to learning with others, see White (2006).

It would be ideal to include studies in this review that have addressed helping virtually isolated learners get more out of web-based instruction through face-to-face collaboration in small teams but I could not find any such research. This study represents the first attempt I am aware of to bring the advantages of collaboration to adult learners using web-based instruction who would otherwise be on their own and perhaps miss out on enhanced learning from working with others.

I recognize that some adults in virtually isolated settings may take ideas from the WBI and discuss them with others in an ad hoc manner. This type of spontaneous collaboration may deliver the benefits of collaboration that others have found in more structured settings. However, self-initiated collaboration is beyond the scope of this study so I did not look for any research dealing with that topic.

TBL is a relatively new strategy for learning in some fields (Clark, Nguyen, Bray, & Levine, 2008). There are not many references to this strategy in the instructional design literature. However, TBL has been used and tested in some areas, particularly in medicine and business (Haberyan, 2007). I describe what TBL is next.

**Team-Based Learning**

Team-Based Learning was introduced by Dr. Larry Michaelsen (Michaelsen et al., 2004). He began experimenting with it in the 1970s and has developed it over the
years (Michaelsen et al., 2004). The first TBL handbook was published in 2002 (Michaelsen et al., 2004).

TBL is an instructional strategy (Beatty, Kelley, Metzger, Bellebaum, & McAuley, 2009; Fink, 2004; Haberyan, 2007; Levine et al., 2004) used in face-to-face classroom settings with very specific guidelines and is adaptable to many subjects (Michaelsen & Sweet, 2008a; Michaelsen et al., 2004). TBL is unique in that it can be used for small group learning in very large classes with just one professor, even with 200 students or more (Haberyan, 2007; Levine et al., 2004; Michaelsen, 2004c; for an example, see Carmichael, 2009).

Some group approaches to learning call for assigned roles for team members (Fink, 2004; Kaplan, 2002). However, in TBL, assigned roles are avoided because they tend to foster individual work efforts rather than the group synergism that leads to greater levels of learning (Fink, 2004; Michaelsen, 2004b). Moreover, the types of problems in TBL intended to be of such complexity that no one in the class should be able to solve them on their own at first (Michaelsen & Sweet, 2008b).

TBL is based on the foundation of four principles and a specific pattern of preparation and implementation. TBL also relies heavily on group cohesion developed over time between team members (Fink, 2004; Michaelsen, 2004b). While other strategies similarly emphasize team cohesiveness, TBL prescribes precise and unique steps to achieve a strong team bond to facilitate rich learning outcomes including deep learning (Fink, 2004; Haberyan, 2007). Here is a closer look at TBL’s foundational principles and processes.
Fundamental Principles of TBL

**Principle 1. Groups must be properly formed and managed.** This principle is designed to avoid two common obstacles that can easily arise in the formation and function of learning teams (Michaelsen, 2004b). The first is interference that comes from preexisting relationships such as boyfriend/girlfriend, or from “cohesive subgroups based on background factors such as nationality, culture, or native language” (Michaelsen, 2004b, p. 29) that could form after learners are placed into teams and lead to exclusion of other group members (Michaelsen, 2004b).

The second obstacle is the potential imbalance of resources among teams. When teachers form groups properly, they ensure that student skills and experience are distributed evenly among teams (Michaelsen, 2004b; Michaelsen & Sweet, 2008b). The instructor uses his or her vantage point to learn about the range of skills and experience represented by the students in the class and then forms teams that include a balanced diversity of those skills and experience (Michaelsen, 2004b).

Michaelsen (2004a) suggested creating groups of five to seven members with as much diversity as possible. Doing so, he said, increases the likelihood of realizing a sufficient resource pool needed to solve the challenging problems assigned during the term of learning.

The last guideline in forming and managing teams properly is to make the teams permanent. That is, teams should remain intact for the duration of the course (Michaelsen, 2004b; Michaelsen & Sweet, 2008b). This gives teams the time they need to develop the trust necessary to speak openly with one another (Michaelsen, 2004b;
Michaelsen & Sweet, 2008b). Michaelsen (2004b) described the importance of this suggestion:

> In newly formed groups, members typically begin the testing process by engaging in small talk and by carefully avoiding disagreements, even though doing so (i.e., avoiding disagreements) inevitably limits their ability to work productively. If properly nurtured, most groups will, in time, develop more productive interaction patterns. (p. 30)

Groups typically need many hours—about 30—to reach successful levels of openness and honesty (Michaelsen, 2004b; Watson, Michaelsen, & Sharp, 1991). Changing a group after a few days or even a few weeks inhibits this process (Michaelsen, 2004b).

**Principle 2. Students must be made accountable.** For TBL to work properly in the classroom, participants must engage in effective peer assessment (Fink, 2004; Michaelsen, 2004b; Michaelsen & Sweet, 2008b; Sweet & Pelton-Sweet, 2008). Michaelsen (2004b) explained, “Peer assessment is essential because team members are typically the only ones who have enough information to accurately assess one another’s contributions” (p. 32). In TBL, student accountability through proper peer assessment motivates students to prepare for class, contribute to team discussions, and raises the quality of team performance (Michaelsen, 2004b; Michaelsen & Sweet, 2008b).

A significant portion of the course grade is based on group participation (Fink, 2004). Students are therefore motivated to prepare for the group quizzes by completing the readings and individual homework assignments in each unit (Michaelsen, 2004b; Michaelsen & Bauman Knight, 2004). Students are also motivated to share their opinions and help the group excel with their in-class discussions and problem solving.

Students receive feedback from their peers as they work together on quizzes and
projects (Michaelsen, 2004b). This feedback comes in the form of facial expressions, body language, and verbal responses. Team members also give each other written feedback (Fink, 2004; Michaelsen, 2004b).

**Principle 3. Team assignments must promote both learning and team development.** Michaelsen (2004b) asserted, “The most fundamental aspect of designing effective team assignments is ensuring that they truly require group interaction” (p. 33). Here Michaelsen warned of work that can be divided and done individually. Assignments should have to be done together. This allows team members to get the most out of the insights that others bring to the group. It also facilitates group cohesion as team members discuss problems, posit various solutions, give each other feedback, and so forth (Michaelsen, 2004b; Michaelsen & Sweet, 2008b). With a “divide and conquer” approach, group cohesion and the learning benefits associated therewith are seriously threatened (Michaelsen & Bauman Knight, 2004; Michaelsen & Sweet, 2008c).

**Principle 4. Students must receive frequent and immediate feedback.** The inclusion of instant feedback has been shown to improve group cohesion as well as understanding and retention of course concepts (Michaelsen, 2004b). The feedback should also be frequent and clearly articulate between effective and ineffective solutions (Michaelsen, 2004b). In TBL this feedback comes in the form of: (a) answers on the individual and team quizzes at the beginning of the unit; (b) in group discussions and problem solving as team members respond to each other’s solutions; and (c) from the instructor that gives them guidance and answers along the way.
**TBL Processes**

Well before the course begins, the instructor divides the course into several units, typically five to seven units (Michaelsen, 2004b). TBL’s instructional strategy calls for three main steps that are repeated for each unit. The steps are: (a) readiness assurance phase, also called the readiness assurance process (Fink, 2004; Michaelsen, 2004b; Michaelsen & Sweet, 2008b); (b) application phase; and (c) assessment phase.

**Readiness assurance phase.** In TBL, the instructor gathers demographic information about each student. The goal is to assign learners into teams that are as equal as possible in terms of the resources each person brings to the group (Michaelsen, 2004b; Michaelsen & Sweet, 2008b). For example, in any class with adults there are typically different levels of work experience, academic ability, years of school, and other training. Having the instructor form the groups helps avoid resource imbalance and the tendency to migrate to subgroups that could stand in the way of team cohesion (Michaelsen, 2004b).

On the first day of the course, the instructor explains TBL to the students, forms the students into groups, and resolves any concerns students raise. Before the end of the first class period, the instructor issues unit readings to the students. Between the first class and the second, students read the unit material on their own and come to the second class period prepared with a foundational understanding of the concepts and main ideas of the unit (Michaelsen, 2004b; Michaelsen & Sweet, 2008b).

During the second class period, the professor administers a closed-book quiz called a Readiness Assurance Test (RAT). The quiz covers major concepts from the
readings and usually contains 18-20 questions in multiple-choice format (Michaelsen, 2004b). Each student first takes the quiz individually and turns it in. This quiz is called an individual Readiness Assurance Test (iRAT). Then, during the same class period and while the computer scores the individual quizzes, group members come together and take the same closed-book quiz as a team. This quiz is called a group Readiness Assurance Test (gRAT).

For the gRAT, the professor gives each team the quiz questions again. He also gives them a card called the IF-AT form. The IF-AT form stands for “Immediate Feedback Assessment Technique” produced by Epstein Educational Enterprises (Michaelsen, 2004b). The IF-AT is essentially an accompanying scratch-off sheet with the answers to the quiz questions hidden by the scratch-off material. The IF/AT sheet contains sections for each question on the gRAT. Each of these sections has a spot corresponding to each option of every multiple choice or true/false question of the quiz. The correct answer for each question is indicated underneath the scratch-off material by a small marking, typically a smiley face, a star, or a dot underneath the scratch-off material in the spot that corresponds to the correct option of the gRAT item in question.

Team members discuss each question and talk about the answer choices. As the team members agree on a solution for a question, they scratch off the corresponding area of the IF-AT sheet to determine if their choice is correct. If the team does not get the correct answer on the first try, they discuss the option further and make another choice. They do this until they find the star, dot, or smiley face. Partial credit is given to the team when they get the answer right on a subsequent try, with the number of points possible
decreasing after each attempt per question. This process gives the group immediate feedback—an essential and distinguishing feature of TBL (Michaelsen, 2004b).

Completing the gRAT serves several purposes. First, when approached as intended, the gRAT promotes student discussion, critical thinking, and evaluation of others’ ideas (Fink, 2004; Michaelsen, 2004b). A significant portion of the course grade is usually designated to the group scores so there is plenty of motivation for adequate discussion to get the answers right on the first try (Michaelsen, 2004b).

Second, gRATs help the instructor to hone in on items which need greater explanation as evidenced by many groups missing the correct answer on the first or second try (Michaelsen, 2004b). This process of the gRAT also helps the instructor avoid spending time on questions that most or all of the groups answered correctly (Michaelsen, 2004b).

Once the groups finish the quiz, the instructor returns the individual quizzes and posts the group quiz results for the class to see. This way, everyone can compare their efforts with the other groups and gauge their progress in the class (Michaelsen, 2004b).

When team members miss a question but are determined that the choice they made was correct, the team may contest the answer they disagree with by submitting to the professor written evidence that draws on material from the readings to support their appeal (Michaelsen, 2004b; Michaelsen & Sweet, 2008b). The teacher then decides whether the appeal is valid. Challenges are done on a team-by-team basis rather than by the entire class.

The readiness assurance phase engenders much discussion and reflection at
several different times in the class period. Students thus refine their cognitive structures and strengthen their explanations (Fink, 2004). In this way the readiness assurance phase prepares the students for the more important part of the course—the application of unit concepts and ideas.

Application phase. Michaelsen (2004a) and others (see for example Sibley & Parmelee, 2008) have been clear that the emphasis in TBL is on the application of knowledge, not just on the acquisition of it. After the second class session with the individual and group quizzes, subsequent class periods during the unit are devoted to solving increasingly complex problems and applying them to authentic situations. There are several procedures for the application phase that help improve learning but explanation of them is beyond the scope of this study. Figure 1 illustrates the sequence of TBL for each unit of a course with the focus for this research highlighted in blue.

(Repeated for each major instructional unit, i.e., 5-7 per course)

Figure 1. TBL instructional activity sequence with focus on the readiness assurance process (adapted from Michaelsen, 2004b).
Assessment phase. Finally, at the end of the unit, the instructor issues an exam to be taken independently or in groups. This exam evaluates students on the main points covered in the unit and specifically tests for problem-solving ability (Fink, 2004).

Research on TBL

There is a high level of enthusiasm for TBL but relatively little research has been done to measure the effects of TBL on cognitive outcomes. Most of the research on TBL has been conducted in face-to-face learning environments (Palsolé & Awalt, 2008). In these studies, most scholars have focused on the effects that TBL has had on student attitude and engagement in learning (see for example Clark et al., 2008; Dunaway, 2005; Haidet, O’Malley, & Richards, 2002; Kelly et al., 2005; Seidel & Richards, 2001; Shankar & Roopa, 2009). Relatively few studies have been conducted on the pedagogical effectiveness of TBL in terms of understanding, remembering, applying, and evaluating (Anderson et al., 2001).

Since it was the purpose of this research to assess cognitive learning associated with TBL, I have focused on TBL studies that measured cognitive outcomes rather than those that dealt with learner attitude and motivation. Some of the studies that investigated the cognitive impact of TBL also contained measures of student motivation and engagement but I did not include those portions of the research in this review.

I have organized the reviewed TBL research into four categories. The first category comprises studies where the authors tested TBL without comparing it to any other instructional approach. I have called this category “Exploratory Experiences with
TBL Only."

The second category consists of studies where the researchers compared TBL to lecture-based instruction. I labeled this the “TBL vs. Lecture” category.

The third group of studies featured comparisons between TBL and other collaborative methods of learning. I named this category “TBL vs. Other Collaborative Strategies.”

The final category covers reports where researchers explored TBL as a digital tool, often in hybrid settings (face-to-face mixed with online). I called this category “Digital TBL.” While these studies did not focus on cognitive outcomes, I included them in the review because they represent attempts at using TBL with web-based instruction as I have done in this research.

**Exploratory Experiences with TBL Only**

Haberyan (2007) tested TBL with a course for her undergraduate Industrial/Organizational psychology class at Northwest Missouri State University. The course structure followed the TBL guidelines quite closely. She included the Readiness Assurance process, with iRATs, gRATS, and mini lectures to support student understanding of more difficult concepts. She also included the application phase with group problem solving, as well as the assessment phase with group assessment and an individual posttest. Her experiment was a simple one-group pretest-posttest design (Campbell & Stanley, 1963) that lasted for one semester.

Haberyan (2007) found that the students (n = 40) achieved statistically significant gains between the pretest and the posttest. She used a t test to analyze the results (pretest:
$M = 3.90, SD = 1.53$; posttest: $M = 5.63, SD = 1.70), t(39) = 5.16, p < .001$. Haberyan noted the limitations of not using a control group and emphasized the exploratory nature of the study. She suggested ways to incorporate experimental designs in future research with TBL.

Hunt and colleagues (Hunt, Haidet, Coverdale, & Richards, 2003) incorporated several aspects of TBL into a second year evidenced-based medicine (EBM) course of 168 students. They did so because there was a significant discrepancy between the lecture-based teaching of the course and the regular practices of EBM, which include working in teams on complicated patient conditions. In the lecture-based format, students consistently focused largely on retaining facts. Based on what the researchers had learned about TBL, they felt that introducing TBL would better prepare the students for team problem-solving situations in the workplace than lectures would.

The authors examined the effects of TBL for their EBM course using a one-group pretest-posttest design (Campbell & Stanley, 1963). They implemented many aspects of TBL (pre-class reading, iRATs and gRats; group problem solving to build application skills, etc.) but they decided to have the students complete the majority of group work out of class. All of the quizzes and the final were open-book exams.

The results of the study show high scores on the homework assignments (88.2%, $SD = 7.16$ for the first assignment and 92.6%, $SD = 6.36$ for the second one). Examination scores were also high 86.0% ($SD = 7.38$).

While students improved their scores after taking the course, it is important to consider the two ways in which the instructional design departed from standard TBL.
practice, which the researchers acknowledged. First, the students conducted most of the group work outside of class. No mention was made about the extent to which students followed TBL principles in their group work. Second, the exams were open-book. Michaelsen (2004a, 2004b) specifically advised against most out-of-class work and open-book exams in the practice of TBL. Access to class notes and texts may have boosted scores and skewed an accurate measure of retention and deeper learning. Because of these two factors, it is difficult to say whether TBL can be given full credit for the positive test scores found in this research.

**TBL vs. Lecture**

Three physicians in Germany sought to improve the mandatory continuing medical education (CME) experience for medical professionals in that country (Kühne-Eversmann et al., 2008). Two of these doctors were faculty with the medical education unit at the University of Munich and the other was a private practitioner.

Every 5 years, physicians in Germany must earn at least 250 CME credits from accredited courses to stay up-to-date in their skills (Kühne-Eversmann et al., 2008). The authors cited two studies (Davis, 1998; Davis et al., 1999) that claimed lecture-based CME courses to be ineffective.

In an attempt to help CME patrons learn more than they did from lectures, the authors piloted a new approach based on TBL in a series of CME seminars about endocrinology and diabetes. After the pilot, the researchers used the same design in three more courses on internal and general medicine. The results of their research report were based on the measures they applied in the three courses following the pilot study. The
results were also based on two questionnaires with items that measured, among other things, participants’ expectations and opinions of how well they learned. The researchers used a Likert-like scale (1-6) for the questionnaire items.

Each course took 5 hours for students to complete. Two hundred thirty physicians were enrolled in the three courses. One hundred sixty-five physicians took just one of the courses, 46 took two, and 24 enrolled in all three classes. Participation in the courses was voluntary.

At the beginning of each course, learners were given a multiple-choice pretest. After the pretest, an experienced professional in the field presented introductory information and guidance about the course. Next, the students were placed in groups of four to six to discuss solutions to problems. The group work was patterned after TBL. After agreeing on answers within the groups, the participants shared their ideas between groups, with the discussion being moderated by the expert. To close, the expert summarized the course and the students then took the posttest, which was identical to the pretest. At the end of the course, participants were given the two questionnaires.

Results showed that participants increased their scores from pretest to posttest by an average of 23.1% (from an average of 47.2% to 70.3%; $SD = 17.8, p < 0.001$). Moreover, the scores from the questionnaire indicated that of the physicians who completed the questionnaires ($n = 159$), many found the CME course to be very instructional ($mean = 5.16, SD = 0.84$) and that the teamwork helped them learn ($mean = 5.46, SD = 0.75$). The researchers considered these results to be significant given the studies they cited that showed that lecture-based CME had not led to improvement in
physician learning. The authors concluded that TBL was a key component in helping doctors learn and that CME courses with TBL are much more effective than lecture-based CME courses.

Carmichael (2009) tested the effects of using TBL in a large introductory biology course. A different, lecture-based section of the same course served as the control group. Pretest scores of the two groups were not statistically different. The TBL group was given weekly RATs. The people in the lecture group had individual access to the RATs but no indication was given in the report whether they used them. There were four midterms in the course that the investigators used as the primary means of evaluation.

The TBL group scored significantly higher on the first three tests while there was no significant difference between the two groups on the last midterm. The students in the TBL section achieved more A’s and B’s and fewer low grades in the class than did the other section ($\chi^2 = 10.91, 4 \text{ df}, p < 0.05$). The authors also reported that participants who used TBL did a more accurate job of interpreting results than did the lecture group, which suggests greater deep learning, although it is not clear how this was measured.

In another study, Touchet and Coon (2005) were motivated by a mandate from the Accreditation Council for Graduate Medical Education regarding psychiatry resident competency to look for a new instructional strategy for their psychotherapy program. With more stringent standards and rising costs, the researchers believed that the instructional approach used to that point (lectures and some case work) was inadequate. They suspected that the practice of extensive lecturing had led to complacency in the students. The researchers were specifically concerned that students had come to believe
that everything they needed to know was given in the lectures, that attendance at the lectures was sufficient to learn the course material, and that learning outside the scheduled meeting times was unimportant.

The authors decided to use TBL to restructure the psychodynamics course and run a pilot test with two groups of students in an intense 5-week period. While the restructuring was extensive, the authors measured the success of the course by observation and feedback from students and faculty. The instructors who supervised the casework detected several positive changes in student engagement and critical thinking skills compared to students of previous years. They also noticed that these students did a better job of integrating course concepts into the casework than when previous student cohorts were taught primarily by lecture. While the researchers were pleased with the results, they suggested the need to conduct experimental studies to better measure the effectiveness of TBL.

Lucas, Baker, and Roach (2001) conducted a study comparing lecture learning to TBL, the results of which were mixed. Using two sections of a lower-level undergraduate class on the legal environment of business, the primary author taught one section using a traditional lecture method and the other section using TBL.

The courses were both held over the same 15-week period. Each class was intact, meaning that random assignment was not applied to the study. The reported sample sizes varied for each test and were between 29 and 35 in the lecture section and 28 and 36 in the TBL section of the course.

Both classes were given a pretest on the first day of class and an identical posttest
at the end of the course. During the semester there was a midterm and a final. The authors developed all of the tests to measure verbal information and intellectual skills based on the work of Gagné, Briggs, and Wager (1992), where verbal information represented lower-level learning and intellectual skills represented deeper learning.

Results indicated no significant difference between groups on most of the tests. However, the TBL group did show significantly greater improvement between the pretest and the posttest on verbal information than did the lecture section. Also, the TBL group scored significantly higher with respect to intellectual skills on the first midterm than did the lecture section.

The authors gave a detailed description of TBL at the beginning of the report but few details were given about their implementation of the TBL strategy. In particular, very little information was given about the extent of peer feedback used, which is a critical component of TBL.

Finally, the authors noted that the TBL students had limited practice of the skills in the course and that the skills assessed on the posttest did not fully correspond with those practiced in the application exercises. It was unclear whether the posttest items fully corresponded with the content covered in the lecture section.

In another study, McInerney and Fink (2003) were concerned with low student achievement in their lecture-based undergraduate microbial physiology course. Although the classes (55-70 students) usually consisted of seniors and a few graduate students, problem-solving ability and levels of comprehension as measured by the final examination were typically low.
In 2000, the researchers decided to implement portions of TBL, specifically, the assignment of students into groups, individual quizzes (iRATs) and group quizzes (gRATs). They hoped that restructuring the course in this way would help students develop better critical thinking skills, increase understanding, improve retention of course concepts, and elevate enthusiasm for learning.

At the end of the course in 2000, McInerney and Fink (2003) compared the final exam scores of that year with final exams scores of previous years. Using ANOVA and a Tukey test for post hoc analysis, they found that test scores measuring problem solving ability, comprehension, and retention were not significantly different from those of the students from the year before.

In 2001, the researchers kept the new course structure but added two challenging problems to the group work, one for each half of the semester. With the inclusion of these problems, the course more closely resembled the complete TBL strategy. Group members engaged in discussions where they measured their understanding of course material, debated best solutions, and reconsidered ideas. Groups consisted of five to six students.

In 2002, the instructors repeated what they had done in 2001. The authors measured student problem solving ability by judging students’ critical analysis, interpretation, deduction, inference, and creativity.

With the class of 2000 serving as the control group, results showed that the classes of 2001 and 2002 outperformed their cohorts from the year before. In terms of the judgment criteria mentioned above, the authors found student solutions in 2001 and
2002 to be much more sophisticated than the solutions given by students in the class of 2000. However, no numbers from 2000 were given in the report to compare with the scores of the subsequent 2 years. Moreover, specifics of the scales they employed for judging were not provided in their research report.

For understanding and retention, the researchers designed the final examinations in 2001 and 2002 to be as similar as possible to the final exam given in previous year. Using analysis of variance and a Tukey test, they found that more students achieved scores between 70% and 90% in 2001 and 2002 than students did in 2000. This result was significant at the .05 confidence level.

**TBL vs. Other Collaborative Strategies**

Koles, Nelson, Stolfi, Parmelee, and DeStephen (2005) compared case-based group discussion (CBGD) with TBL in a second-year pathology class. The course was divided into two equal spans of five months. The researchers designed two versions of the course: A TBL version and a CBGD version. They randomly assigned 83 medical students to two groups, the green group and the gold group. Students were then put into teams of five or six people. Therefore, the green group was made up of several green teams and the gold group was made up of several gold teams.

The first part of the course (months 1-5) covered immune, neoplastic, cardiovascular, and parathyroid disease modules (INCP). The second part (months 6-10) included genetic, muscle, breast, and liver disease modules (GMBL). Thus, each half of the course included four learning modules for a total of eight modules overall.

For the first half of the course, the gold teams completed the four INCP modules
in TBL format. At the same time, the green teams completed the four INCP modules in CBGD format. At the end of 5 months, all participants took the second part of the course covering the GMBL disease modules. This time the groups swapped instructional strategies.

Using a 2-way ANOVA to compare group achievement, the researchers discovered no statistically significant differences on final exam mean scores. However, again using a 2-way ANOVA with the iRATs as the pretest and the final exam as the posttest, the researchers found a significant difference in the lowest quartile of retention scores between groups for the INCP portion of the course. Those in the bottom quartile of scores within the gold group (TBL) retained course content at a significantly higher rate (iRAT: $M = 76.8\%, SD = 7.6$; Course Final: $M = 75.3\%, SD = 6.9$) than those in the bottom quartile of scores in the green group using CBGD (iRAT: $M = 81.9\%, SD = 6$; Course Final: $M = 72.6\%, SD = 4.2$), $P = 0.035$.

Overall, the researchers concluded that CBGD and TBL are both effective overall at promoting active learning. However, TBL may help lower achieving students to a greater degree than CBGD does.

**Digital TBL**

Freeman (2004) described the move to a hybrid (combination of face-to-face instruction and online) class at the University of Technology Sydney in Australia. Professors had already been using groups to help students learn but moved significant portions of the course online to meet the changing demands of the university. The school chose TBL based on the recommendation of one of its own professors who had attended
a TBL conference and returned with positive reviews. In the design of the course at Freeman’s University, four RATs were given in class over the course of the semester. They used application activities in the face-to-face setting as well as online. The online application activities were team debate, role-play, and team topic tracking, where the emphasis was to bring theoretical concepts to life with real-world examples. The students used synchronous and asynchronous tools to conduct their team-based activities. Freeman detailed the online application exercises, the explanation of which are beyond the scope of this study. Freeman reported that overall, students and faculty enjoy the team-based learning format and felt that it was very effective at facilitating better learning, including deep learning, compared to previous instructional models.

Pasolé and Awalt (2008) developed a fully online, asynchronous version of a course using TBL as the instructional strategy. Their report documented several items: Course setup, creation of teams, issues of accountability, promotion of team development and learning, feedback, and implementation of TBL’s fundamental four S’s (see chapter 2 of this document for details on the 4 S’s). The authors also briefly commented on student performance (noting it was good overall), class retention rates, and student satisfaction.

Robinson and Walker (2008) developed three electronic tools to facilitate TBL in face-to-face classrooms. The first was a digital version of the Readiness Assurance Tests and application tests that students use in the classroom. They named the product team-based testing (TBT). The purpose of the tool is to alleviate the burdens of paper-based tests and scoring.

The second tool was a set of guidelines to facilitate team discussion of the most
important ideas from the readings. The intent of this tool is for students to use Microsoft PowerPoint in the creation of their own list of critical takeaways from the readings and post the file to the group portion of a class website. Group members review each other’s PowerPoint files before discussing the ideas in class. Group members decide among themselves which ideas they will include in their team PowerPoint to share with the class. Robinson and Walker emphasized that this exercise saves class time by having the students consider the most important ideas before meeting face-to-face.

The third tool was created to simplify peer feedback within each a team of students. Group members use digital forms rather than paper. This tool makes it easy for the instructor to sort comments, print them out, and review them. The digital forms also facilitate the exchange of comments among peers.

The work of Robinson and Walker represents potential for the advancement of TBL on the Internet. Each of these tools could conceivably be used and/or repurposed for full-fledged online TBL classes.

**Summary**

I have reviewed research that has investigated exploratory experiences with TBL, compared TBL with lecture-based instruction and other collaborative formats, and introduced portions of TBL in digital formats. These studies, along with studies about user attitude and engagement (which I have not reviewed), represent the research that has been done on TBL.

Testing TBL in online environments is still very new. The efforts that have been made include no experimental studies. However, they provide suggestions for the
designs of such experiments.

No studies have been done to measure the effectiveness of TBL for virtually isolated adults. In the next chapter, the description of the methodology used in this study to explore the effectiveness of TBL in virtually isolated settings is given.
CHAPTER III

METHODS

To evaluate the effects that the readiness assurance process of TBL has on virtually isolated adults using web-based instruction, I created an online course about listening in marriage for married couples. I chose this content and population because of personal interest and experience with the content, and what I perceived to be a good fit for this study. The group cohesion that is fundamental to TBL is ideally already in place with married couples. In this section, the research design, instruments, participants, and data analysis used in the study are described.

Design

A randomized pretest-posttest experimental design (Campbell & Stanley, 1963) was used with two pretests and two corresponding posttests. The first pretest contained questions representing the two lower levels of Bloom’s revised taxonomy. Hereafter the first pretest and posttest are identified as “pretest-L” and “posttest-L,” respectively, for lower learning. The second pretest contained questions representing application and evaluation, levels 3 and 5 of Bloom’s revised taxonomy. Hereafter the second pretest and second posttest are identified as “pretest-D” and “posttest-D,” respectively, for deeper learning. Each posttest was identical to its corresponding pretest.

The online material about listening in marriage was delivered over two consecutive days in three separate courses for the three groups in the study—one treatment group, a control group, and a baseline group (see Table 1). The treatment
Table 1

*Participant Groups and Treatments for the Study*

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretests</th>
<th>Instruction (TBL)</th>
<th>Instruction (Alone)</th>
<th>Posttests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Couples</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Independents</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Baseline</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

group, called the TBL group, consisted of couples taking the pretests alone on day 1 and the rest of the online course together on day 2, including the posttests. The control group, called the independent group, consisted of married people who took an identical course but did so alone. The third group, labeled the baseline group, consisted of married people who took just the pretests and posttests and who did so alone.

I customized the instructions in each course to fit the requirements of working with one’s spouse, working alone, and just taking the pretests and posttests. In doing so I kept the instructions as similar as possible, using the same wording where applicable. There was a closing survey on the second day. For the treatment group and the control group the survey had 17 questions. For the baseline group the survey contained five questions. In every other aspect, the content of the three courses was identical. The 12 extra questions for the TBL group and the independent group related to the readings, which the baseline group did not do.

The design in this experiment design differed in some ways from the typical TBL Readiness Assurance Process. In the standard version of the RAP, individuals read articles about the fundamental unit concepts and then, during the first (or second) class period of a unit, take both the individual Readiness Assurance Test (iRAT) and group
Readiness Assurance Test (gRAT) successively. In this study, the participants took the iRATs as the pretests and then did the readings on day 1. Participants completed the gRATs (for the couples group) or the iRATs again as the posttests on day 2. I could have followed the chronological order of TBL more closely by administering pretests and readings on day 1 and then the iRATs and the gRATs on day 2. However, this would have meant administering the test three times in a very short period. I was concerned that effects of testing (Campbell & Stanley, 1963) would interfere with results. I also wanted to follow TBL structure by giving just one iRAT and one gRAT.

**Variables**

The following were the variables of this study.

1. Independent Variables: Type of instruction (TBL, independent learning, no instruction).
2. Dependent Variables: Learning outcomes based on levels 1 and 2 of Bloom’s revised taxonomy (remembering and understanding), and; learning outcomes based on levels 3 and 5 of Bloom’s revised taxonomy (applying and evaluating).

**Instruments**

**Courses**

The three courses used to test the hypotheses were created in Moodle 1.9.9. The subject matter of the course came from two sources. The first source was a Utah State University extension class called “Marriage & Family Relationships” (see ocw.usu.edu).
This course was created by James Marshall, PhD, as part of the Utah Governor’s Commission on Marriage. I chose this material because of my familiarity with it. In 2005 and 2006, I worked with Dr. Marshall and Dr. Lee of the Family, Consumer, and Human Development Department at Utah State University on a grant to produce short video vignettes for Dr. Marshall’s course.

The course has seven modules, each of which contains several subtopics.

1. Your Partner
2. Finances
3. Sexual Relations
4. Personal Interests and Expectations
5. Things to Watch Out For
6. The Busy-ness of Work and Marriage
7. Communication, Conflict, and Commitment

Module 7 is divided into three subtopics. These subtopics are communication, conflict, and commitment. The subtopic of communication is further divided into subsections called skillful sending and skillful receiving of messages. I combined the contents from the subsections of communication as one of the two readings for participants to complete.

The second source was an eight-page article entitled, “Listening—With Your Heart As Well As Your Ears” by Herbert C. Lingren (1997) of the University of Nebraska. This article was in the list of suggested readings at utahmarriage.org. I selected this article because its content fit well with the course segment by Dr Marshall.
All of the other parts of the course (instructional strategies, graphic design, etc.) were products that I developed for this research. I designed the courses to only include the readiness assurance process of TBL.

Course Structure

I called the course “Listening in Marriage” and structured it as a two-day learning activity with the pretests and readings on day one and the posttests on day two. Day 1 activities were available from 5:00 AM until 11:55 PM on the first day. Day 2 activities were available for the same time period on the second day. I did not make the activities available for the full 24 hours per day to prevent “night owl” participants from starting the study just before midnight on day 1 and completing the study without a break just after midnight on day 2. There would likely have been some participants who would not have stayed up late to begin day 1 and complete the day 2 activities in immediate succession. Such a discrepancy in time between participant completion of activities would have potentially introduced a confound in the study results, skewing scores because of differences among participants in testing procedures.

Everyone began the study at the login page (see Figure 2). They entered the system with their unique username and password that I provided. They then clicked on the name of the course in which they were enrolled and which was the only one they saw in the menu. After selecting the course, the system showed the participants a welcome note and the two-day schedule (see Figures 3 and 4).

Meeting TBL guidelines. The course design used in this study varied in some ways from the standard TBL format. All of the adaptations from the basic TBL structure
Figure 2. Listening in Marriage log-in screen.

Figure 3. Listening in Marriage welcome screen.
Figure 4. Listening in Marriage day 1 activities for TBL participants.

were needful because of limits of finances, nature of the learning group, and available time within which to work. These variations are described below.

**Nature of learning group.** For this study, each team had only two people due to the nature of the group (i.e., married couples). Michaelsen (2004b) suggested groups of five to seven to increase the likelihood of diversity in experience and resources. However, even with just two people, some diversity is guaranteed given that each group had one male and one female and they are two different people with different backgrounds and experiences. Beyond that, the level of diversity varied from couple to couple.

While the group size in this study did not match the recommendation of Michaelsen and his colleagues, keeping the group size to the married couple maintained performance group authenticity (where the group in the learning arena matches the group
of the performance arena). Doing so follows one of the other points that Fink (2004) emphasized, which is the application of course concepts and ideas into every-day problem solving. Moreover, Michaelsen (2004b) clarified that TBL is adaptable to almost any learning environment. Some tradeoffs are unavoidable but still leave TBL intact.

**Permanence of groups for building trust.** Michaelsen (2004b) emphasized the need for groups to be together for the whole course to achieve the trust and cohesion that are conducive to learning. Ideally, people who are married, especially those who have been married for more than a few months, represent teams where trust and cohesion are already in place.

Using married couples allowed me to proceed in the data collection much more efficiently than would have been possible with groups of people less acquainted with one another. Teams of strangers would have needed significant time (i.e, 30 hours, based on Michaelsen, 2004b) to develop the required trust that is key to TBL effectiveness.

**Peer assessment.** In TBL, peer assessment is intended to motivate each team member to participate in learning, both by sharing ideas and by listening to the ideas of others (Michaelsen & Bauman Knight, 2004). Peer assessment as it is used in TBL typically consists of anonymously evaluating fellow group members at mid-term and at the end of the course and counts toward a student’s final grade (Michaelsen, 2004a).

I did not implement a tool for spouses to assess each other’s contribution to team learning. Peer assessment in this experiment would not have counted toward a final grade. While there may not have been the same motivation in this team learning as when
groups work for a grade in a college course, I anticipated that the couples would be sufficiently motivated to complete the course because of the value they placed on their marriage.

**Quiz Questions**

TBL includes guidelines for creating RAT questions. Below I explain the guidelines and what I did to follow them.

Questions in TBL are usually in the form of multiple choice or true-false (Michaelsen, 2004b). I opted to use multiple-choice for all of the questions in this study. Creating multiple-choice questions for TBL is difficult, even for those well trained in test construction (Collins, 2006). The TBL community relies on specific principles (Collins, 2006; Michaelsen, 2004a, 2004b; Woodford & Bancroft, 2005) to guide the construction of multiple-choice questions for TBL. I followed these principles in the creation of the quiz questions for the instruction in this experiment. I explain them next.

**Bloom’s taxonomy.** Team-based learning leans heavily on the work of Benjamin Bloom, specifically his prominent taxonomy of cognitive processes (Bloom, 1956), to evaluate student learning. Bloom organized the six levels of his taxonomy in the following hierarchy, starting at the bottom: knowledge, comprehension, application, analysis, synthesis, and evaluation. In the revised taxonomy (Anderson et al., 2001; Krathwohl, 2002), Bloom’s levels are renamed as follows, with the top two sections reordered: remembering, understanding, applying, analyzing, evaluating, and creating. I chose to follow the revised taxonomy in this research.
While Bloom introduced six levels in his taxonomy, they are sometimes categorized as lower levels of learning and higher levels of learning (see for example Collins, 2006; Gokhale, 1995). Gokhale discussed a division with the lower two levels of the taxonomy and the upper four. Collins mentioned three divisions, with the first level of the taxonomy (remembering) as representative of lower-level learning. The five upper levels are considered to represent higher learning with a division pairing understanding and application together and the last three levels together.

While much is mentioned in the TBL literature about deeper learning, none of the TBL writings specify divisions of Bloom’s taxonomy into categories of lower-level learning and deeper learning. Yet, the descriptions of TBL in the handbook (Michaelsen et al., 2004a) and other foundational TBL sources (see for example Michaelsen & Sweet, 2008a) are more aligned with the distinctions of lower-level learning and deeper learning as described by Gokhale (1995) than those mentioned in by Collins (2006). Therefore, I followed used the division where remembering and understanding constitute lower-level learning and the other levels representing deeper learning.

The readiness assurance process in this study included questions from the lower levels (remembering and understanding) and upper levels (applying and evaluation) of Bloom’s revised taxonomy (Anderson et al., 2001). There were four questions from level 1, eight questions from level 2, five questions from level 3, and three questions from level 5 (see Appendices B and C for the questions and respective Bloom categories identified).

Woodford and Bancroft (2005) and Collins (2006) gave guidelines for writing effective multiple-choice questions for up to level four of Bloom’s taxonomy. However,
I also wanted to test the participants’ ability to evaluate (level 5) married couples listening skills as depicted in written and video scenarios. I therefore constructed and included some level-5 questions (evaluation).

**Effective questions and sequencing.** To create effective Readiness Assurance Tests that help prepare students for the rest of the unit, Michaelsen (2004a, 2004b) suggested using a careful sequence of questions starting from the lower levels to the higher levels of Bloom’s taxonomy. He maintained that doing so gives the students a more thorough understanding of the course concepts in preparation to apply them in the application phase of TBL.

Using such a sequence also helps with the readiness assurance process itself. It helps students to leverage what they learned from the first part of the RAT in subsequent RAT questions. Thus the RATs can become part of the instruction while also serving as initial evaluation (Michaelsen, 2004a). Including level 3 (applying) questions and higher in the RATs facilitates familiarity with the course concepts but also stimulates discussion that helps students develop deeper learning (Michaelsen, 2004b).

**Test for the main concepts.** The purpose of the RAT is to help the students become familiar with the main concepts of a unit in a course. The idea is not to teach students everything or to have them master skills yet—that comes in the application phase. Michaelsen (2004b) wrote, “The RAT questions should focus on foundational concepts (and avoid picky details), but be difficult enough to create discussion within the teams” (p. 42).

**Effective distracters.** Aside from the correct answer, educators should compose
very good distracters that are plausible but not the best among the options (Collins, 2006; Woodford & Bancroft, 2005).

**Question building and refinement.** To build effective quiz questions, I turned to several authoritative sources for guidance. I consulted the TBL handbook (Michaelsen et al., 2004), TBL articles (Michaelsen & Sweet, 2008b; Woodford & Bancroft, 2005), and the guidelines given by Collins (2006). I also asked Larry Michaelsen for feedback on questions I had developed. Furthermore, I attended the annual TBL conference in New Orleans in early 2010. There I learned, both from listening to presentations about developing questions, and from being a participant in TBL min-courses, about the nature of Readiness Assurance Test questions that are needed to establish effective TBL modules.

After constructing the RATs using the strategies listed above, I asked people to anonymously rate the questions by taking an online quiz composed of Readiness Assurance Test questions I wished to use in the study. These volunteers did not read any material that the quizzes covered.

Thirty-nine people participated in the quiz. The results showed that some questions were too easy, indicated by the fact that many people answered them correctly without having studied the topic of listening in marriage. I changed those questions to make the correct answers less obvious, replacing some of the answer choices with more plausible options. For example, I had formulated one of the pilot questions about listening as follows, “When we reflect what the other person said, we should do which of the following?”
Of 39 respondents, 37 chose the correct answer. In an attempt to make the question more challenging, I changed the answer choices to those below, which I used in the actual study.

- a) report or reproduce what was said
- b) retell or recall what was said
- c) restate or recap what was said
- d) repeat or replicate what was said

As can be seen from comparing the two sets of options, the correct answer is “restate or recap what was said.”

The percentage of those in the pilot who answered this question correctly was 94.9%. The number of participants who answered this question correctly on the pretest of the actual study was 69.9%. While the quiz item could use more refining, the difference in respondent answers between the question in the pilot and the one included in the study suggests that the question used in the study was a more robust (Collins, 2006) RAT item.

Finally, I asked two of my doctoral committee members to review the questions. One of the committee members specializes in adult education. The other specializes in statistics and evaluation. They approved the RAT items, the latter
specifically endorsing the face validity of the questions.

**Participants**

The target population for this research was couples married from 0 to 7 years with both spouses between the ages of 18 and 30 and in their first marriage. I used several methods to find participants, all of which represent forms of convenience sampling.

First, I recruited through word of mouth by asking family members and friends to pass the study information on to couples they knew who qualified. I also distributed flyers (see Figure 5) and posters in grocery stores, doctors’ offices, and around the campus of Utah State University. I worked through university housing who agreed to include my flyer in their monthly newsletter to the married students’ apartment complex. I also dropped off flyers door-to-door in four local condominium developments that typically have many young married couples. See Appendix A for the poster and participant compensation details.

In addition to flyers and word of mouth, I sent requests to several listservs at Utah State University and Brigham Young University. In these requests, I explained the study and invited those interested to contact me directly. I also created a Facebook page that interested couples could view for more details about the study.

The listservs were by far the most successful means of finding participants. Word-of-mouth through family and friends was the next best method. Paper flyers yielded quite a bit less interest than the other two approaches.

I used a spreadsheet to keep track of everyone who contacted me about the
When a couple showed interest, I replied to them quickly and I recorded their names and email address in the spreadsheet. Then I randomly assigned the couple to one of the three groups: The TBL group, the independent group, or the baseline group (see Figure 6). To do this, I used the random number generator at stattrek.com.

I set up the generator to give one random number from 1 to 3. If the randomizer selected the number 1, I assigned the couple TBL group. If the randomizer yielded the number 2, I assigned the couple to the independent group. If the randomizer produced
Figure 6. Random assignment of participants into groups.

For couples assigned to group 2 and group 3 only one spouse in a couple participated. To select a spouse from each couple for these two groups, I used the randomizer again by following the same procedure as before but set the randomizer to choose either the number 1 or the number 2. The number 1 meant that the husband was selected to participate and the number 2 signified that the wife had been selected. In a few instances, one spouse let me know up front that only she or he would be able to participate. In these cases I still ran the randomizer for assignment to group. If the computer assigned the couple to the TBL group, I let the spouse know that they could not do the study since only one of them was available to participate. However, if the
computer assigned “their couple” to group 2 or group 3, I did not run the randomizer for selection of spouse but allowed the available spouse who to participate. This was the case with five participants, two from the independent group and three from the baseline group.

I set up the recruiting of participants in a “revolving door” fashion where I allowed couples or individuals to begin the study as they contacted me. At first I tried to find all of the participants needed for the entire study before beginning. However, it soon became evident that this would take too long and that I would risk losing those who had expressed interest to begin immediately while I sought the rest of the participants. The study started in September 2010, and concluded in early November, 2010.

In my effort to find participants, a pattern of recruiting soon emerged: Some people emailed and immediately indicated that they would like to do the study. Others who were interested emailed back for more information and, after I supplied it, committed to participate. A third group emailed for more information but did not respond after I gave them the information they asked for. When I did not hear back from a couple who had requested information, I followed up once and in some cases twice to inquire whether the couple was still desirous to join the study. Many couples answered, saying that they were no longer interested or able to participate. However, several couples indicated that they were still interested, signed up, and completed the research.

In all, 187 couples/people showed initial interest in the study. One hundred forty-eight people started the study; 33 couples (66 people) in the TBL group, 42 people in the independent group, and 40 people in the baseline group. One hundred seventeen people
completed the study; 25 couples (50 people) in the TBL group, 35 people in the independent group, and 32 people in the baseline group. See Appendix E for a copy of the letter of information that was sent to participants.

A significant issue that needed attention in the design of this study was the verification of independent work when it was required (on day 1 for the TBL group and on both days for the other two groups). In other words, I had to implement something in the design to decrease the possibility that participants would talk about the quizzes and discuss ideas with their spouses or anyone else when they were not supposed to. I implemented three measures to help keep people “honest.”

The first measure I took to encourage independence was to randomly select only one spouse from each couple in the independent and baseline groups to participate in the study instead of allowing both spouses to participate even if in different groups. While it was still possible for the one participating spouse in the independent and baseline groups to break their silence about the course, I felt that including just one spouse would reduce that temptation.

Second, in the instructions for each activity, I reminded participants to work independently where the course required it. This amounted to participants seeing several reminders each day to avoid talking about the study until it was over (or until day 2 for the TBL group).

Finally, I included end-of-day surveys for all three groups on both days to use as “snapshots” of participants’ independent work. In these surveys, I directly asked participants whether they followed the injunction to work alone.
Analysis

Statistical calculations (power analysis) show that to find statistical significance using ANOVA, it would be necessary to have at least 64 participants/couples in each group. However, analysis of covariance allows for the use of groups half the size of what would otherwise be necessary to find statistical significance (Taylor & Innocenti, 1993) as well as increase statistical power (Kinnear & Gray, 2008; Taylor & Innocenti, 1993). Due to time and financial constraints and given the statistical advantages it offers, I used analysis of covariance (ANCOVA) to analyze the data with the pretests as the covariates.

Participants in the TBL group took the pretests and readings independently and they took the posttests together. While participants’ scores for every couple in this group were the same, I counted the scores on the posttests by individual and not by couple, as per TBL standard procedures.
CHAPTER IV

RESULTS

In this study, I built a course on the principles of the Readiness Assurance Process of Team-Based Learning and used it to test adult learning in virtually isolated settings. All statistical analyses were calculated using SPSS 19. I have reported the results of the experiment starting with the participant demographics.

The second part of the chapter is organized in two sections, one for each posttest. Each section contains the descriptive statistics and the ANCOVA results of the respective posttest, including pair-wise comparisons and reports of effect size where applicable.

Upon preparing the discussion of the results for Chapter V, I realized that the first two questions on the posttest-D were actually lower-level questions of understanding (Bloom’s level 2) rather than items of deeper learning as I had first categorized them to be. I decided to remove the two questions from the posttest-D and add them to the first posttest. While retaining the original analyses, I reran the statistical procedures for both tests and have added those results to the appropriate sections of the chapter.

Finally, the last section shows the results of the concluding survey. The participants gave many comments on this survey that help explain the results of this research.

Demographics

Of the 117 people who participated there were 44 males and 73 females. It was difficult to find enough participants so I allowed people to join the study who had been
married beyond the target range of years and target age. I also accepted people who had
been married more than once.

There were 50 people (25 couples) in the TBL group, 35 people in the independent group (10 male and 25 female), and 32 people in the baseline group (9 male and 23 female). The youngest person was 20 years old and the oldest person was 55 years old ($M = 27.03$ years; $SD = 6.27$ years). The newest-wed couple in the study had been married for 0.17 years (2 months) while the couple married longest had been together for 8.5 years ($M = 2.8$ years; $SD = 2.38$ years). Table 2 displays these demographics by group.

The TBL group consisted of participants working as married couples. The independent group (Ind) had people who were married but who worked alone. Only one spouse per couple was included in the study (see Chapter III, section on participants, for details.) The baseline group (Bas) consisted of married people working alone who did not receive the readings about listening in marriage.

Table 2

**Participant Demographics by Group: Age and Years Married**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>TBL</td>
<td>49</td>
<td>26.92</td>
<td>6.63</td>
<td>20</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Ind</td>
<td>35</td>
<td>26.91</td>
<td>6.29</td>
<td>20</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Bas</td>
<td>32</td>
<td>26.88</td>
<td>5.43</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>Years married</td>
<td>TBL</td>
<td>50</td>
<td>2.79</td>
<td>2.43</td>
<td>.17</td>
<td>8.50</td>
</tr>
<tr>
<td></td>
<td>Ind</td>
<td>35</td>
<td>2.67</td>
<td>2.31</td>
<td>.17</td>
<td>7.83</td>
</tr>
<tr>
<td></td>
<td>Bas</td>
<td>32</td>
<td>2.97</td>
<td>2.41</td>
<td>.17</td>
<td>7.42</td>
</tr>
</tbody>
</table>

1 One participant did not give a response.
One hundred eight people were in their first marriage while 9 were in a second marriage or beyond. Five people noted that they had used online materials to learn about listening skills and nearly half of the participants (53) reported having had some formal instruction in listening skills. Fifteen people (just over 1 out 10) reported having gone for professional marriage counseling at some time in their life.

The categories of first marriage, previous online listening instruction, previous face-to-face listening instruction, and marriage counseling were measured as dichotomous variables where participants answered either “yes” or “no” for each item (1 = yes and 0 = no). Table 3 displays these results by group.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>n</th>
<th>Percent</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st marriage</td>
<td>TBL</td>
<td>50</td>
<td>94</td>
<td>.24</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Ind</td>
<td>35</td>
<td>89</td>
<td>.32</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Bas</td>
<td>32</td>
<td>94</td>
<td>.25</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Previous instruction (online) about</td>
<td>TBL</td>
<td>50</td>
<td>4</td>
<td>.20</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>listening</td>
<td>Ind</td>
<td>35</td>
<td>6</td>
<td>.24</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Bas</td>
<td>32</td>
<td>3</td>
<td>.18</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Previous instruction (face-to-face)</td>
<td>TBL</td>
<td>49</td>
<td>9</td>
<td>.51</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>about listening</td>
<td>Ind</td>
<td>35</td>
<td>54</td>
<td>.51</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Bas</td>
<td>32</td>
<td>28</td>
<td>.46</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Marriage counseling</td>
<td>TBL</td>
<td>50</td>
<td>20</td>
<td>.45</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Ind</td>
<td>35</td>
<td>14</td>
<td>.36</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Bas</td>
<td>32</td>
<td>6</td>
<td>.25</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
Attrition Analysis

As mentioned in Chapter III, there were 148 people who began the study and 117 who completed it. I counted participants as having begun the study if they had at least logged into the course and completed the opening survey. Eight couples from the TBL group dropped out of the study. Seven people (three males and four females) dropped out from the independent group. Eight people (three males and five females) dropped out of the baseline group.

Disqualified Scores

While 117 people participated in the study, there were 10 individuals who took the posttests incorrectly. Instead of trying for partial points, these participants only chose one answer and then moved to the next question (as was required for the pretest). These people, therefore, scored either four out of four or zero out of four on each question of the posttests. This means that their scores were much lower than they would likely have been and could not be accurately compared with those who completed the test as instructed. I dropped these scores from the statistical analyses.

I noticed this error part way through the data collection period. To help others avoid making the same mistake, I added text to the fourth step in the instructions. The fourth step originally read, “Try to get as many correct answers as you can on the first try. If you do not get the correct answer on the first try, keep looking for the correct answer. You will get full points (4/4) when you select the correct answer on the first try.” The text I added immediately after this read, “Please note: This means that you should not get 0 (zero) points on any question. If you do not keep going until you find the right
answer for each question I cannot use your data and cannot compensate you.” I expect that adding this text helped some participants complete the tests properly when they might have otherwise treated the posttests like the pretests. I do not think that making this change to the data collection instruments compromised the search results in any way.

Of the 10 participants who made this error on the first posttest, four were from the TBL group, four were from the independent group, and two were from the baseline group. Some people corrected their mistake for the posttest-D and some did not. Two people from the TBL group made this error on posttest 2. The same four participants in the independent group made this error on the posttest-D. One participant from the baseline group repeated the error on posttest two. Additionally, there were two participants in the TBL group who did not complete the second pretest but who did complete posttest-D. I also dropped these two posttest scores from the study since they had no covariate. With these adjustments, the sample sizes became 46 for the TBL group, 31 for the independent group, and 30 for the baseline group.

**Posttest-L Results**

Posttest-L was used to test hypotheses 1 and 2. Hypothesis 1 states, “People who take the web-based instruction about listening in marriage will obtain a statistically significant higher mean score on lower-level test items than those who do not take the course but who take the pretest and posttest.”

Hypothesis 2 was also a prediction of lower-level learning. It states, “Spouses who take the web-based course about listening in marriage and follow the readiness
assurance process of Team-Based Learning will reach a statistically significant higher mean score on lower-level test items than people who take the web-based course alone."

For lower-level learning, then, I made two predictions. First, that the course would help people learn, whether they did so in groups or alone. The second prediction was that those who studied together would learn more than those who studied alone.

Table 4 shows the descriptive statistics for the scores of the first pretest and the corresponding posttest.

I ran a one-way ANOVA to check for statistical equality of groups based on pretest score variance. The results showed no statistical difference in the variance of the scores between groups $F(2, 104) = .744, p = .49$. This result signifies that the random assignment into groups was successful. In other words, the results of this ANOVA strengthen the assumption that any differences found between group scores on posttest-L were unlikely due to errors in assigning participants to groups.

**Viability of Covariates**

For analysis of covariance, factors thought to be responsible for a significant portion of the difference (if any) between group pretest scores, other than the treatment

Table 4

*Means and Standard Deviations for Test L (out of 40)*

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>TBL</td>
<td>15.65</td>
<td>5.83</td>
</tr>
<tr>
<td>Ind</td>
<td>16.67</td>
<td>5.07</td>
</tr>
<tr>
<td>Bas</td>
<td>17.20</td>
<td>5.77</td>
</tr>
</tbody>
</table>
variable, are identified as covariates. These covariates are then integrated into the analysis of variance equation to remove their influence in the experiment and isolate the effect of the treatment (Brace, Kemp, & Snelgar, 2009; Taylor & Innocenti, 1993). Doing this increases statistical power by improving the likelihood of finding a statistically significant difference when it exists, thus reducing the chance of making a type-II error (Taylor & Innocenti, 1993). In this way, ANCOVA is more likely to give an accurate account of the phenomena being studied than is ANOVA (Taylor & Innocenti, 1993).

While there may be several potential covariates for any dependent variable, pretests are often used in ANCOVA as covariates (Taylor & Innocenti, 1993). In this study, pretests were used to partial out the effects of previous knowledge about listening in marriage, which is potentially wide-ranging among participants. I also tested age and number of years married as possible factors that could have influenced posttest scores.

The matrix in Table 5 shows the Pearson correlation coefficients between these variables. As the matrix reveals, the highest correlation with the posttest is the pretest but

Table 5

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age</th>
<th>Years married</th>
<th>Pretest 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years married</td>
<td>.48*</td>
<td>.06</td>
<td></td>
</tr>
<tr>
<td>Pretest 1</td>
<td>.22*</td>
<td></td>
<td>.21*</td>
</tr>
<tr>
<td>Posttest-L</td>
<td>.07</td>
<td>.12</td>
<td></td>
</tr>
</tbody>
</table>

* $r < .05$, ** $r < .01$
the correlation coefficient is only .21. While this value is well below the desired .5, it was the only correlation that was statistically significant. I therefore used the pretest as planned for the covariate in the analysis of covariance for hypothesis 1.

Tests of the Assumptions of One-way ANCOVA

After confirming the pretest as the covariate of choice, I verified homogeneity of variance and homogeneity of regression, two traditional assumptions of ANCOVA (Brace et al., 2009).

Homogeneity of Variance

To verify that the assumption of homogeneity of variance was satisfied, I tested the pretest scores of all three groups using Levene’s statistic. A significant difference in this score would indicate a violation of this assumption, meaning that the groups were statistically different to begin with. No statistical significance would indicate that the variance of three groups was equal for testing purposes (Brace et al., 2009). The results of this test were not statistically significant: $F(2, 104) = .507, p = .60$. This result helped confirm statistical equality of group pretest scores.

Homogeneity of Regression

This assumption refers to the nature of the relationship between the dependent variable and the covariate across groups (Brace et al., 2009). ANCOVA requires this relationship to be similar for each group used in the experiment (Brace et al., 2009). Graphically, this is indicated by parallel or close-to-parallel regression slopes (Brace et
al., 2009; Taylor & Innocenti, 1993). Slopes that are not parallel or close to parallel indicate that the relationship between the covariate and the dependent variable is not consistent among the groups in the experiment (Brace et al., 2009; Taylor & Innocenti, 1993). When such is the case, groups cannot be accurately compared with ANCOVA (Brace et al., 2009; Taylor & Innocenti, 1993).

As table 6 shows, the $F$ ratio of this test was not significant, meaning that the slopes were at least close to parallel and the groups were similar with respect to the relationship between the covariate and the dependent variable (Brace et al., 2009). Figure 7 gives a graphical representation of the actual regression slopes from pretest to posttest by group.

**ANCOVA**

With the assumptions of homogeneity of variance and homogeneity of regression satisfied, I proceeded to run the analysis of covariance between all three groups. The results show that there was a statistically significant main effect, meaning that TBL and independent groups had statistically significant higher scores than the baseline group in

| Table 6 |

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>$df$</th>
<th>Mean square</th>
<th>$F$</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>78.530</td>
<td>2</td>
<td>39.265</td>
<td>3.459</td>
<td>.037</td>
</tr>
<tr>
<td>Pretest1</td>
<td>.869</td>
<td>1</td>
<td>.869</td>
<td>.077</td>
<td>.783</td>
</tr>
<tr>
<td>Group * Pretest1</td>
<td>3.884</td>
<td>2</td>
<td>1.942</td>
<td>.171</td>
<td>.843</td>
</tr>
<tr>
<td>Error</td>
<td>828.591</td>
<td>73</td>
<td>11.351</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>82707.000</td>
<td>83</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
lower-level learning items. Table 7 displays the details of the ANCOVA for posttest-L. The linear plot in Figure 8 shows the relationship between posttest scores by group.

Pairwise comparisons (Table 8) confirmed statistical significance between the TBL group and the baseline group, the independent group and the baseline group, and the TBL group and the independent group. That is to say, those who took the instruction scored higher than those who did not, as predicted. Also, couples who studied together scored significantly higher than people who studied alone. Thus, for both hypothesis 1 and hypothesis 2, I rejected the null hypothesis.
Table 7

Analysis of Covariance for Lower Learning Levels

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>df</th>
<th>Mean square</th>
<th>$F$</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest1</td>
<td>159.214</td>
<td>1</td>
<td>159.214</td>
<td>12.912</td>
<td>.001</td>
</tr>
<tr>
<td>Group</td>
<td>796.728</td>
<td>2</td>
<td>398.364</td>
<td>32.308</td>
<td>.000</td>
</tr>
<tr>
<td>Error</td>
<td>1270.021</td>
<td>103</td>
<td>12.330</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>110576.000</td>
<td>107</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8

Pairwise Comparisons Between Groups on Posttest-L

<table>
<thead>
<tr>
<th>(I) Group</th>
<th>(J) Group</th>
<th>Mean diff. (I-J)</th>
<th>Std. error</th>
<th>Sig.</th>
<th>95% confidence interval for difference</th>
<th>Lower bound</th>
<th>Upper bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBL</td>
<td>Ind</td>
<td>2.340*</td>
<td>.818</td>
<td>.005</td>
<td>.717</td>
<td>3.963</td>
<td></td>
</tr>
<tr>
<td>TBL</td>
<td>Bas</td>
<td>6.659*</td>
<td>.830</td>
<td>.000</td>
<td>5.014</td>
<td>8.304</td>
<td></td>
</tr>
<tr>
<td>Ind</td>
<td>TBL</td>
<td>-2.340*</td>
<td>.818</td>
<td>.005</td>
<td>-3.963</td>
<td>-7.17</td>
<td></td>
</tr>
<tr>
<td>Ind</td>
<td>Bas</td>
<td>4.319*</td>
<td>.900</td>
<td>.000</td>
<td>2.534</td>
<td>6.104</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05

Figure 8. Estimated marginal means for posttest-L.
**Effect Size**

To give a better understanding of the magnitude of the differences that were shown to be statistically significant, I calculated the effect size in terms of Cohen’s $d$, a common standard of effect size measurement (Brace et al., 2009; Howell, 2002; McMillan, Lawson, Lewis, & Snyder, 2002). For ANCOVA, Cohen’s $d$ can be derived from the sample sizes, the correlation coefficient, and the F ratio from ANCOVA comparing two groups (Glass, McGaw, & Smith, 1981; Taylor, 2011). The result is a “standardized mean difference effect size” which is the equivalent of Cohen’s $d$ (Glass et al., 1981; Ray & Shadish, 1996; Taylor, 2011). For the difference between group 1 and group 2, the effect size was $0.59 (p = .013)$, a moderate effect (Brace et al., 2009; Howell, 2002).

**Adjustments**

While analyzing the research results, I realized that the first two questions of posttest-D were misplaced. These questions measured understanding (Bloom’s level 2) and should have been in the first posttest. I added them to the scores of the first posttest and made the corresponding adjustment in pretest scores. I reran the statistical analysis for results of posttest-L. The means and standard deviations of the adjusted pretest and posttest scores are shown in Table 9.

I used ANOVA to check for equality of variance in the adjusted scores of pretest 1. The results $F(2, 99) = .193, p = .82$ were not statistically significant, meaning the adjusted scores of the first pretest were statistically equal. I also calculated a new correlation matrix. This time, there were no significant covariates (see Table 10).
Table 9

*Means and Standard Deviations for Adjusted Test L (out of 48)*

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>TBL</td>
<td>19.90</td>
<td>6.64</td>
</tr>
<tr>
<td>Ind</td>
<td>20.77</td>
<td>5.20</td>
</tr>
<tr>
<td>Bas</td>
<td>20.55</td>
<td>6.65</td>
</tr>
</tbody>
</table>

Table 10

*Correlation Matrix for Adjusted Test L*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age</th>
<th>Years married</th>
<th>Pretest 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years married</td>
<td>.48**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest 1</td>
<td>.24*</td>
<td>.09</td>
<td></td>
</tr>
<tr>
<td>Posttest-L</td>
<td>.00</td>
<td>.09</td>
<td>.09</td>
</tr>
</tbody>
</table>

* r < .05, ** r < .01

Continuing with the standard procedure, I tested for homogeneity of variance using Levene’s statistic, the results of which were not statistically significant $F(2, 99) = 1.351, p = .264$. However, the test for homogeneity of regression came back positive. This means that the regression lines of the groups between covariate and posttest ($F = 3.41, p = .037$) were significantly different. A major assumption of ANCOVA was therefore violated. When this is the case, ANCOVA should not be used for statistical analysis. ANOVA is an acceptable alternative for analysis and I used it, especially since no potential covariate showed a significant correlation with the pretest. I ran a one-way ANOVA, the results of which were statistically significant (see Table 11). Levene’s
Table 11

ANOVA for Adjusted Posttest-L

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sum of squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1237.978</td>
<td>2</td>
<td>618.989</td>
<td>31.242</td>
<td>.001*</td>
</tr>
<tr>
<td>Within groups</td>
<td>1961.482</td>
<td>99</td>
<td>19.813</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3199.461</td>
<td>101</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .001

statistic confirmed equality of error variance between posttest scores $F(2, 99) = 1.949, p = .148$.

As in the original analysis, pairwise comparisons indicated significant differences in lower-level learning between all three groups. The effect size of the difference in learning lower-level items between the TBL group and the independent group was .39, a small to medium effect (Brace et al., 2009; Howell, 2002). In this case, I used the regular formula for Cohen’s $d$ to calculate effect size instead of using the $f$ ratio from ANCOVA and converting it to Cohen’s $d$. The scatterplot looked the same for this test as it did with the original test.

Thus, with the addition of the two questions, ANCOVA was no longer an applicable tool for analysis. However, ANOVA showed that I should still reject the null hypothesis with respect to learning the lower-level items.

Posttest-D Results

Posttest-D was used to check for differences in test items scores of deeper learning between groups. To compare the variance of scores between groups on posttest-
D, I followed the same procedures that I used for posttest-L. Table 12 shows the means and standard deviations by group for the second pretest and posttest.

**ANOVA**

The one-way ANOVA showed no significant differences between pretest 2 scores of the three groups, $F(2, 105) = .292, p = .75$. The scores of the pretest 2 were, therefore, statistically the same.

**Correlation Matrix**

The correlation matrix for hypothesis 2 revealed a similar result to the matrix of hypothesis 1. The pretest correlation with the posttest was the only statistically significant coefficient in the matrix. This time, the correlation was stronger than the one found in the matrix for the first hypothesis. Again, I used the pretest as the covariate for the second ANCOVA. Table 13 shows the correlation matrix for the second hypothesis.

**Tests of the Assumptions of One-Way ANCOVA**

**Homogeneity of variance.** Levene’s statistic on posttest-D $F(2, 105) = 1.488,$

Table 12

*Means and Standard Deviations for Test D (out of 40)*

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th></th>
<th></th>
<th>Posttest</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>n</td>
<td>M</td>
<td>SD</td>
<td>n</td>
</tr>
<tr>
<td>TBL</td>
<td>10.78</td>
<td>5.32</td>
<td>46</td>
<td>26.473</td>
<td>2.972</td>
<td>46</td>
</tr>
<tr>
<td>Ind</td>
<td>10.51</td>
<td>4.86</td>
<td>31</td>
<td>25.839</td>
<td>4.009</td>
<td>31</td>
</tr>
<tr>
<td>Bas</td>
<td>9.13</td>
<td>5.30</td>
<td>31</td>
<td>25.936</td>
<td>2.886</td>
<td>31</td>
</tr>
</tbody>
</table>
Table 13

*Correlation Matrix for Deeper Learning*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age</th>
<th>Years married</th>
<th>Pretest 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years married</td>
<td>.48*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest 2</td>
<td>.12</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>Posttest-D</td>
<td>.05</td>
<td>.16</td>
<td>.30*</td>
</tr>
</tbody>
</table>

* $r < .01$

$p = .23$ was not significant. This result confirms that the groups were equal. The assumption of homogeneity of variance was satisfied.

**Homogeneity of regression.** As with the first ANCOVA, the test for homogeneity of regression was not significant, showing that the relationship between the dependent variable and the covariate was alike among groups. Details of the test results for this assumption are in Table 14. Figure 9 displays the results graphically in a scatterplot.

**ANCOVA**

Table 15 shows the results of the ANCOVA for posttest-D. While the assumptions for ANCOVA were satisfied, the results of the ANCOVA indicated no significant difference between scores on posttest-D $F = .451, p = .64$. This is not surprising given how close the group mean scores were to each other.

Pairwise comparisons displayed in Table 16 show that there were no significant differences between any two groups on test 2. Since no statistical significance was
Table 14

Homogeneity of Regression for Deeper Learning

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>27.546</td>
<td>2</td>
<td>13.773</td>
<td>1.398</td>
<td>.252</td>
</tr>
<tr>
<td>Pretest 2</td>
<td>120.698</td>
<td>1</td>
<td>120.698</td>
<td>12.249</td>
<td>.001</td>
</tr>
<tr>
<td>Error</td>
<td>1005.067</td>
<td>102</td>
<td>9.854</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>74929.000</td>
<td>108</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 9. Regression lines for posttest-D.
Table 15

Analysis of Covariance for Deeper Learning Levels

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest2</td>
<td>104.975</td>
<td>1</td>
<td>104.975</td>
<td>10.656</td>
<td>.001</td>
</tr>
<tr>
<td>Group</td>
<td>8.881</td>
<td>2</td>
<td>4.441</td>
<td>.451</td>
<td>.638</td>
</tr>
<tr>
<td>Error</td>
<td>1024.568</td>
<td>104</td>
<td>9.852</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>74929.000</td>
<td>108</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 16

Pairwise Comparisons for Deeper Learning

<table>
<thead>
<tr>
<th>(I) Group</th>
<th>(J) Group</th>
<th>Mean difference (I-J)</th>
<th>Std. error</th>
<th>Sig.</th>
<th>95% confidence interval for difference</th>
<th>Lower bound</th>
<th>Upper bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBL</td>
<td>Ind</td>
<td>.679</td>
<td>.729</td>
<td>.354</td>
<td>-.768 - 2.125</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bas</td>
<td>.400</td>
<td>.731</td>
<td>.585</td>
<td>-1.049 - 1.849</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ind</td>
<td>TBL</td>
<td>-.679</td>
<td>.729</td>
<td>.354</td>
<td>-2.125 - .768</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bas</td>
<td>-.279</td>
<td>.799</td>
<td>.728</td>
<td>-1.863 - 1.306</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

detected, I did not calculate an effect size. Given these results, I did not reject the null hypothesis for my predictions about deeper learning in the online course.

Adjustments

With the removal of the first two questions from posttest-D, I reran the analysis as I did for posttest-L. The means and standard deviations of the adjusted scores for posttest-D are shown in Table 17.
Table 17

*Correlation Matrix for Deeper Learning*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age</th>
<th>Years married</th>
<th>Pretest 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years married</td>
<td>.48*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest 2</td>
<td>.05</td>
<td>-.01</td>
<td></td>
</tr>
<tr>
<td>Posttest-D</td>
<td>-.04</td>
<td>.13</td>
<td>.17</td>
</tr>
</tbody>
</table>

* $r < .01$

With the new numbers, I calculated the ANOVA of the new pretest scores to check for equality of variance between groups. The results $F(2, 100) = .154$, $p = .86$ were not statistically significant, meaning that the adjusted pretest scores for the second hypothesis were statistically equal.

I calculated a new correlation matrix. This time, there were no significant correlations with posttest-D.

In the test for homogeneity of variance, Levene’s statistic was not significant $F(2, 100) = 1.212$, $p = .3$. This assumption of ANCOVA was therefore satisfied.

As with the original analysis, the test for homogeneity of regression came as statistically insignificant $F(2) = 1.599$, $p = .21$. Since the assumptions of homogeneity of variance and regression were satisfied, I ran ANCOVA with the pretest 2 as the covariate, even though its correlation with posttest-D was not statistically significant.

**ANCOVA.** The results of the ANCOVA for the adjusted posttest-D were not statistically significant (see Table 18).

**Closing survey.** Several questions on the closing survey elicited information from the participants about their behavior during the study and about their opinions after
Table 18

Analysis of Covariance Posttest-D Adjusted Scores

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest2</td>
<td>23.461</td>
<td>1</td>
<td>23.461</td>
<td>2.715</td>
<td>.103</td>
</tr>
<tr>
<td>Group</td>
<td>11.264</td>
<td>2</td>
<td>5.632</td>
<td>.652</td>
<td>.523</td>
</tr>
<tr>
<td>Error</td>
<td>855.579</td>
<td>99</td>
<td>8.642</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>39069.000</td>
<td>103</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

completing the courses. In the summary of participant responses from the closing survey, I did not include the comments from the four participants in the independent group who answered the posttests incorrectly and whose scores were dropped from the study. In the TBL group, there were also four participants who answered the first posttest incorrectly and whose scores were dropped from the study. However, two of these participants (one couple) answered posttest-D correctly and their comments from the concluding survey are included in the tables below.

One of the questions for the TBL group about participant behavior was, “Overall, to what degree do you feel that you and your spouse discussed the options to each question before selecting an answer together?” The answer choices were:

a) We did not discuss the options at all but just chose an answer.
b) We discussed the options a little bit but not that much.
c) We discussed them more than a little but only somewhat thoroughly.
d) We discussed them quite a bit. We took the time we needed with most or all of the questions to decide together on the answer we thought was best.
The equivalent question for the independent group was, “Overall, to what degree do you feel that you considered the options to each question before selecting an answer?”

The answer choices were:

a) I did not consider the options at all but just chose an answer.

b) I considered the options a little bit but not that much.

c) I considered them more than a little but only somewhat thoroughly.

d) I considered them quite a bit. I took the time I needed with most or all of the questions to decide on the answer I thought was best.

This question did not apply to the baseline group participants. Table 19 shows the responses to this question by group.

Another question on the closing survey was about the “daily snapshots,” indicating the extent of independent work when it was required. This question asked, “Considering both days of this study, to what degree do you feel you followed our request not to discuss the instruction with anyone during the specified times when we asked you to work independently?” The answer choices were:

1. I really didn’t follow the request not to discuss the instruction at specific times with others--I talked quite a bit with my spouse and/or someone else about it.

Table 19

<table>
<thead>
<tr>
<th>Group</th>
<th>Did not discuss or consider</th>
<th>Discussed or considered little</th>
<th>Discussed or considered somewhat</th>
<th>Discussed or considered quite a bit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBL</td>
<td>0</td>
<td>13</td>
<td>17</td>
<td>18</td>
<td>48</td>
</tr>
<tr>
<td>Ind</td>
<td>0</td>
<td>2</td>
<td>13</td>
<td>16</td>
<td>31</td>
</tr>
</tbody>
</table>
2. I didn’t do too well but did follow the request a little bit.

3. I followed the request most of the time but slipped here and there.

4. I never spoke with anyone about the instruction during the times specified to work independently.

The end-of-day snapshots showed that 106 out of 117 participants refrained from discussing the learning materials with others when they were not supposed to. For the TBL group, this was on day 1. For the other two groups, this was on both days.

There was only one couple from the TBL group who did not maintain complete silence when it was required. However, even then, they followed the guideline most of the time and only slipped up a little bit. Their posttest scores were the lowest (posttest-L) and next to lowest (posttest-D) of the entire TBL group.

In the independent group, six participants reported having violated their agreement to work independently. Five of these said that they followed the request most of the time to keep silent. One participant admitted that she did not really follow the request at all. Two participants from the baseline group reported that they followed the request most of the time to refrain from talking about the site. However, they deviated to a small degree.

Two survey questions asked the participants of the TBL and independent groups to tell about their treatment of the articles. The first one asked, “How many times did you read the articles?” The next question about the readings was, “Which of the following best describes how you read the articles?” Tables 20 and 21 show the summary of these participant behaviors with regard to the readings.
Table 20

**Participant Reports of Readings**

<table>
<thead>
<tr>
<th>Group</th>
<th>I did not read them</th>
<th>I read one but not the other</th>
<th>I read both articles once</th>
<th>I read both articles twice</th>
<th>I read both articles three times</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBL</td>
<td>2</td>
<td>3</td>
<td>40</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>IND</td>
<td>0</td>
<td>2</td>
<td>24</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 21

**Participant Reading Detail**

<table>
<thead>
<tr>
<th>Group</th>
<th>I read the titles and bold headings only</th>
<th>I skimmed but did not really read</th>
<th>I read at a normal pace</th>
<th>I read more thoroughly than a normal pace</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBL</td>
<td>0</td>
<td>6</td>
<td>35</td>
<td>6</td>
</tr>
<tr>
<td>IND</td>
<td>0</td>
<td>3</td>
<td>23</td>
<td>5</td>
</tr>
</tbody>
</table>

The final two questions on the closing survey for the TBL and independent groups were opened-ended. The first of these said, “Please share what stood out most to you from participating in this study.” The second invited, “Please enter any other comments or suggestions for improvement you wish to make about your experience in this study and/or the website itself.” Participants made both positive and negative comments in response to these two survey items.

In reviewing the final two survey items, comments emerged about the following themes: general opinions, instructional strategy (besides the RATs), participant learning, RAT items, readings, videos, and the website. I tallied all of the comments into these themes. Some participants entered responses that contained comments about more than
one theme and I counted them as such. Table 22 shows these themes and the frequency of comments made in each of them by group.

While participants offered a lot of positive feedback, all of the comments from the largest category, the RATs, were negative. Many participants from both groups found some of the quiz questions to be problematic. Following are some sample comments from this category.

Table 22

*Participant Closing Comments by Theme*

<table>
<thead>
<tr>
<th>Comment type</th>
<th>What stood out most</th>
<th>Final comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TBL</td>
<td>IND</td>
</tr>
<tr>
<td>General statement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Negative</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Instructional strategy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Perception of learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>19</td>
<td>23</td>
</tr>
<tr>
<td>Negative</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>RATs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Negative</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>Readings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Negative</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Videos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Negative</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Website</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
One male participant in the TBL group wrote, “Many of the correct answers did not seem intuitive to me.” A female participant in the same group mentioned, “Neither I nor my spouse liked the wording or ambiguity of some of the questions. It is hard to evaluate what we really learned from this material with many of the questions.”

One female from the independent group explained her feelings about some of the quiz questions:

A lot of the questions seemed to be qualitative rather than quantitative. Many times, I felt like I chose the best answer and it turned out to be wrong. It really confused me because the concepts about types of listening seem too “boxed in” for my taste. I felt like there are more grey areas and some types of listening are mere variations on other types of listening and it is difficult to tell them apart.

Another participant from the independent group, a male, gave his thoughts, “Some of the questions appeared to be subjective. At least one or two questions seemed to be completely incorrect based on what I learned – are the answers put in correctly on the website?”

Finally, there were four comments from these two survey items that were neutral. Participant comments from all of the closing survey questions, both positive and negative, can be seen in Appendix D.
CHAPTER V
DISCUSSION

The purpose of this study was to examine whether the readiness assurance process of team-based learning can help virtually isolated adults learn more in pairs than alone in a short online course. Using Bloom’s revised taxonomy (Anderson et al., 2001), I examined two levels of learning: lower-level learning (remembering and understanding) and deeper learning (applying and evaluating).

Lower-Level Learning

The first and second hypotheses tested participants’ learning in the two lower levels of Bloom’s revised taxonomy. The analysis of participant posttest scores for test 1 using ANCOVA with the pretest as the covariate showed a statistically significant difference between groups. The TBL group and the independent group both scored significantly higher than the baseline group on the posttest. This result signifies that the instructional module based on TBL’s RAP helped people remember and understand concepts about listening in marriage.

Moreover, the TBL group scored significantly higher than the independent group on the first posttest. The effect size of this difference was .39, a small to moderate effect (Brace et al., 2009; Howell, 2002). In terms of percentages, the difference in scores between the TBL group and the independent group was 6% (86% and 80%, respectively). In a formal academic setting such as a university course, this is equivalent to one half-letter grade, or the difference between a B and a B-.
In terms of the course subject—listening in marriage—the difference in scores on remembering and understanding from learning with one’s spouse compared to learning alone might be more significant as well. However, other studies are needed to operationalize variables that would measure the impact of the treatment on the day-to-day status of marriage. For example, variables could be designed to assess differences in a couple’s level of happiness, satisfaction, sense of fairness, and other indicators of marital success that potentially come from remembering and understanding more of the instruction.

**Deeper Learning**

The third and fourth hypotheses of this study investigated participants’ deeper learning (levels 3 and 5 of Bloom’s revised taxonomy). Using the same statistical analyses employed for the first and second hypotheses, I did not find statistical significance between the group scores of posttest-D. What is more, scores from the TBL group and the independent group did not differ significantly from the scores of the baseline group—those participants who only took the pretest and the posttest but did not receive the readings about listening in marriage. The instruction did not help people learn at a higher level at all, as measured by the scores of posttest-D. This was a particularly surprising result. Participant responses from the TBL group and the independent group on the closing survey and their posttest scores illuminate possible reasons for these outcomes.
No Difference from Baseline Scores

**Extent of discussion and contemplation.** On the closing survey, I asked participants to rate the degree to which they discussed (TBL group) or considered (independent group) the quiz questions. Results from the survey showed that 30 out of 46 participants in the TBL group admitted discussing the posttest question only somewhat or not very much at all. In the independent group, 15 out of 31 participants reported that they considered the posttest questions only somewhat or not very much.

With this level of discussion and consideration of questions, participants were able to score fairly well on the first posttest, which had less demanding items of recall and understanding. However, more complex quiz questions, such as those that test for application and evaluation, may require more discussion and consideration. Without taking the time to thoroughly discuss or consider the concepts from the readings in relation to the answer options, it is possible that many participants of the TBL group and the independent group made hasty choices on posttest-D that led to no significant difference between the two groups or between them and the baseline group.

**Explanation of TBL.** Many Participants expressed confusion and frustration over the Readiness Assurance Test questions. While they did not specify which questions they struggled with, scores point to posttest-D as being problematic. Participants complained that the questions were subjective and ambiguous.

TBL needs to be clearly explained to learners (Michaelsen & Sweet, 2008b). This is true in face-to-face courses and probably more so in settings where learners are virtually isolated. In reviewing the course instructions, it is evident that I did not explain
Team-Based Learning to participants of the TBL and independent groups.

**TBL quiz format.** An important aspect of TBL that learners need to clearly understand is the format of multiple-choice quiz questions. TBL emphasizes selecting not just the right option on the RATs but the *best* option among choices that are all good possibilities (Sweet, n.d.). Learners need to see a demonstration of this principle before beginning a TBL course (Michaelsen & Sweet, 2008b; Sweet, n.d.).

**Depth of discussion (and consideration).** Another critical aspect that learners need to understand is the necessity of adequate discussion to find the correct answer, especially when answering questions of deeper learning. It can be easy to gloss over quiz items when this point is not understood. Learners also need to see this principle demonstrated (Michaelsen & Sweet, 2008b; Sweet, n.d.).

The courses in this study did not include explanations of either of these features (quiz questions and extent of discussion/consideration). Also, I did not pilot the quiz instructions. Doing so might have helped reduce bias and clarify problems with wording and participants’ expectations.

It is not surprising, then, that so many participants in the TBL and independent groups found a lot of the RAT items answers to be subjective and confusing. Nor is it surprising that their posttest-D scores were no different than those of the baseline group. With better instructions, participants in the TBL and independent groups might have succeeded at using the concepts from the readings to achieve deeper learning and show significantly higher scores than the baseline group.
No Difference Between TBL and Independents

There were differences between the TBL group and the independent group in participant behavior that may have contributed to no difference in test scores. First, six people in the independent group talked about the study with someone while the study was still running. This may have boosted the posttest scores of those six participants.

Second, there were more people in the TBL group who only read one of the articles or skimmed the articles than there were in the independent group. Moreover, there were two people in the TBL group who did not even read the articles but no one in the independent group missed the readings.

Finally, there was a difference in the percentage of participants who considered the RAT items thoroughly versus those who did not. In the independent group, half of the people reported taking enough time to thoroughly consider the RAT items before selecting an answer. However, only about one third of participants in the TBL group reported discussing the RAT items to this degree.

Limitations

Test Item Validity

Participant comments about the RATs point to closer examination of the process used to come up with the test items. There is always more that can be done to ensure the validity of the quiz instructions and questions, especially for the items of deeper learning. I authored all of the quiz components, which means they necessarily carry my biases. Subjecting the quiz directions and questions to greater subject matter expert scrutiny to
establish formal inter rater reliability would likely have improved the quality of the RAT items and reduced participant confusion. Subject matter experts in this case would include TBL experts as well as family life education experts.

While I did pilot the majority of the quiz questions, I did not pilot all of them. The questions I did not pilot were those related to the video scenarios. I did not pilot these questions because of limitations with the online survey system I used. There were three such questions, all of them representing level 5 of Bloom’s revised taxonomy. Of all the quiz items to pilot, the level 5 questions, uncommon in multiple-choice format, probably needed usability testing the most. More extensive usability testing of RAT items within the target population would likely have helped avoid participant confusion as well.

**Assumed Trust Between Spouses**

I assumed couples in the TBL group had the level of trust prescribed by TBL for effective group work. However, I did not take any measures to verify that assumption. While my guess might have been accurate, some spouses could have been suffering from a lack of trust in their relationship. Including a survey item that would have operationalized and measured the level of trust in each couple would have given me a better appraisal from which to draw conclusions about the test results. This is especially true of posttest-D with the items of deeper learning that require greater discussion and trust. TBL rests on the view that greater trust is required for deeper learning (Fink, 2004), and deeper learning demands the sincere sharing of opinions, ideas, and feelings.
**Generalizability**

Generalization of the findings from this study is limited by the sampling techniques I used and by the content of the course.

**Sampling techniques.** To find participants for this study, I used convenience sampling techniques. Convenience sampling is as its name suggests—convenient—because it allows a researcher to include people in the study who are readily available rather than randomly selected (Fraenkel & Wallen, 2000). However, such samples leave out members of a population who are not readily available (Fraenkel & Wallen, 2000; Pyrczak, 2001) due to time constraints, inhibition to respond to someone they do not know, being elsewhere when the opportunity came to sign up for the study, or a host of other reasons. Recruiting participants with convenience sampling necessarily introduces biases into the results of a study (Fraenkel & Wallen, 2000; Pyrczak, 2001) and limits the generalizations that can be made about the research results (Fraenkel & Wallen, 2000; Howell, 2002). Given the convenience sampling used to find participants, this study should be replicated with similar samples to establish the validity of the results before attempts at generalization should be made (Fraenkel & Wallen, 2000).

**Course content.** TBL has been used in a wide variety of courses (see for example Dinan, 2004; Goodson, 2004; Herreid, 2004; Lucas, 2004; Nakaji, 2004; Streuling, 2004). Yet, a course on listening in marriage is quite different than one about college algebra or chemical engineering, particularly when it comes to deeper learning. Listening in marriage requires sharing more personal ideas and feelings than does a course in the hard sciences. It likely takes a greater level of trust to share ideas about listening in
marriage than to share opinions about mathematical equations or predictions regarding chemical compound behaviors. Due to the nature of the course topic, the results from this study should not be considered representative of every potential TBL course in a virtual isolated setting.

**Implications**

To date, no other research has been conducted on the use of TBL in virtually isolated settings. Millions of adults use instruction where virtual isolation is assumed. The results of this study suggest that the implementation of TBL’s Readiness Assurance Process would help adults in virtual isolation improve recall and understanding of course content.

The implications for deeper learning are different. The results of this study suggest the need to conduct more research, correcting the shortcomings that were a part in these courses. Until such studies can be done to substantiate deeper learning gains from RATs in virtually isolated settings, the implementation of the Readiness Assurance Process in virtual isolation should focus on testing items of recall and understanding.

**Recommendations for Future Research**

I have several suggestions for future studies that examine TBL in virtual isolation. The first suggestion is the development of a valid and reliable tool to guide the creation of TBL course instructions in virtually isolated settings. TBL is a very different strategy from what most students know and expect. TBL experts emphasize taking adequate time
to explain the strategy to students at the beginning of a course (Michaelsen, 2004b; Michaelsen & Sweet, 2008b). It is especially important to give students in an online, virtually isolated course, a clear view of the TBL elements used in the course, with clear directions along the way.

My next suggestion is the development of a valid and reliable tool for writing RAT items, especially for questions covering the higher levels of Bloom’s taxonomy. This tool would include guidance for developing directions for each test item, not just the formulation of questions stems and answer choices. The tool would also give customized guidance for writing questions of different subjects (i.e., social sciences vs. hard sciences). Such a tool could also help in face-to-face TBL classrooms. Larry Michaelsen and Michael Sweet have just completed a volume on TBL in the social sciences that will be published later this year that should serve as a guide in developing test items in virtually isolated courses such as Listening in Marriage.

Next, TBL in virtually isolated courses should include specific explanation of the TBL strategy. Many people have never experienced TBL or the type of multiple-choice questions on TBL Readiness Assurance Tests. In face-to-face classes, instructors take an entire class period explaining TBL. Given the many negative comments, it may be that the participants did not understand what was expected of them. There was no equivalent in my modules to the clarification face-to-face instructors provide for their students. This is an important issue in virtually isolated learning where there is no contact with the instructor or creator of the course. The course designer must therefore make certain that explanations are clear with help files provided, such as frequently asked questions.
While TBL needs to be clearly explained to students in virtually isolated settings, such explanations should be as succinct as possible. If course explanations and quiz directions are too long in online TBL courses, students might not read them all. Chances are that people will skip over explanations and directions to get to what they have to do and move on as best as they can. It is therefore important to give instructions in a succinct and engaging manner. When appropriate, using simple computer animation, audio, or a short video in place of long sections of text may elicit and maintain users’ attention to learn about how to use the course and answer RAT questions.

Finally, good usability testing takes time but it does a lot to shape the development of an instructional design into an effective instructional product. Subjecting course instructions, quiz directions, and quiz questions to an abundance of scrutiny, both by TBL experts and subject matter experts, will prepare the way for effective implementation of TBL in virtually isolated learning.

**Conclusion**

The Readiness Assurance Process of TBL may help virtually isolated pairs of adults remember and understand more than people working alone. It might also be able to help people learn at higher levels, but great care is required in the development of course and RAT directions, as well as multiple-choice questions. Valid and reliable tools are needed to help build robust courses for virtually isolated learners.

Clear course instructions as well as specific directions for each test question are a key part of effective evaluations and learning in any course, especially where virtual
isolation is assumed. This is particularly the case with TBL courses because TBL is an unfamiliar strategy to many learners. Expectations and process need to be spelled out so that, instead of wondering what is expected of them, students can focus their cognitive resources on the readiness assurance test items to help each other remember and understand fundamental unit concepts. With these measures in place, courses using TBL’s readiness assurance process in virtually isolated settings will hopefully be able to help learners reach significant deeper learning as well.
REFERENCES


Fink, L. D. (2004). Beyond small groups: Harnessing the extraordinary power of learning teams. In L. K. Michaelsen, A. Bauman Knight, & L. D. Fink (Eds.), *Team-based learning: A transformative use of small groups in college teaching* (pp. 3-25). Sterling, VA: Stylus.


APPENDICES
Appendix A

Recruiting Poster
Participant compensation: TBL group—a new book, retail value of $29.99; Independent group a new book, retail value of $21.99; baseline group $5.00 cash. Also, one on four participants, regardless of group, was randomly selected to win a 12x12 decorative ceramic tile and stand. The tile had vinyl lettering that said “Kindness Begins with Me.”
Appendix B

Feedback for Posttest-L with Bloom’s Categories
This is the feedback for posttest-L that I sent to participants after they had completed the study. Beside each question I have added the Bloom’s category to which it belongs. The categories for Bloom’s taxonomy were not included when I sent the feedback to participants.

**Barclay Study - Activity I - Answers**

Thanks for completing the study. Let me explain a few things. First, the material in this website represents only the first part of a course. The rest of the course would have examples and practice for you to see and do. For those of you who did not have the readings, there were two articles that the group members read. If you were in group 3 and felt “in the dark” that is because you did a pretest and posttest only, as indicated in my explanatory email.

Second, my goal was to see how much you gleaned from the readings by yourself or with your spouse. There were different levels of questions based on Benjamin Bloom’s revised taxonomy; some questions evaluated your recall, others tested your understanding, and others measured your evaluation of what you saw and read in the scenarios.

Here is the feedback for activity I. I did not give feedback at the times of the activity because an explanation for one answer could affect your answers for subsequent questions and then skew the results of the study. So thanks for your patience.

Explanations are given for each answer choice. For most of the questions, all of the answer choices are plausible but there is one that is better than all of them. The answers are based on the readings, not on what seems more or less likely to the reader, or what you feel you would have said. See the reasons for the correct answers. I hope this is informative and helpful.

**Question 1** (BLOOM'S LEVEL 1 – Remember, specifically, recognizing)

A main reason for poor listening is what? (Choose the **best** answer.)

**Choices**

a. different listening styles  
**Incorrect.** There was no reference to this in the readings.

b. mental distraction  
**Incorrect.** This is close but it does not adequately answer the question based on the
c. dissimilar attitudes  
Incorrect. This may play a part but this was not mentioned in the readings.

d. selective attention  
Correct. Absolutely. Remember that in the Marshall article it says, “Unfortunately, many of us do selective listening, which means we only hear what we want to hear. We sometimes use selective listening when we don’t really want to hear what someone is saying or when we already think we know what they are going to say.” (p. 2)

Question 2 (BLOOM’S LEVEL 1 – Remember, specifically, recognizing)  
What are some of the positive things that come from effective listening? (Choose the best answer.)

Choices

a. strengthened family relationships; improved cooperation; better sense of humor; stress prevention; higher self-esteem  
Incorrect. These are good things but they were not all mentioned in the readings.

b. strengthened family relationships; increased enjoyment of life; getting better work from others; problem prevention; more learning  
Correct. See the Lingren article starting on page 3.

c. strengthened family relationships; better compatibility; more time spent together; anger prevention; increased optimism  
Incorrect. These are good things but they were not all mentioned in the readings.

d. strengthened family relationships; stronger attraction; improved outlook; unnecessary debt prevention; greater patience  
Incorrect. These are good things but they were not all mentioned in the readings.

Question 3 (BLOOM’S LEVEL II – Understand, specifically, inferring. The learner must “[draw] a logical conclusion from presented information”)

Reflective listening is a skill that is intended to help couples reach what? (Choose the best answer.)
Choices

a. reconciliation
Incorrect. This is a desirable outcome but is not always relevant—not always needed that is.

b. resolution
Incorrect. This is true but not specific enough.

c. recognition
Correct. This answer gets closer to the heart of effective listening than do the other answer choices. When we want others to listen, especially our spouse, we want him or her to recognize our feelings and intents and thoughts. We want to be appreciated and know that our spouse care for us.

d. reflection
Incorrect. This is a means to the desired end, not what couples need to reach.

Question 4 (BLOOM’S LEVEL 1 – Remember, specifically, recognizing)
What are the three main parts of skillfully receiving messages from your spouse?

Choices

a. listening with your heart, head, eyes, and ears; using “I messages”; and finding time to talk
Incorrect.

b. listening with your heart, head, eyes, and ears; avoiding blame; and problem solving
Incorrect.

c. listening with your heart, head, eyes, and ears; reflecting or summarizing; and finding common ground
Correct. See the Marshall article.

d. listening with your heart, head, eyes, and ears; the receptive listening technique; and empathizing
Incorrect.

Question 5 (BLOOM’S LEVEL 1 – Remember, specifically, recognizing)
What are the three types of listening with your heart, head, eyes, and ears?
Choices

a. integral listening, cooperative listening, and promptive listening  Incorrect.

b. promptive listening, empathetic listening, and reflective listening  Incorrect.

c. engaged listening, promptive listening, and affective listening  Incorrect.

d. silent listening, supportive listening, and promptive listening  Correct. Again, see the Marshall article.

Question 6 (BLOOM'S LEVEL II – Understand, specifically, inferring)

What does promptive listening let the other person know? (Choose the best answer.)

Choices

a. you would like them to know you are listening  Incorrect.

b. you would like them to give a response  Incorrect.

c. you would like them to recall something  Incorrect.

d. you would like them to keep going  Correct. Remember what promptive listening means (Marshall article, p. 3):

Promptive Listening - Ask open-ended questions to invite the other person to share more.

“What happened then?”
“Tell me more.”
“What else do you know?”

“What does that mean to you?”
“How does that make you feel?”

Question 7 (BLOOM’S LEVEL II – Understand, specifically, exemplifying. The learner “must select an example form a given set.” Also,
Reflective listening involves what? (Choose the best answer.)

Choices

a. stop the speaker after a few sentences
Correct. According to the readings, we should not wait until the speaker is done. In the Lingren article it says, “After four or five sentences, stop the speaker with “let me see if I am understanding you.” Then, repeat back in your own words what you heard and the feelings you picked up on. “You said...” “You felt...” “Was that accurate?” If the speaker says it was not accurate, ask for a clarification of the portion of the message that was misunderstood or incorrect. Once this is clarified for both of you, then the speaker can go on for another few sentences, and the reflection process continues.”

b. wait until the speaker has finished then summarize his/her ideas
Incorrect. Summarizing is important but not enough. And we should not usually wait until the speaker is done before summarizing. Instead, summarize or reflect after a few sentences.

c. say back what the speaker said to you
Incorrect. This is important to do—to reflect. However, the goal of reflective listening is not just to reflect—it is to reflect in order to understand the other person.

d. maintain good eye contact with the speaker
Incorrect. Reflective listening involves good eye contact but it requires more.

Question 8 (BLOOM’S LEVEL II – Understand, specifically, interpreting. The learner must paraphrase the concept or principle presented in the question stem by identifying the most accurate clarification from the options.)

Which of the following best fits with reflective listening?

Choices

a. interpreting
Correct. Reflective listening is a tool to reach accurate interpretation or understanding of the spouse’s thoughts and feelings.

b. supplementing
Incorrect. This is not a wrong answer but it is not the best one.

c. deferring
Incorrect. Yes we sometimes defer to let the other person talk. But deferring is not the best fit or the ultimate reason for reflective listening.

d. increasing
Incorrect. We do want to increase something but what is it?

Question 9 (BLOOM’S LEVEL II – Understand, specifically, interpreting. The learner must clarify, paraphrase, represent, or “translate” what was given in the readings.)

When we try to reflect what the other person said, which of the following is the best choice?

Choices

a. report or reproduce what was said
Incorrect.

b. retell or recall what was said
Incorrect.

c. restate or recap what was said
Correct. As you probably noticed, this answer is the only one that suggests listening well enough to gain and show understanding, not just to say back the exact words of the other person.

d. repeat or replicate what was said
Incorrect.

Question 10 (BLOOM’S LEVEL II – Understand, specifically, interpreting. It is the same type of question as number 9. The learner must paraphrase (select the most accurate representation of what the “10 commandments of listening tell us is important in couple communication.)

What do the “10 commandments of listening” tell us is important in couple communication?

Choices

a. read between the lines
Correct. This answer requires memory and interpretation. Again, reading between
the lines means you get it. You get what your spouse is trying to say. You are listening
to words, but more importantly to feelings too.

b. only argue within the rules
Incorrect. The “10 commandments of listening” do not mention this.

c. give constructive feedback
Incorrect. The “10 commandments of listening” do not mention this.

d. manage conflict carefully
Incorrect. The “10 commandments of listening” do not mention this.
Appendix C

Feedback for Posttest-D with Bloom’s Categories
This is the feedback for posttest-D that I sent to participants after they had completed the study. Beside each question I have added the Bloom’s category to which it belongs. The categories for Bloom’s taxonomy were not included when I sent the feedback to participants.

**Barclay Study - Activity II - Answers**

Here is the feedback for activity II. I did not give feedback at the times of the activity because an explanation for one answer could affect your answers for subsequent questions and then skew the results of the study. So thanks for your patience.

Explanations are given for each answer choice. For most of the questions, all of the answer choices are plausible but there is one that is better than all of them. The answers are based on the readings, not on what seems more or less likely to the reader. I hope this is informative and helpful.

**Question 1** (BLOOM’S LEVEL II – Understand, specifically, summarizing. The learner must watch a video and “select the most appropriate [type of listening represented in the video] from a list of four possible [types of listening]”)

What kind of listening does Rob demonstrate in this scene? (Choose the **best** answer.)

**Choices**

**a. Self-centered listening**
**Incorrect.** Even though Rob is self-centered, there was nothing called self-centered listening in the readings.

**b. Selective listening**
**Correct.** Yes. Rob is hearing what he wants to hear—what fits with his discomfort and complaints.

**c. Second level listening**
**Incorrect.** This was not a type of listening mentioned in the readings.

**d. Strained listening**
**Incorrect.** While there is definitely much strain here, this was not a type of listening mentioned in the readings.
**Question 2** (BLOOM’S LEVEL II – Understand, specifically, summarizing. The learner must watch a video and “select the most appropriate [type of listener represented in the video] from a list of four possible [types of listeners]”)

What type of listener is Rob in this situation? (Choose the **best** answer.)

**Choices**

a. **Interrupter**
   *Incorrect.* The Lingren article says, “The Interrupter. **Interrupters never allow the other to finish.** They may be afraid that they will forget something important they want to say. Or they may feel that it is necessary to respond to a point as soon as it is made. Or they may simply be more concerned with their own thoughts and feelings than with those of others. In any case, they barrage the speaker with words rather than offering an understanding ear.” (p. 3) **Rob did some of this but there is a better fit in one of the other answers.**

b. **Faker**
   *Incorrect.* See the Lingren article starting on page 2: “The Faker. Fakers only pretend to be listening. They may smile while you talk to them. They may nod their heads. They may appear to be intent, but they are either thinking about something else, or are so intent on appearing to be listening that they do not hear what you are saying. Often their minds wander as they tune in and out of the conversation.” **Rob did not really do this. True, he was intent on what he would say next, but he did not try to give the impression that he was calmly listening.**

c. **Dependent**
   *Incorrect.* Again from the Lingren article, page 2: “The Dependent Listener. Some people primarily want to please the speaker. They are so concerned about whether the speaker has a good impression of them that they are unable to listen and respond appropriately. Dependent listeners may agree excessively with what the speaker says, not because they really agree, but because they want to maintain the goodwill of the speaker (nodding head all the time). By trying to please, dependent listeners are frustrating at best.”

d. **Judge and Jury**
   *Correct.* Lingren, page 3: “The Judge and Jury Listener. **These listeners often become so involved in the judgment of the idea or behavior of others that they don’t hear the full story.** They may interrupt with a comment about being “wrong” or “incorrect” or may attack the other person without attempting to understand their position. When this happens, **they shut their ears** so they don’t listen. A kind of hardening of the
categories.”

**Question 3** (BLOOM’S LEVEL III – Apply, specifically, executing.)

What principle or concept of effective communication would have best helped Rob and Jill avoid getting to this point?

**Choices**

a. Use common ground to find a solution  
**Incorrect.** Rob and Jill are not at this point yet. Going straight to common ground would be better than arguing, but it would mean quite a jump from where they are here.

b. Use “I” statements more frequently  
**Incorrect.** “I” statements are good but they were not mentioned in the readings.

c. Use the speaker-listener technique  
**Incorrect.** As with option “a” this would be better than arguing but using this technique usually requires planning, or at least calming down first. It would require a major leap from where they are here.

d. Use reflective skills  
**Correct.** It is possible and suggested to stop and, if things are not volatile, reflect on what the other person is saying. In other words, really listen to the other person. Doing this here would prepare Rob and Jill to use the speaker-listener technique later and/or find common ground.

**Question 4** (BLOOM’S LEVEL III – Apply, specifically, executing.)

What principle or concept of effective listening would best help Rob and Jill begin to resolve this problem now?

**Choices**

a. Shut off the emotional flooding and try to resolve the problem  
**Incorrect.** Emotional flooding needs to be stopped but that wasn’t discussed so much in the readings. Moreover “try to solve the problem” is quite vague.

b. Use silent listening to try to resolve the problem  
**Correct.** If either Rob or Jill were to stop worrying about their own opinion and just
start listening with their heart to the other, the situation would most likely improve dramatically.

c. **Implement the positive outcomes of conflict to try to resolve the problem**  
**Incorrect.** This was not mentioned in the readings.

d. **Come back to the issue later to try to resolve the problem**  
**Incorrect.** This is a reasonable choice given the arguing going on. However, the couple is not so angry that this option is the best way to go at this point.

**Question 5** (BLOOM’S LEVEL III – Apply, specifically, executing.)

At one point, Rob asks Jill if she even hears the baby at night. Jill answers that she does sometimes but that she has “just been a little tired lately.” Rob responds to Jill, “Oh you’ve been tired? I’ve been tired!”

What is the **best** thing Rob could do next to fix the situation?

**Choices**

a. **He should reconsider what Jill has said**  
**Incorrect.** He should indeed do this but the Lingren article suggests something else first. It may seem obvious but it is important.

b. **He should find common ground with Jill**  
**Incorrect.** He should but not yet.

c. **He should stop trying to get his point across to Jill**  
**Correct.** Yes. In the Lingren article it says on page 6 that the first commandment of effective listening is: “Stop talking! You cannot listen when you are talking. You will only be thinking about what you are going to say next instead of paying attention to what the other person is trying to say. Consciously focus your attention on the speaker.”

d. **He should pay attention to Jill’s non-verbal messages**  
**Incorrect.** Rob should do this but the **first** thing he should do next is to stop talking.

**Question 6** (BLOOM’S LEVEL III – Apply, specifically, executing.)

What should Rob have done at the end instead of just complaining and walking away?  
(Choose the **best** answer.)
Choices

a. Stop and explain calmly why he is so tired and frustrated
   **Incorrect.** This is better than just walking away but where would his focus still be?

b. Stop and pay attention to non-verbal language
   **Correct.** Yes. This would show Jill that Rob is really listening or trying to listen to her.

c. Stop and rethink the situation to find common ground with Jill
   **Incorrect.** Again, better than just walking away but common ground comes, or should come, after one has heard the other person out, or sometimes while doing so.

d. Stop and show appreciation for what Jill has done
   **Incorrect.** This is a good idea but it is better to listen first.

**Question 7 (BLOOM’S LEVEL III – Apply, specifically, executing.)**

Rob said, “I never expected things to be this way.” Jill retorted, “Well I don’t see how we can change that much now.”

What would have been the **best** thing for Jill to say instead?

Choices

a. Pause and say, “Rob, I can tell you’re really upset. I’ll do better to get up with the baby at night.”
   **Incorrect.**

b. Pause and say, “I see. I bet we can find something that works for both of us.”
   **Incorrect.**

c. Pause and say, “You’re really ticked off. It sounds like this has been bothering you for a while.”
   **Correct.**

d. Pause and say, “I wish you would have said something earlier. But I’d like to work this out.”
   **Incorrect.**
**Question 8** (BLOOM’S LEVEL V – Evaluate, specifically, judging)

How effective was Jill in this encounter at silent listening?

**Choices**

a. **Completely Lacking** - there is no evidence of the skill or principle in the person’s conduct.
   **Incorrect.** She actually did do some silent listening.

b. **Mostly Ineffective** - there is a small amount of evidence of the skill or principle in the person’s conduct.
   **Incorrect.** Jill was not perfect at silent listening but she was better than this.

c. **Somewhat Effective** - there is a medium amount of evidence of the skill or principle in the person’s conduct.
   **Correct.** Yes. To Jill’s credit, she did some silent listening, and more than just a little bit. Can you identify in the video where she did this?

d. **Mostly Effective** - there is a high amount of evidence of the skill or principle in the person’s conduct.
   **Incorrect.** Jill could have done even more. Can you think of how she could have done better at silent listening? What would you have done?

**Question 9** (BLOOM’S LEVEL V – Evaluate, specifically, judging)

How effective was Jill in this encounter at supportive listening?

**Choices**

a. **Completely Lacking** - there is no evidence of the skill or principle in the person’s conduct.
   **Correct.** Jill did none of this.

b. **Mostly Ineffective** - there is a small amount of evidence of the skill or principle in the person’s conduct.
   **Incorrect.** Jill did not do any supportive listening whatsoever. See the Marshall reading. What part of the video do you feel what supportive listening on Jill’s part. Did you get a different type of listening confused with supportive listening?

c. **Somewhat Effective** - there is a medium amount of evidence of the skill or
principle in the person’s conduct.

Incorrect. Jill did not do any supportive listening whatsoever. See the Marshall reading.

d. **Mostly Effective** - there is a **high** amount of evidence of the skill or principle in the person’s conduct.

Incorrect. Jill did not do any supportive listening whatsoever. See the Marshall reading.

**Question 10** (BLOOM’S LEVEL V – Evaluate, specifically, judging)

How effective was Jill in this encounter at **promptive** listening?

**Choices**

a. **Completely Lacking** - there is **no** evidence of the skill or principle in the person’s conduct.

Incorrect. Remember what promptive listening is. Jill did some.

b. **Mostly Ineffective** - there is a **small** amount of evidence of the skill or principle in the person’s conduct.

Correct. Do you remember what Jill said as promptive listening?

c. **Somewhat Effective** - there is a **medium** amount of evidence of the skill or principle in the person’s conduct.

Incorrect. Jill only did a little bit.

d. **Mostly Effective** - there is a **high** amount of evidence of the skill or principle in the person’s conduct.

Incorrect. Jill could have done a lot more promptive listening.
Appendix D

Closing Survey Responses
Stood Out Most

These are the verbatim responses by participants in response to the question on the closing survey that asked, “Please share what stood out most to you from participating in this study.” The responses shown here are exactly as the participants entered them. The only changes made were to remove any names that the participants mentioned. These changes are indicated by square brackets.

Men – TBL Group

“How important it is to read between the lines when talking.”

“Many of the correct answers did not seem intuitive to me.”

“I felt frustrated that we didn’t answer the test questions correctly because I think we were over analyzing most of the answers. I found this study enjoyable and I think that these type of courses have many benefits.”

“I think it’s funny when articles propose as facts what are simply things to consider. Listening principles are more data-driven: x works 90% of the time, y works 7%, and z 3%. There is no rule-based “if this happens, apply x”. Some of the methods used in the videos and the readings would drive me crazy.”

(Some of the information I didn’t feel was nessesary such as the suggestions for how the couples should have spoken to each other. If [my wife] would have told me that I was obviously ticked off I think I might have gotten even more angry.”

“No comment”

“I felt like we’ve encountered many of these similar situations because I am a graduate student right now, but I we have managed to resolve our situations a little differently. Perhaps this was reflected in our efforts to answer the questions correctly.”

“Good to review these concepts and remember how our marriage can be stronger if we listen to each other better. Especially since having our first child we haven’t listened as well as we have in the past.”

“The videos weren’t that helpful. The articles were more informing, and the interpretation of the videos seemed very subjective. I’m not really sure that anyone talks to their spouse in this way, but it is good to keep these things in mind.”

“I learned that I have lots of room for improvement with listening to my wife. I also
learned that there is not always the BEST way to approach an issue.”

“I thought it was very doable. I also liked the second day better, I learned more.”

“I would rather work with a human then a computer with marriage counseling”

“Really, it reminded me of the need we have to continually use good communicating skills. It also caused me to reflect a little on some challenges we could overcome in our communicating, and I’m considering bringing those challenges up since the ideas are fresh.”

“The different types of listening, and the videos”

“I liked all of the different techniques of listening that there were; I had not realized that there were so many. The videos were done very well, but it was sometimes hard to see where the principles were that we were supposed to “pull out”.”

“It doesn’t take much to significantly increase one’s listening abilities.”

“Some of the ways we speak to one another are in need of improvement.”

“the academic side of “listening” seems pointless to me because the “correct” answers made no sense to me.”

“Marriage is a team effort, and there are many components that help contribute to the well being of both companions. I think that effective listening and conflict resolution skills could be very helpful.”

“Ambiguous answers that seemed exactly what WE wouldn’t want to do in a similar situation but that would be the right answer. People are different and there is no best way to communicate with every person. It takes skill.”

“The concepts presented in the questions were ambiguous at best.”

“I was impressed with the illustrative videos with the role-playing scenarios. I also liked the design of this questionnaire Web site. Thanks for the opportunity to participate.”

“Listening is a much bigger part of Communication than I thought.”

“I guess just how many different ways there are to listen. Thought there was just one way.”

“I did enjoy the articles, and plan to read them again more thoroughly.”
Women – TBL Group

“It was good to have a video to apply the concepts from the reading. Yet I don’t learn well from reading, so I found it frustrating that there was no “lecture” as part of the content.”

“I think the video examples stood out most because we were able to actually see facial expressions, reactions, and time it took for the other to respond.”

“It was interesting to me how many different types of listening skills or styles there are. I really enjoyed the readings and feel like I learned or was able to review things that I already knew.”

“Overall, my husband and I communicate well.”

“Most of the answers I thought were weird, we felt that they would not work in our marriage sometimes.”

“I felt the answers were subjective to the one designing the study and somewhat incomprehensible to me. I had a difficult time applying the principles from the articles to the real life situations.”

“I laughed because my husband and I are in a similar situation to Rob and Jill and so it was interesting to hear how they worked out their problems and to think how better we could work things out.”

“I enjoyed reading the articles but I didn’t agree with many of the answers of the survey. At times I found myself annoyed with some of the answers.”

“The articles that were provided were the only things I think were really helpful. The videos were corny, and the quiz questions were confusing with what felt like more than one right answer. I think I gained something from reading the article, and perhaps if my husband and I could have discussed the article more directly we would have actually used these skills in the future. But the video and quizzes seemed to take away from the learning content of the articles.”

“This was a study focusing not only on marital communication, but on recalling and applying information. The process of this study was very formal. It did feel like a classroom setting the grading. We both approached it as such and so when we got an answer incorrect we were frustrated because we felt that we could argue the validity of our answers.”

“I thought some of the questions for the video were too opinion. My husband and I thought we knew the answer for sure, but then got it incorrect. I really enjoyed the articles. I also liked day two more than day one.”
“In need to be better at implementing different, more healthy listening skills and eliminate the less effective ones from my habits. I consider myself a good listener, however, I have improvements to make to be even better and more considerate. Many of the listening skills I have learned previously and try to use, it’s when I get emotional about the situation then I revert the “wrong” listening techniques. As an older, newlywed couple we do well with our listening. Life experience was a big help for me when I entered marriage. We are honest in letting the other one know we misunderstood or didn’t listen and need clarification. We aren’t perfect with it but we willing to make changes to continue to improve.”

“The importance for knowing and applying FORMAL listening techniques to improve communication.”

“This study helped me realize how often I don’t tune out distractions, when others are talking to me, specifically my spouse. I also thought it was interesting in the readings were it talked about how much faster we can listen than we talk, and how we should use that to really try to understand what we are hearing rather than day dreaming. It made me think about how much more effective I could be listening to my spouse, friends, and family, but then it also made me think about my studying habits and how much more useful I could make instruction time.”

“some of the “correct responses” seemed negative and would have probably escalated the argument instead of making things better. a lot of the content dealt with reflective listening.”

“I saw certain characteristics of myself and my spouse in the characters. I realized how he feels when I do things.”

“all the definitions and terms are more confusing than helpful when it comes to listening.”

“Listening takes effort and practice. It also is a family effort.”

“Even though learning about different techniques for listening was interesting and helpful, my husband and I found that just because we felt that something was the right action to take, we were often wrong. I don’t think there is a right or wrong answer, because different people like to talk about problems differently. You can use all the listening and communication skills you want, but if one of the spouses just needs time to cool off, the skills won’t help.”

“The different types of listening. I will probably put more effort into how I listen to my spouse from here on out.”

“The thing that stood out to me most was the terminology. I feel like the types of listening and their names were pretty subjective. I walk away feeling like you could argue these points a couple different ways.”
“Listening”

“I found it interesting that things I thought would be the most effective methods from my upbringing were not the correct answers. It made me think about how well I may not be communicating with others even though I think I am.”

“How much I looked forward to discussing the content with my husband.”

**Men – Independent Group**

“I learned how much I need to work on listening.”

“The knowledge I GAINED in communication and listening.”

“That these are principles that each couple or person can figure out how to apply in their lives. I also like the fact that these principles can be used in one’s professional life as well as their personal life.”

“How poor communication leads to more problems in relationships”

“There are a lot of very complicated aspects of communication, and this was a very interesting look at a tiny piece of the complex puzzle. What really stood out to me were the vast variety of methods of listening. I did not know the specific names or what they meant. There is a lot to learn.”

“What stood out most to me was how easy it is to take an issue or situation then either blow it up out of proportion and out of control with in the first second of a conversation or confrontation. If a couple could control themselves and first agree to listen and find common ground before blowing up or giving silent treatment problems or issues wouldn’t seem so hard or take so long to resolve. You would hope the each spouse is mature enough to recognize when they are mad, frustrated, or upset and change that before it effects the other spouse. Then decide to talk and listen through an issue without having a drama scene before or during.”

“The importance of listening and focusing on the speaker and trying your best to reflect and repeat back what they just said.”

“The different styles of listening and the face that we think a lot more than we can hear so we need to use that extra processing to think about what is being said and not other things, distractions, what we are going to say, etc.”

“Due to the nature of the subject (i.e. dealing with people), it would have been helpful to discuss and interact the questions and papers with my spouse and others.”
Women – Independent Group

“A lot of the questions seemed to be qualitative rather than quantitative. Many times, I felt like I chose the best answer and it turned out to be wrong. It really confused me because the concepts about types of listening seem too “boxed in” for my taste. I felt like there are more grey areas and some types of listening are mere variations on other types of listening and it is difficult to tell them apart.”

“That we all have issues that need to be worked through. Life doesn’t come with an instruction manual and it is helpful at times to learn from others on how to communicate more effectively.”

“The speaker-listener technique. I love that. I think I will use this with my spouse as well as my kids!”

“I loved the idea of focusing on listening and all the little particulars that help in making a person feel like they are recognized and important. It’s true that we can have millions of thoughts going through our minds, but it’s more efficient to listen attentively instead of trying to do or think of more than one thing at a time. Plus, you receive better networking and real relationships from effective listening. Thank You for the reminder. I also thought it was odd, that there even were very particular right and wrong answers for our given scenarios. It helps to know the persons personality in order to know what the next “best” course of action is.”

“I didn’t realize that there was so many different types of listening. It was interesting to learn about the different types in the articles.”

“Knowing that I wasn’t going to be graded like this was an actual college course, I did not work as thoroughly. However; I am very interested in this and if I had been able to retrieve the actual article, I would have performed much better. I was still able to learn a lot.”

“I think I gave my thoughts on this previously, but I liked the examples they are applicable to myself and my situation with my husband. It also gave me things to watch out for in future discussions with my husband. Thanks!”

“I liked all of the different listening techniques and their descriptions. It helps to have specific instruction on different techniques.”

“I feel that the reflective listening stood out the most in this study. Most of the multiple choice questions had “summarize and repeat what the other partner said”, or something similar. I think this is a really good idea, and it’s sometimes easier said than done. But the readings showed that it can really be effective.”

“Learning about various forms of listening skills is one thing, applying them is completely different. Sometimes the articles were so specific that the big picture was lost.
For instance, what is the difference between a dependent listener and the self-conscious listener. Is the difference so drastic that they really need to be separated. Also, it would be better if there was more convergence between the two articles. Who really has time to memorize the terms, definitions and memorize lists when the purpose is to improve your listening within your marriage?”

“I learned that I am probably not as good of a listener than I thought I was. I wanted to try the strategies out myself and have more guidance. It interested me in possibly finding a workshop to attend with my husband about listening strategies. I felt frustrated that even after study of the articles and feeling like I understood that material that the study questions were so confusing. I had a hard time deciding what was the best answer and I often disagreed with the one that was marked as correct. I tried to take into account possible gestures and tones of voice of answers which caused me to not choose them. I thought that I would do better on the questions.”

“I liked the videos, It’s always helpful for me to see how other people handle things and learn from their mistakes and apply what they did well. I also really enjoyed the readings! I wish I could have had more time to read over them again, I feel I would have gotten even more from them and done better on the surveys... sorry, family life called.”

“I actually enjoyed watching the videos. I would have liked to watch more to be honest. It was nice to see examples of common arguments or disagreements. I could easily put myself in their positions and immediately realized what I do and do not want to do in time of conflict.”

“I learned that I am not good at analyzing situations and coming up with the best results on my own, when I wasn’t given a clear cut answer, I got the answer wrong. I misinterpreted what listening skills were going on in the video.”

“It was interesting to know about the different types of listening skills”

“The thing that stood out to me most was the last video with Ty and Natalie. I really liked the way they worked things out in the end. I don’t know that real life situations would work out like that, but I liked the skills they used and I will try using them the next time I have a disagreement with my husband.”

“That its mainly just away to teach listening techniques. I guess I need better understanding of them because I chose a lot of the answers of what I honestly thought to be correct but sometimes the last answer I would have chosen ended up being the right one. It was slightly confusing to me and I wish they would have given examples as to WHY a particular answer was correct and not the others.”

“Seeing my mistakes in video form. Also, it seems like I know all of the stuff that I learned, but having it spelled out and defined makes it easier to understand them and hopefully I’ll remember them. I enjoyed learning this information and was entertained as I read the articles.”
“The articles seemed interesting…and a tangible source of knowledge for the future.”

“I guess what stood out the most was the material of the example couples in the videos. I was surprised and comforted that common issues I experience were used as examples. It was encouraging to think that maybe others experience similar issues….”

“The different types of listeners and how to implement better types of listening. I frequently do other things while my spouse is talking to me, instead of stopping to make eye contact and to reflect what is being said to me.”

“The situations helped me realize how I react in those types of situations, and helped me see which areas I can improve upon.”

“I thought the readings were very interesting. I liked learning about how people listen and ideas for how to be a better listener.”

“Reflective listening stood out the most. It was easy to recognize reflective listening in the videos after reading about it. I think it stood out more to me because I had heard of it before. I think I would have to review the “Ten Commandments of Effective Listening” again and discuss it with someone before I could fully internalize the concepts.”

**Final Comments**

These are the verbatim comments by participants in response to the item on the closing survey that asked, “Please enter any other comments or suggestions for improvement you wish to make about your experience in this study and/or the website itself.” The responses shown here are exactly as the participants entered them. The only changes made were to remove any names that the participants mentioned. These changes are indicated by square brackets.

**Men – TBL Group**

“My only suggestion would be to have better questions which are answered absolutely in the readings or videos. My perceptions of what I read and viewed were obviously very different from whoever engineered the questions we were graded on. Many of the questions seemed subjective and could be answered better in essay form than multiple choice.”

“See #8 and #16. It would be nice to have a spot to explain choices for the questions (albeit potentially messy for a study), as multiple choices might make sense for different
reasons. Good luck!”

“Maybe make it a bit more user friendly. I had a hard time navigating to some of the activities.”

“I wasn’t motivated to do the study because I didn’t have a clear understanding of what the purpose of the study was, or what the benefits of evaluating the information would be to anyone reading or participating in the study. You should tell people why you are doing the study and that you had a specific goal of what you hope they will learn based on reading and applying the articles. The answers should be more objective and have clear differences.”

“None...Thanks for the opportunity.”

“Some of the answers to the questions were poor answers, not actually answering the questions according to the subject matter discussed in the articles. The second video was better than the first video.”

“Nothing further.”

“Good stuff.”

“Found it interesting. Didn’t love all the questions, I thought some of them were personal choice rather than something I should have learned.”

“make the answers less ambiguous”

A couple of the questions were a little nebulous making it difficult to select one specific answer. Unfortunately, I can’t remember them at this point. Otherwise, the suggestion I have is that we get feedback of some sort so we know what we could improve or understand better.

“Have more videos, instead of reading”

“I really liked this study because it opened my eyes to some ways of listening that I had not thought of. One thing that I did not like about the questions was how some of the answers were ambiguous with the tone that they were stated. It made it hard to choose the best response from one of the spouses, because you don’t know in what manner they were saying it.”

“Make the questions and answers more pertinent to the material.”

“I hate “best” and “most” questions, so I feel that there is a better way of assessing these.”

“don’t make the choices for the questions almost identical to each other.”
“I was pleased with the study.”

“It was frustrating with the ambiguity of the answers to questions. It seems like they would be wrong in a certain situation (often the situation I was thinking of apparently.”

“Questions to test knowledge should not be solely about ambiguous definitions that only the creator of the phrases understands.”

“I realize the answers were a “choose the best option” kind of set-up. But many answers were not only good choices, but they were essentially the exact answer worded in a different way.”

“It was great.”

**Women – TBL Group**

“The website was intuitive. Some of the questions were confusing though. I think it would create more problems to say things like, “It looks like your ticked off...” or “When do you think this strong desire to play golf will go away?” I don’t think those would be positive responses.”

“Sorry we answered so many questions wrong. We really felt that we had chosen the best answer. We felt that many of the right answers weren’t the best for the question being asked. We were very often confused with many of the questions.”

“I liked the articles we read and I think I gained some helpful knowledge from them. For the quizzes - a lot of the responses that were “correct” did not make any sense given the context (we discussed them and on occasion, the answer we ruled out at the start ended up being “correct” according to the system); some terms were not adequately explained and some of the responses were so similar we just guessed about them.”

“Make the questions shorter.”

“Perhaps discussion with spouse about our own listening techniques and what principles we use in successfully managing conflict. I felt the study was too arbitrary.”

“My husband and I felt that some of the questions were poorly worded. We could see where there could be multiple answers and we just happened to guess wrong. Or we would discuss a question and come to a conclusion of which two answers it could be and which answer it most definitely was not, and in the end, the answer would be the one we said we thought it wasn’t. That was confusing. I thought I (and it sounded like he) really understood the readings and the concepts, but we found the answers to some of the questions to be contradictory to what we understood.”

“None.”
“The articles were worthwhile but the remaining videos and quizzes were lengthy without much benefit.”

“If this was for a class I would contact the professor to discuss the subjectivity of his questions as it felt like more than one answer could have been correct. However, since this was a study perhaps that was the point.”

“I thought the video and articles combined were very helpful!”

“It would have been helpful to have audio with some answers or an indication of how they were spoken. By guessing at the tone of voice of the response caused our answers to be incorrect. Once we were opposites on an answer because one of us read it accusingly and the other read it supportively. The website was easy to maneuver through, once we are all on the same page about when we would be doing our quizzes.”

“Neither I nor my spouse liked the wording or ambiguity of some of the questions. It is hard to evaluate what we really learned from this material with many of the questions. The readings were great though, and I think they would help many people married or not through reading them.”

“give more information on the different listening styles. some of the answer options were not mentioned in the articles and so we did not know what they meant. explain why one answer is better than another.”

“I felt that in some questions, all the answers applied, not just one. But, as you stated, we were to choose the BEST answer, which was just not obvious to me.”

“It was good. No complaints.”

“The videos are super cheesy and made my husband and I laugh. The music and slow motion also give them an over-exaggerated intensity that didn’t help our efforts to take this seriously.”

“I apologize, but we really struggled with some of the questions and I think something must have been wrong. We really thought out our answers and definitively decided on the best answer. Most of the time, that was wrong. Then our second pick was wrong. And our third, and sometimes it seemed the most ridiculous answer was right! Take number 7 on Activity II for example. Some of the answers suggested a resolve to the problem or a kind response, but the “best” answer ended up being “You’re really ticked off”? ?? We found things like that on many questions.”

“The quizzes were too subjective.”

“Seems to be good.”

“There were too many good answers! It was hard to pick the right one.”
Men – Independent Group

“You may need more bandwidth. There was slowness on the first question of Day two. It may be a simple programming issue, but it may also have to do with bandwidth. Loved both days.”

“Thank you, site was easy to manipulate and easy to understand.”

“There seemed to be a couple of questions that would have been up for discussion on what the “best” next step or action might have been. Or I could have misunderstood them because I didn’t read the literature as thorough as it was expected.”

“It looks very good.”

“There was one set of instructions associated with some of the tests that I didn’t understand: “Please note: This means that you should not get 0 (zero) points on any question. If you do not keep going until you find the right answer for each question I cannot use your data and cannot compensate you.” These instructions were confusing because I didn’t really know what they were asking me to do.”

“In the end couples need to be taught or remind themselves that there is a better to do it. There is a better way to listen. I believe websites like this one used would help many couples remember to listen. It would help every couple because no one is perfect at it, yet of course the amount of things learned will vary.”

“I really enjoyed watching the videos more than reading the articles. I was pretty bored with the first article especially.”

“Good.”

“Some of the questions appeared to be subjective. At least one or two questions seemed to be completely incorrect based on what I learned - are the answers put in correctly on the website?”

Women – Independent Group

“I don’t know anything about psychology, but when asked “which answer would be MOST effective,” I often had a different opinion of what would be effective. I felt like the course, had it wanted me to choose the truly effective answer, should have spent more time on what sort of answers are effective and why. That is the part I understood the least.”

“It’s very hard to really understand where I as a person doing this study is coming from. Everyone has different life experiences and opinions.”
“I would have liked more instruction at the beginning (and maybe I just missed it) that I was doing the first part without reading material, because I searched and searched for something I was supposed to read first. The rest was quite self-explanatory.”

“I think the setup was aesthetically pleasing and effective. The videos worked well, and the instructions were very explicit. I wish I had a bit more time to read the material, but I plan to go over it with my husband afterward. We both find communication a very important topic for daily living.”

“Again it was hard to distinguish the “best” answers because every person is different. I thought of how I would have went about the different scenarios with my husband, and that would be completely different from someone else and their spouse. It was just hard to choose the “best” answer, when more than one answer would have worked.”

“I wish that I would have read the article thoroughly and that I would have been given a little bit more direction.”

“I thought it was a great study and website.”

“This was a well put together study, great job. I had a hard time with some of the questions from the videos though, because I felt as though the options for answers were opinions. The readings did not give only one solution to communication problems, and I don’t think there should be only one solution. The readings talked about many options so I kept picking the answer that I thought would be best for the couples and kept getting it wrong, even if it was mentioned in the reading. Other than that the study seemed great. Good luck!”

“All the videos and stories appeared to be one-sided, that the husband was always in the wrong. I was impressed with the quality of both the videos and website. Good job!”

“I assume you piloted the questions ahead of time, but I still felt that they weren’t cut and dry enough. I do not necessarily agree with all the answers that are marked as correct. I found it difficult to pick a BEST answer from some of the categories. I thought that the videos were useful. I also found the texts to be a quick and easy read.”

“I felt a few of the questions were a little confusing. for example on one of them it said to stop the person after a few sentences or to wait until the person was done and then summarize. The best option was the first which was my first instinct but really it doesn’t say why you are stopping the person. You could be just stopping them to vent. So I picked the latter although in the readings it says to allow them to say about 5 sentences then stop them and summarize. Not a big deal just wanted you to know that a few of them were a little tricky. It could have just been me.”

“Add more videos. I’m a visual learner.”

“The video was very choppy, i’m not sure if it was my fault or the type of video. I
thought everything else went very well. I enjoyed it!”

“My only suggestion would be what I mentioned before about the ambiguity of the answers. Being asked to choose the best response is difficult.”

“Refer back to my answer on Question 16”

“I liked it and it was pretty easy to use. I would have liked to have more time to think on it, but I guess that’s my fault for hurrying through. I also would have liked to do this with my spouse rather than on my own.”

“none”

“I would like brief explanations in the scenario questions about why one answer was correct, vs. another. Sometimes, I didn’t fully agree.”

“I would have liked more activities that helped me to internalize the readings, maybe like short examples that said “which listening skill is demonstrated here,” or even “here is an example of this listening skill.”
Appendix E

Letter of Information to Participants
Letter of Information
(Self-Directed and Collaborative Digital Instruction for Adults)

Introduction/Purpose  Professor Byron Burnham, Dean of Graduate Studies and faculty in the Department of Instructional Technology and Learning Sciences at Utah State University, and Matt Barclay, a doctoral student in the same department, are conducting a research study to find out more about adult learning with the Internet. You have been asked to take part because you fit the description of the population of adults we are studying. All participants will take part from a site of their choosing with high-speed internet access, most likely their home. There will be approximately 100 total participants in this research.

Procedures  If you agree to be in this research study, the following will happen to you.

You will be randomly assigned to one of three groups. No matter which group you are assigned to, you will be asked to complete two surveys and two assessments online on two different days. These activities should take no more than 30 minutes to an hour on each day to complete.

You may also be asked to work on some web-based instruction about communication in marriage. The choice of who is asked to work on the web-based instruction will be made randomly. Participation will take place from your home or a place of your choosing where you have access to a computer and a high-speed internet connection.

1. You will be given a username and password to a website and take the first survey and first assessment. You will take a second assessment and survey 1 day after the first. The surveys will ask you some questions about yourself. The assessments will ask you questions about your familiarity with the topics of the research. You will receive an email reminder at the end of the first day. We will keep your email address confidential.

2. If you are not randomly selected to take the instruction, the instruction will be made available to you after the study if you wish to take it.

3. If you are randomly chosen to take the instruction:
   a. You will be asked to either work with your spouse or work alone. All participation in this study is online.
Letter of Information
(Self-Directed and Collaborative Digital Instruction for Adults)

b. The instruction lasts for 2 days. We are asking participants to study as though it were a college class—to learn the material and try to score well. Again, the time involved is about 30-60 minutes per day.

c. On day one you will do the first survey and first assessment, some online activities, and you will be given two short articles to read by yourself.

d. As mentioned above, you will do some online activities, take the second assessment, and the second survey on the 2nd day.

New Findings During the course of this research study, you will be informed of any significant new findings (either good or bad), such as changes in the risks or benefits resulting from participation in the research, or new alternatives to participation that might cause you to change your mind about continuing in the study. If new information is obtained that is relevant or useful to you, or if the procedures and/or methods change at any time throughout this study, your consent to continue participating in this study will be obtained again.

Risks Participation in this research study may involve some added risks or discomforts such as demands relating to adjusting your schedule to include these activities. However, there are no anticipated risks involved in the study.

Benefits There may or may not be any direct benefit to you from these procedures. The investigator, however, may learn more about what helps adults learn more from educational websites and how to design such websites for improved learning. It is likely that you will learn new things from the content of the instruction that will be used in this study, which may have either a direct or indirect benefit to you, now or in the future.

Explanation & offer to answer questions Matt Barclay sent an email that has explained this research study to you and answered any questions you have sent to him. If you have other questions or research-related problems, you may reach Professor Burnham at 797-1191.

Extra Cost(s) There will be no additional costs to you for participating in this research.

Payment/Compensation You will be compensated according to the group to which you are randomly assigned and hence the amount of time and effort associated with the work asked of members of that
Letter of Information
(Self-Directed and Collaborative Digital Instruction for Adults)

group. Those in the baseline group who take an assessment at the beginning and at the end will receive a $5.00 Aggie Ice Cream coupon. Those in the independent group will receive merchandise from Deseret Book at a retail value of $21.99. Those in the couples group will receive merchandise from Deseret Book at a retail value of $29.99. All compensation is one item per household. Regardless of the group you are assigned to, you and your spouse will also be entered into a drawing for an additional prize (a decorative 12x12 tile plus an easel, retail value of $29.99 at Desert Book). There is a one in four chance that you will win another prize from the drawing. Prizes are one per household. If you will receive payments, gift cards or similar items of value for participating in this research, the Internal Revenue Service (IRS) has determined that if the amount you get from this study, plus any prior amounts you have received from USU since January of this year total $600 or more, USU must report this income to the federal government. There will be no costs to you to participate in this study. To receive compensation and to be part of the extra prizes drawing, you must complete each day of the research.

Voluntary nature of participation and right to withdraw without consequence Participation in research is entirely voluntary. You may refuse to participate or withdraw at any time without consequence or loss of benefits. You may be withdrawn from this study without your consent by the investigator and/or the student researcher if it is discovered that you have answered falsely any of the questions in the research study, and/or if you start but do not complete the research.

Confidentiality Research records will be kept confidential, consistent with federal and state regulations. Only the investigator (Byron Burnham) and student researcher (Matt Barclay) will have access to the data which will be kept in a locked file cabinet in a locked room and on a password protected computer and server. Personal, identifiable information will be kept to verify completion of the research so we may issue you the compensation for your participation. When the research is complete and you have received your compensation, all research records with personal information will be destroyed.

IRB Approval Statement The Institutional Review Board for the protection of human participants at USU has approved this research study. If you have any pertinent questions or concerns about your rights or a research-related injury, you may contact the IRB Administrator at (435) 797-0567 or email irb@usu.edu. If you have a concern or complaint about the research and you would like to contact someone other than the research team, you may contact the IRB Administrator to obtain information or to offer input.
Letter of Information  
(Self-Directed and Collaborative Digital Instruction for Adults)

Investigator Statement “I certify that the research study has been explained to the individual, by me or my research staff, and that the individual understands the nature and purpose, the possible risks and benefits associated with taking part in this research study. Any questions that have been raised have been answered.”

Signature of PI & student or Co-PI

Byron Burnham (principal investigator)  
(797-1191)  
(byron.burnham@usu.edu)  
Matt Barclay (student researcher)  
(787-8212)  
(matt.barclay@aggiemail.usu.edu)
VITA

MATTHEW W. BARCLAY

CONTACT
517 S. 750 E. River Heights, Utah 84321
E-mail mwbarclay@gmail.com Phone: (435) 787-8212

EDUCATION

Utah State University, Logan, UT Ph.D. Instructional Technology, June, 2011
Areas of Emphasis: Instructional Strategies in e-learning and face-to-face; Team-Based Learning; fundamental ID and ISD theory; video production, web design, and human computer interaction; learning and cognition
Major Professors: Byron Burnham; David Merrill

Indiana University, Bloomington, M.S. Instructional Systems Technology, May IN 2003
Areas of Emphasis: Human performance improvement; digital video production; human computer interaction; website design
Major Professors: Tom Schwen; Barbara Bichelmeyer

Brigham Young University, Provo, B.S. Family Sciences, April 1998 UT
Areas of Emphasis: Human development; marriage relations; film making
Major Professors: Maxine Rowley; Trevor McKee

EMPLOYMENT – INSTRUCTIONAL DESIGN

Instructional Designer, Independent Contractor, The Church of Jesus Christ of Latter-day Saints Nov 2010-present
• Designed core messages and instruction for exhibits in Rome Italy Visitors’ Center
• Conceptualized new tools and innovative uses of technology for visitor interaction and learning

Instructional Designer/Project Manager, Development of Online Curriculum, BYU Hawaii Sept 2008-Dec 2009
• Led a team in the design and development of online instruction for BYU Hawaii students at a distance
• Designed and implemented original uses of video technology for adult learning

**Instructional Consultant, Department of Elementary Education, Utah State University**

- Coached Elementary Education professors in the design and development of courses in the Blackboard (Vista) for graduate and undergraduate curriculum
- Developed look and feel of course interface within Blackboard

**Instructional Designer & Project Manager, Utah Governor’s Commission on Marriage, Utah State University**

- Managed project and developed instructional strategies for videos sponsored by the Utah Governor’s Commission on Marriage
- Wrote and edited video scripts
- Hired video crew, actors, assistant script writer
- Directed video shoots and edited footage
- Oversaw budget

**Instructional Designer/Researcher, Center for Open and Sustainable Learning, Utah State University**

- Led and assisted design and development for USU’s OCW
- Recruited SMEs and led process of adding courses to OCW
- Designed digital courses, formative evaluation, and produced a short video

**Instructional Designer, Northface Project, Utah State University**

- Developed interface for online courses
- Recorded and edited audio of subject matter experts
- Integrated SME content into flow of courses

**Instructional Designer, Independent Consultant, Salt Lake City, UT**

- Provided e-learning design and development recommendations to media companies for video and instructional vignettes
- Guided video shoots for instructional effectiveness

**Instructional Designer, Information in Place, Inc., Bloomington, IN**

- Led and assisted development of training for use with augmented reality technology, mobile learning, U.S. Army Project
• Assessed learning needs and implemented corresponding instructional strategies
• Produced feature and functionality documents and storyboards
• Built storyboard simulations and participated in graphic design

**Instructional Designer & Associate Instructor, Indiana University,** Bloomington IN 2001-2003
• Taught students face-to-face and online in the acquisition of MS Office skills, basic html, website creation, and ftp
• Helped develop and implement the first online course for on-campus students

**Instructional Designer, Bloomington Hospital, Bloomington, IN** 2002
• Conducted needs assessment and other human performance improvement services
• Recommended strategies and technology solutions with 3 colleagues for a large educational division of the hospital

**EMPLOYMENT – OTHER**

**Instructional Technician, NuSkin International, Provo, UT** 2000-2001
• Implemented software solutions for internal clients
• Instructed internal clients in functionality and features of hardware and software
• Designed an intranet website for IT helpdesk personnel

**Senior Instructional Technician, Sento Corporation, American Fork, UT** 1999-2000
• Coached computer technicians in product knowledge and client interaction
• Provided customer service and technical solutions to clients in U.S. and Europe (Fluent in French)

**Art Director Assistant, Groberg Communications, Bountiful, UT** 1998-1999
• Researched artifacts for authenticity in PBS film (American Prophet, narrated by Gregory Peck)
• Ensured proper placement and appearance of props on set

**TEACHING POSITIONS**

<table>
<thead>
<tr>
<th>Date</th>
<th>Course Title</th>
<th>Position</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2008</td>
<td>Technology for Teachers</td>
<td>Instructor</td>
<td>Utah State University</td>
</tr>
<tr>
<td>Summer 2008</td>
<td>Technology for Teachers</td>
<td>Instructor</td>
<td>Utah State University</td>
</tr>
</tbody>
</table>
Fall 2007  
Technology for Teachers  
Instructor  
Utah State University

Fall 2005  
Foundations in Instructional Technology (Graduate)  
Co-instructor  
Utah State University

Spring 2005  
Evaluation for Classroom Teachers (Graduate)  
Teaching Assistant  
Utah State University

2001-2003  
Introduction to Computers and Computing (Undergraduate)  
Associate Instructor  
Indiana University

Winter 1998  
Critical Inquiry and Research Methods (Undergraduate)  
Teaching Assistant  
Brigham Young University

Summer 1996  
English/French (K-12)  
Instructor  
Ski Ten International, BE

1994-1997  
French (Post High School)  
Instructor  
Missionary Training Ctr.

PUBLICATIONS


PRESENTATIONS

Barclay, M.B. (2011, March) The Impact of the Readiness Assurance Process on Virtually Isolated Adult Learners. Poster Session at the annual meeting of the Team-Based Learning Collaborative (TBLC), Las Vegas, NV.


Barclay, M.B. (2006, May). *Saying “I Do”: Consider the Possibilities Update on Instructional Video Development Project*. Presentation given at the Governor’s Commission on Marriage Board Meeting, Salt Lake City, UT.

Barclay, M.B. (2005, October). *Incorporating Design Principles into Interactive Video for Use in OpenCourseWare*. Concurrent session at the annual meeting of the Association for Educational Communications and Technology, Orlando, FL.


**GRANTS & AWARDS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td><em>Wesley D. &amp; Lucille Soulier Scholarship</em> ($500), Utah State University</td>
</tr>
<tr>
<td>2007</td>
<td><em>ECT Cochran Intern Award</em> ($700) AECT 2007 annual convention</td>
</tr>
<tr>
<td>2006-2007</td>
<td><em>Tier Two Tuition Stipend Enhancement Award</em> for $4,000 (awarded – 1 of 20 recipients of 119 applicants)</td>
</tr>
<tr>
<td>2005-2006</td>
<td><em>“Saying ‘I Do’: Consider the Possibilities”</em> (Tom Lee, Principal Investigator). State of Utah, Marriage Coalition $20,000 (funded)</td>
</tr>
<tr>
<td>2005-2006</td>
<td><em>“Saying ‘I Do’: Consider the Possibilities”</em> (Tom Lee, Principal Investigator). Utah State University Extension $5,000 (funded)</td>
</tr>
</tbody>
</table>
## PROFESSIONAL ASSOCIATION MEMBERSHIPS & SERVICE

<table>
<thead>
<tr>
<th>Year(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>Member of the Association for the Advancement of Computing in Education (AACE)</td>
</tr>
<tr>
<td>2008</td>
<td>Member of American Educational Research Association (AERA)</td>
</tr>
<tr>
<td>2006-2007</td>
<td>Graduate Student Senator, Utah State University, one of two graduate students representing the college of Education and Human Services</td>
</tr>
<tr>
<td>2005-2007</td>
<td>Member of International Society for Technology in Education (ISTE)</td>
</tr>
<tr>
<td>Spring 2004</td>
<td>Member of professor search committee, Department of Instructional Technology, Utah State University</td>
</tr>
<tr>
<td>2003-2004</td>
<td>Member of Pi Lambda Theta (Honor Society – Education)</td>
</tr>
<tr>
<td>2003-2008</td>
<td>Member of Association for Educational Communications and Technology (AECT) student volunteer 2003 and 2005, conference submission reviewer, 2005</td>
</tr>
<tr>
<td>2002-2003</td>
<td>Treasurer, Graduates in Instructional Systems Technology (GIST), Indiana University</td>
</tr>
<tr>
<td>1998-1999</td>
<td>Member of Kappa Omicron Nu (Honor Society – Social Sciences)</td>
</tr>
<tr>
<td>1997-1998</td>
<td>Webmaster, Family Science Student Association (FSSA), Brigham Young University</td>
</tr>
<tr>
<td>1990-1992</td>
<td>The Church of Jesus Christ of Latter-day Saints, Switzerland and France, contributed community service teaching, training, and helping with charitable projects in Eastern France and Western Switzerland (headquartered in Geneva)</td>
</tr>
<tr>
<td>1989-1990</td>
<td>Student Council Representative, Chaplain, John Hall, Brigham Young University, attended hall council meetings and helped plan activities</td>
</tr>
</tbody>
</table>