Designing Effective Curricula with an Interactive Collaborative Curriculum Design Tool (CCDT)

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ABSTRACT
Guided by the principles of the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) instructional design (ID) model, this creative instructional product presents a learning/teaching approach that is fundamentally constructivist. For the purposes of designing effective instruction in an academic preparation course, a *Collaborative Curriculum Design Tool* (CCDT) was chosen as the major educational technology tool. The target audience includes adult English as a second language (ESL) students preparing for undergraduate and/or graduate schools in the U.S. Based on this specific learner group in this academic preparation course, the primary learning objective of this design is to help students improve their academic English skills in various domains. Technological tools selected to achieve this learning goal consist of those that promote the development of each competency in the language. There are numerous software programs employed to support students' vocabulary, reading, and writing skills development, in addition to assisting with their improvement in listening and speaing fluency.

Keywords: CCDT, instructional product, constructivist learning approach, ADDIE, ID model, effective instruction, adult ESL students, academic preparation course, technology tools, development of academic English skills in various domains, vocabulary, reading, writing, listening, and speaking competencies.

INTRODUCTION
Continuous technology use both inside and outside of the classroom is a driving force behind this instructional product, which is empowered by various audiovisual technologies that are designed to promote students' improving their academic English skills in all skills (i.e., vocabulary, reading writing, listening, speaking). In order to reach this goal, a comprehensive unit lesson curriculum (i.e., Unit 7, Microbiology) was created. All of the technologies that assist with ESL students' meaning making during their learning were listed in the CCDT in a way that the reader can appreciate for what academic skill enhancement a particular technology was utilized. Besides this unit curriculum design generated on the CCDT, there is also the second technology (i.e., Prezi, presentation software) via which almost all components of the design were demonstrated. Watching this presentation, the viewer can have a quick overview of all of the elements that went into the unit curriculum design produced through CCDT. The latter is an interactive, animated technology where the guiding principles of the selected instructional model, ADDIE, and constructivist learning theory on which this unit curriculum design was grounded can be observed. Considering that learning is an activity which is defined as "a persisting change in human performance or performance potential" (Driscoll, 2005, p. 9), this particular instructional design appears to deliver this, justifying the guiding principles of the aforementioned theoretical learning framework (i.e., constructivism) and the instructional model (i.e., ADDIE).

ACHIEVING MEANINGFUL LEARNING WITH THE CONSTRUCTIVIST LEARNING APPROACH
Constructivism (Vygotsky, 1978) is a theoretical framework which refers to the fact that when guided by the instructor or facilitator, students can gradually improve their performances both inside the classroom and outside, where they begin to direct their own learning, construct their own meanings from the given topic, and thus master academic skills necessary for them to incorporate into real-life cases. The constructivist learning approach, coupled with informal, digital media-rich educational practices in a world of digital technologies today gives learners "more control of what, where, and how they learn and usually involves intrinsic motivation" (Reiser & Dempsey, 2007, p. 167). It leads to meaningful learning in class with learners' collaborative, interactive work in group-based settings (Gagne, Wager, Golas, & Keller, 2005). Given that a plethora of ID practices in the literature aim at human performance improvement (HPI)—or human performance technology (HPT)—(Gagne et al., 2005; Reiser & Dempsey, 2007), it should be no surprise that constructivism is a learning theory that is intertwined with this learning objective. Such learning is also called self-directed learning that, if supported with innovative learning tools, can yield higher learning outcomes on the part of the millenials (Dede, 2011).

ADDIE: A POPULAR ID MODEL

As they seek to facilitate learning/teaching practices that are personalized and meaningful for learners, instructors can greatly take from ADDIE, which is a highly popular ID model for designers of effective instructional/training programs (Reiser & Dempsey, 2007). Especially when designed based on the underlying principles of ADDIE, all educational activities in any industry sector or educational field can yield positive learning outcomes. Under the umbrella of ADDIE, a solid analysis of needs or problems plays a crucial role in defining learning objectives or goals that the designer, trainer, or instructor is to set for his/her learner group. It is a well-known fact that the five essential elements ADDIE consists of have been modified from other ID models over the course of time due to the changing learning styles (Bloom, 1968), needs, and demands of today's learners directing their own learning in the digital age, and with the approaches to learning that have had to adjust to such transformation in education. Nevertheless, it is a modified, albeit a reliable guide to those who desire to bring to life authentic educational products with the sole purpose of enhancing their learners' academic performances both inside and outside of the classroom. Awareness and execution of these five core components can yield positive learning outcomes if all teachers and educational leaders are on board with robust technology integration into instruction. Identifying learning objectives is critical in an ID process. Gustafson and Branch (1997) pointed out that all of the instructional systems design (ISD) approaches determine a learning objective, which is a very necessary component of the entire design process. All of the five phases of ADDIE are presented in a linear manner. According to Reiser and Dempsey (2007), throughout the life of a design project, data are collected and the development team evaluates these data, gaining insights into them. During this process, "it is often necessary to move back and forth among the activities of analysis, design, and formative evaluation and revision. Therefore, the iterative and self-correcting nature of the ID process emerges as one of [ADDIE's] greatest strengths" (p. 11). It is thus undoubtedly that ADDIE stands out as a solid design guide to an array of preceding and current ID models (Reiser & Dempsey, 2007) not only in the field of second language acquisition and teaching—the focus of this study—but across disciplines, as well.

IMPACT OF TECHNOLOGY SUPPORTED ID PRACTICES ON MASTERY LEARNING

Effective instruction is facilitated by solid design approaches that play a crucial role in the way instruction is delivered to a particular group of learners. The process of ID cannot be considered without guiding principles of instruction, models, and certain theories. Instructors' own epistemological perspectives, combined with their knowledge of certain psychological and theoretical frameworks often lay the foundation for the extent to which they create innovative and ingenious instructional products for their learners. Merrill (2002) stressed that instructors' knowledge of first principles of instruction can tremendously help them with the design of instruction which is learner-centered and based on solving real-world problems. Reiser and Dempsey (2007) asserted that instruction can emerge as effective, efficient, engaging, interactive—and even fun—in learning contexts where existing knowledge is the propeller of the new one, when it is integrated into students' world, when it is demonstrated to them as they gain mastery of their own learning (Gagne et al., 2005), and when they end up applying their newly acquired knowledge in real-life settings. Defining students' learning styles prior to the design of instruction can be a good reference point for designers who strive to achieve their students' mastery in learning. Under this context, educational technology emerges as an indispensable part of such instructional practices, building a bridge between traditional and progressive teaching approaches and activities. Van Merriënboer (1997) emphasized that instructors can positively influence learning outcomes in a given context if they lead their learners to gain complex cognitive skills, and if audiovisual technologies are made a substantial aid in this process.

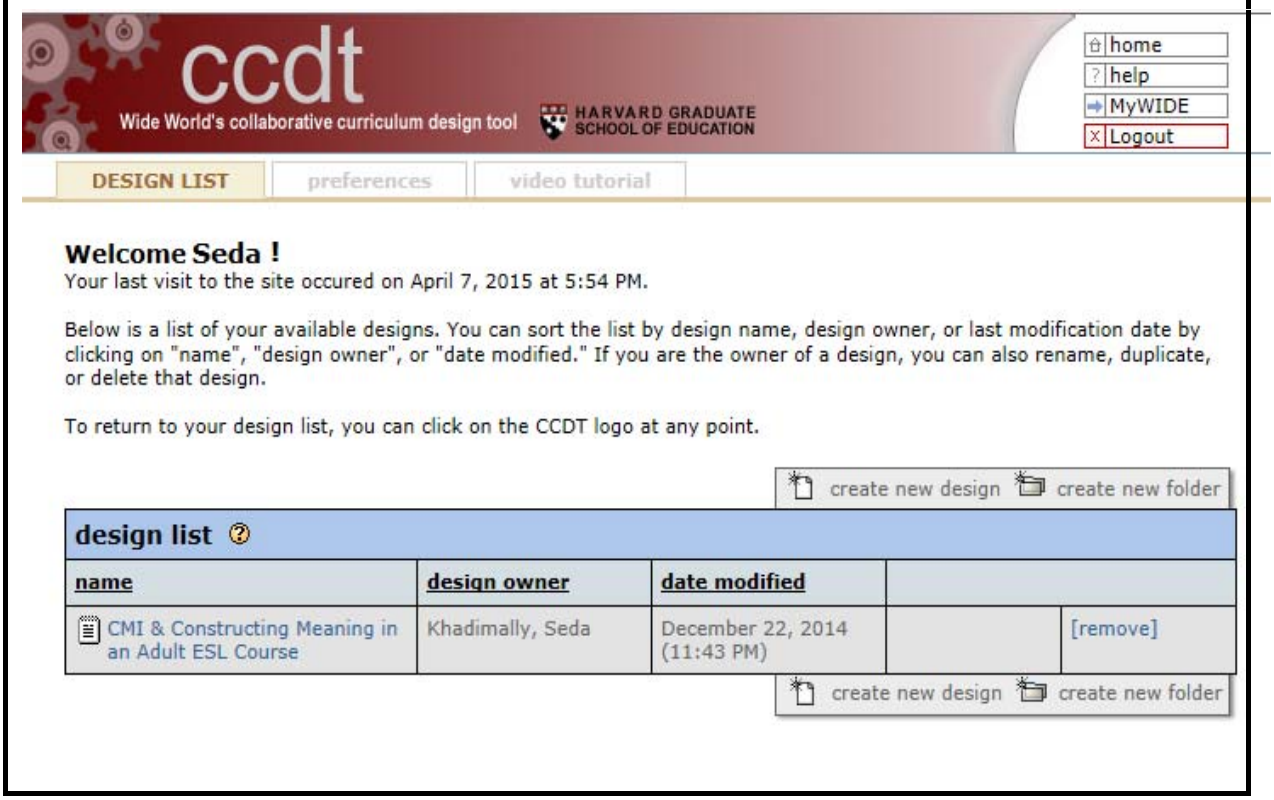
A COLLABORATIVE CURRICULUM DESIGN TOOL (CCDT)

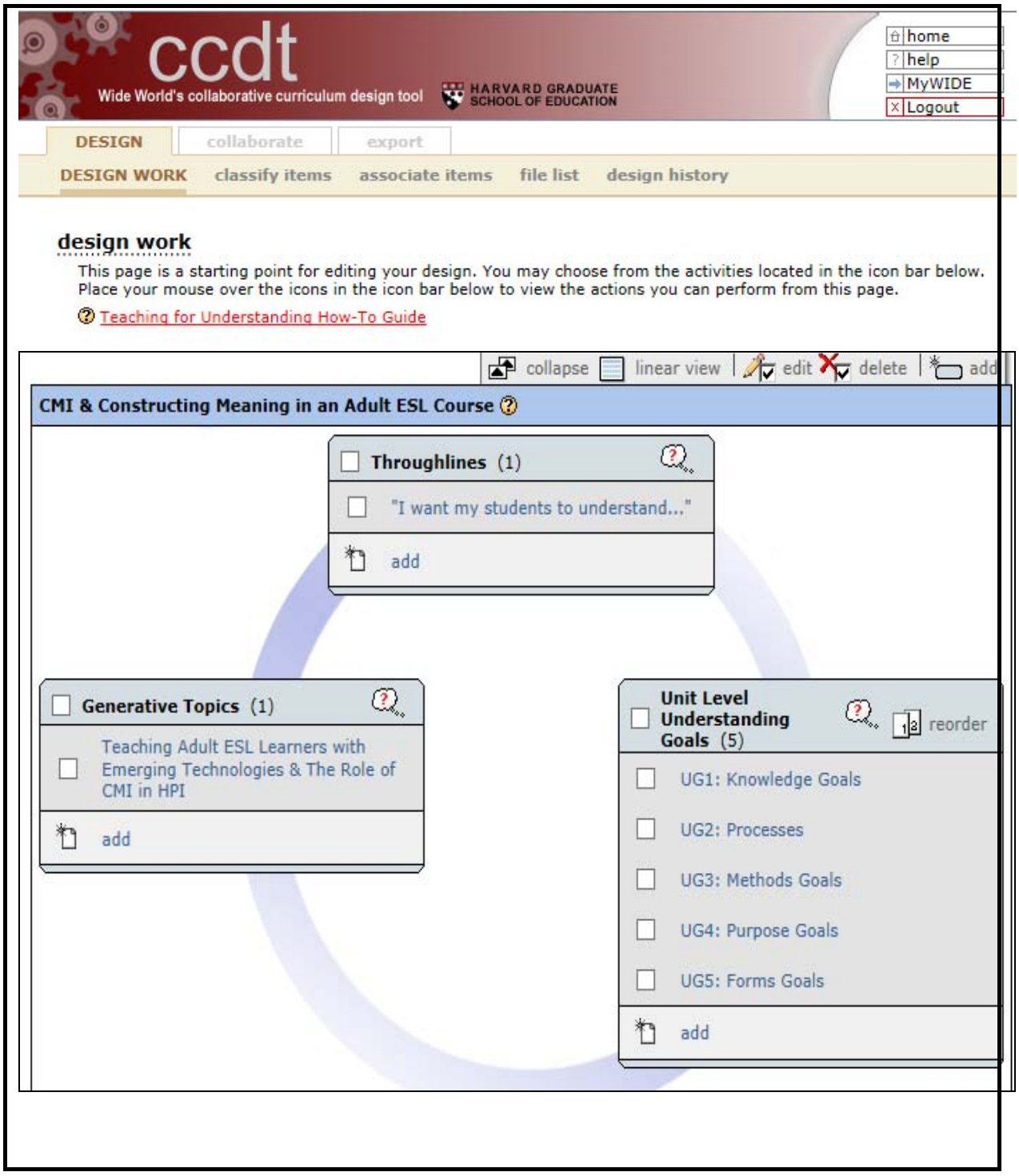
CCDT can be described as an online, interactive design tool utilized to craft effective curricula, unit lessons, or other instructional products (see Figure 1). It is a tech-savvy tool that helps educators share their designs with their colleagues or other educators—not with learners—via a common platform, which lends itself to a collaborative environment of sharing theoretical frameworks, learning and pedagogical approaches, as well as hands-on instructional practices with one another. Easy access and clear interface of the tool makes design engaging and fun for educators as they weave their pattern by using each of the following components under the *Teaching for Understanding* (TfU) framework: Throughlines, Generative Topics, Understanding Goals (UGs), Performances of Understanding (PoUs), Ongoing Assessments (OAs), and other essential elements. Overall, CCDT helps facilitate instruction in any discipline and in any educational, training, or professional development setting. By use of CCDT, instructors, instructional/curriculum designers, trainers, educational technologists, and all others interested in creating innovative, effective, and engaging instructional materials for their learner groups can easily create and access an account for their course on the web. They can also continuously edit their design work through this platform, and after finalizing it, they can electronically publish the completed design work, which is similar to Google Drive or Cloud platform—yet a less complicated one—in the virtual environment. In

other words, instructors using CCDT do not need to be concerned about losing their design work, for they will not be saving their design work on a hard drive.

The particular unit lesson created via CCDT for the purposes of this paper focuses on a content-based, academic adult ESL course. However, as noted earlier, CCDT can be effectively and efficiently used across disciplines by those involved in creating innovative and authentic educational products designed, developed, delivered, and evaluated with a myriad of technologies. The learning objective with a unit lesson or curriculum created with CCDT and under the guiding principles of the TfU framework almost always proves that target learners can gain a comprehensive understanding of the topic covered throughout the course. Moreover, it is also noteworthy that there are two particular advantages of implementing CCDT for an effective unit lesson before, during, and after its creation: 1) Due to the linear and systematic nature of the TfU framework, CCDT guides educators and other learning/teaching agents in their own fields with clear guidelines and a sound pattern (i.e., lesson plan, syllabus, curriculum, etc.), which they can easily follow in a certain learning/teaching environment; 2) The tool also assists design creators with building or developing ID skills necessary to create learning/teaching settings that are collaborative and authentic for specific learner groups. It is pivotal that designers keep all of these features and the central elements of CCDT in mind, especially due to the benefits it provides the educators with in the process of achieving specific learning goals they set for their learners—for the purposes of this paper, adult ESL teachers, in particular. Thus, this paper highlights the characteristics—or the three Ps of CCDT—a practical, progressive, and participatory curriculum design tool. It is also imperative that second language educators appreciate CCDT's conformity with theoretical and pedagogical principles addressed in this paper, as well as its congruence with currently popular ID models and computer aided ESL instruction. Therefore, educators who desire to transcend their current instructional practices with educational technologies can substantially benefit from CCDT, which, for the purposes of this paper, was portrayed as a knowledge-building, innovative, tech-savvy ID tool hoped to be a beacon to ESL instructors, to those working in the field of second language acquisition supported with technologies, or to individuals engaged in the field of education that simply desire to create instructional products that can emerge as highly engaging, meaningful, and fun for their students.

Figure 1. An Exemplary Unit Lesson Designed with the Collaborative Curriculum Design Tool (CCDT)





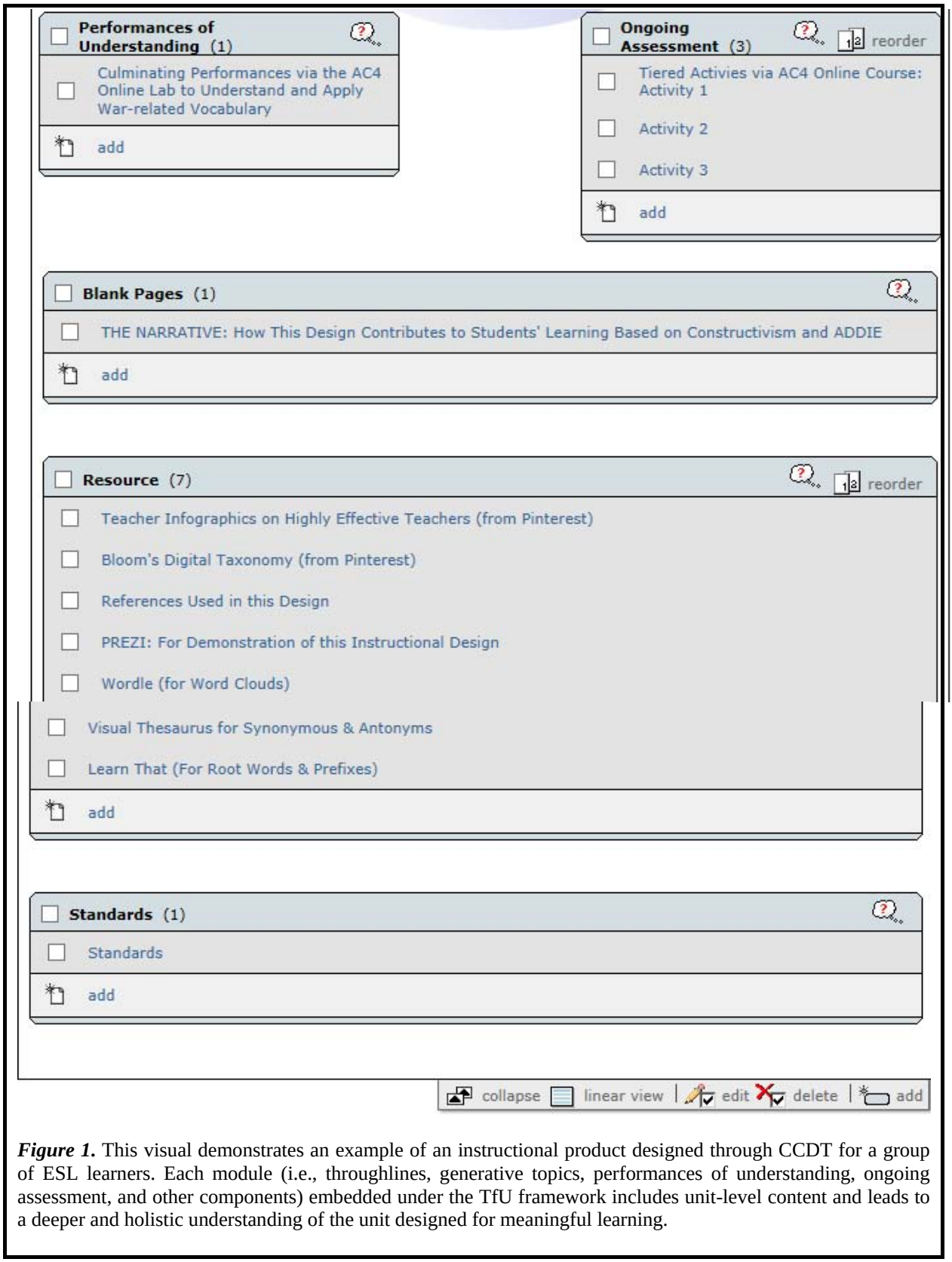


Figure 1. This visual demonstrates an example of an instructional product designed through CCDT for a group of ESL learners. Each module (i.e., throughlines, generative topics, performances of understanding, ongoing assessment, and other components) embedded under the TfU framework includes unit-level content and leads to a deeper and holistic understanding of the unit designed for meaningful learning.

THROUGHLINES

In this unit, all activities were tiered and differentiated, based on the ESL students' learning domains (Bloom, 1968), styles, interests, and readiness levels. Addressing these criteria can help the students figure out how effectively and efficiently they grasped the generative topic, *Fighting Infectious Diseases*, in unit 7, *Microbiology*, by using *war* as a metaphor. They are expected to appreciate the differences among battle-related

vocabulary embedded in the unit. The most important thing for the students to understand about this topic is the subtle nuances among each war-related word such as battle against, wage a war against, be overcome, combat, attack, first line of defense, keep a disease under control, contain, be out of control, outbreak of a disease, be vulnerable to, and be susceptible to a disease.

Through lines (see Figure 2) allow the ESL teacher of this academic English course to set the following learning objectives for her students. Below is the list of these goals and expectations that the educator of this design most wants her students to understand at the end of this 6-week ESL course:

1. Students will internalize their knowledge in the academic topic in unit 7 (i.e., Microbiology), *Fighting Infectious Diseases*, and construct their own meanings from this topic;
2. By using asynchronous and synchronous technologies, the students will engage in an interactive learning environment where they will not only interact and communicate with the instructor, but also with their peers. Technology supported learning will help the students understand the meaning and value of communication in a student-faculty and faculty-faculty interaction (Reiser & Dempsey, 2007). At the end of the unit under study, (i.e., Microbiology), all students will also be able to demonstrate enhanced fluency in writing and listening. They will additionally build on their advanced academic vocabulary repertoire. As the instructor encourages her students to utilize a variety of technological tools both inside and outside of the classroom, she wants her students to make their own meanings from the topic. As they construct their own meanings from the given subject matter over the course of six weeks, students will eventually become self-directed, intrinsically motivated learners (Vygotsky, 1978). As she provides them with an array of authentic learning/teaching materials in vocabulary, reading, writing, listening, and speaking competencies, her students will use various educational technologies during this learning process. With this type of instruction, she wants her students to transform into constructivist learners apt to build authentic meanings, which can lead to their discovery of a type of instruction that is effective, fun, engaging, efficient, and appealing (Reiser & Dempsey, 2007) for themselves.

Figure 2. Throughlines

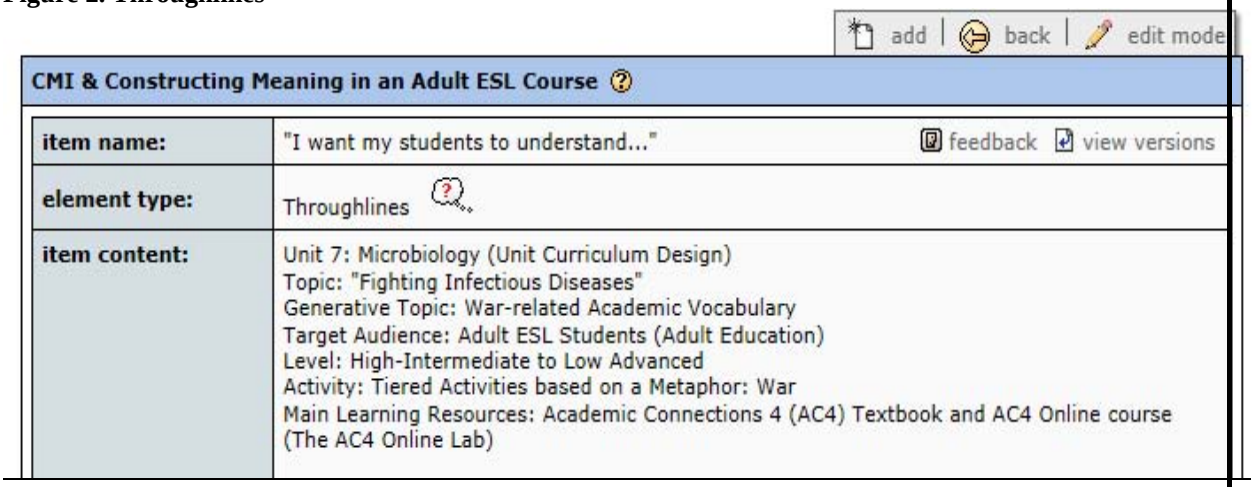


Figure 2. With these overarching goals, the students are expected to develop a deeper understanding of the content from the given unit (i.e., Unit 7: Microbiology) and the particular topic, *Fighting Infectious Diseases*. Throughlines will be closely related to the Understanding Goals (UGs) for this specific unit and vice versa.

3. The ESL instructor wants her students to acquire all skills in English through the use of below educational technologies:

ePortfolios involving digital videos, creating personal narrative videos they can edit and publish (e.g., iMovie, Microsoft Office, YouTube, Final Cut Pro, etc.), designing blogs and wikis, using the word cloud tool Wordle (see Figure 3), and online dictionaries such as Visual Thesaurus, JTW, etc.—so they can build upon their advanced academic vocabulary skills—designing interactive presentations with Prezi, Microsoft PPT, or Adobe Presenter, using social networking tools such as FaceTime, LINE, Google Chat, Skype, Adobe Connect, Lexly, Twitter, and Facebook in order to socially connect.

Figure 3. Unit 7 Vocabulary Words via Wordle.net, an Online Word Cloud Tool

Figure 3. By use of this tool, the most frequently used advanced academic words derived from the unit vocabulary are designed and presented to ESL students in a way that they will gradually begin to digest these words, and build upon them as they engage in various vocabulary, reading, writing, listening, and speaking activities and tests. What stands out by use of this technology is that the students will ultimately end up mastering academic vocabulary pertinent to the topic, *Fighting Infectious Diseases*.

4. The instructor also wants her students to showcase their knowledge with a culminating digital portfolio project at the end of this unit. By preparing an e-Portfolio, students can demonstrate their performances in various skills in the English language, based on their thorough understanding of topics. With this project, they can display their newly gained knowledge of the unit vocabulary words, in addition to their writing, listening, and speaking competencies (see Figure 4 for assessment of ESL students' speaking fluency).

Figure 4. Oral Presentation Assessment Rubric

~Oral Presentation Assessment Rubric~

Unit 7: *Microbiology*

Topic: *How to Prevent the Spread of Infectious Diseases*

CATEGORY	Excellent (4)	Very Good (3)	Good (2)	Fair (1)
Vocabulary	Vocabulary is generally accurate and appropriate to the task; minor errors, hesitations may occur.	Vocabulary is usually accurate; errors, hesistation may be frequent.	Vocabulary is not extensive enough for the task; inaccuracies or repetition may be frequent.	Vocabulary is inadequate for the most basic aspects of the task.
Grammar	Grammar may contain some inaccuracies, but these do not negatively affect comprehensibility.	Some grammatical inaccuracies may affect comprehensibility; some control of major patterns.	Many grammatical inaccuracies may affect comprehensibility; little control of major patterns.	Almost all grammatical patterns inaccurate except for a few memorized patterns.
Pronounciation	Issues are completely or almost completely comprehensible; errors, rhythm and/or intonation problems do not create misunderstandings.	Issues are generally comprehensible, but pronounciation errors, rhythm and/or intonation problems may create misunderstandings.	Issues are difficult to comprehend because of numerous pronounciation errors, rhythm, and intonation problems.	Issues are practically incomprehensible
Preparedness	Students are completely prepared for the topic, and obviously rehearsed.	Students seem pretty prepared for the topic, but might have needed a couple of more rehearsals.	Students are somewhat prepared for the topic, but it is clear that rehearsal was lacking.	Students do not seem at all prepared for the topic to present.
Content	Students show a full understanding of the topic.	Students show a good understanding of the topic.	Students show a good understanding of parts of the topic.	Students do not seem to understan the topic very well
Posture and Eye Contact	Students stand up straight, look relaxed and confident. They establish eye contact with everyone in the room during the presentation.	Students stand up straight and establish eye contact with everyone in the room during the presentation.	Students sometimes stand up straight and establish eye contact.	Students slouch and/or do not look at people during the presentation.

Figure 4. ESL students' speaking skills regarding unit-related topic, *How to Prevent the Spread of Infectious Diseases*, are assessed based on the given rubric criteria—from fair to excellent.

5. The instructor of this academic English course finally wants her students to socially interact with both their peers and herself, by sharing a common culture of both content and method, and thus build a knowledge-building community of ESL learners. Gagne et al. (2005) stressed that group-based, interactive instruction helps students connect and build a community of digital learners in today's world of technology.

***Through Grouping*:**
A. The students will derive context-related meanings of academic words, and appreciate what metaphorical use of the language is;
B. They will appreciate the application of war/battle-related vocabulary in real-life settings;
C. The students will also develop an understanding of certain grammatical structures used to facilitate their academic vocabulary use in context and writing activities.

GENERATIVE TOPICS
The unit topic to be taught in this six-week course is *Fighting Infectious Diseases* in unit 7. There are eight units in sequence in the textbook, *Academic Connections 4 (AC4)*. The textbook involves a built-in online lab (AC4 online), which is an interactive course that provides a variety of skills-based activities to ESL students in all units. The course will heavily rely on supplemental activities through Computer-Mediated Instruction (CMI). The online course will provide the ESL students with hands-on applications as they acquire and implement vocabulary skills, reading, writing, listening, and speaking. All students will benefit from the AC4 online course, which is expected to yield higher learning outcomes in all aforementioned skills. CMI is effective particularly on reading, vocabulary, listening, and speaking fluency. During the design and implementation of this unit curriculum, the instructor will be aware of the fact that technology has a highly positive impact on second language acquisition. Unit instruction via CMI will particularly be critical for her ESL students, for they can more easily—and audio visually—scaffold their learning in each learning domain every time they come across a new concept or expression throughout their progress in this unit (i.e., Microbiology). This will greatly contribute to their performance improvement (Gagne et al., 2005), as competent language learners. CMI will also assist the students as they associate each term with their previous experiences, and thus construct their own meanings (Vygotsky, 1978; Reiser & Dempsey, 2007) from within the subject matter.

The instructor's hands-on use of this online lab and getting her students to perform activities both inside and outside of the classroom environment will greatly contribute to their mastery learning (Bloom, 1968, as cited in Gagne et al., 2005). With respect to this, it is imperative that educators remember that in a digital world of learning and teaching, they must design and evaluate programs that promote students' mastery learning in given tasks and learning objectives. Indeed, from a scholastic point of view, these should be educational programs consistent with progressive learning styles of the millenials (Dede, 2011). Also, from an instructional viewpoint, Gagne et al. (2005) pointed out that "the idea of mastery requires a change in thinking about instructional design as well as assessment" (Bloom, 1968, as cited in Gagne et al., 2005, p. 274), which is exactly what the instructor of this course seeks to accomplish on her part with her curriculum design both during and after the course completion. Especially that she incorporates the technology component of the AC4 course into her students' learning processes will be a substantial aid for her students' *performance improvement* (Reiser & Dempsey, 2007). She is particularly cognizant of the fact that Human Performance Improvement (HPI) or Human Performance Technology (HPT) is a "special field that has evolved professionally in the last 15 years, and can assist individuals and organizations to achieve workplace success" (Reiser & Dempsey, 2007, p. 143). Online technologies that she will employ together with her students throughout the unit (i.e., Microbiology) will solidify her students' appreciation for the value of all generative topics. Use of AC4 will considerably help her learner group to enhance and improve their academic performances in all English skills, which is highly consistent with the guidelines of the HPI/HPT ID model (Reiser & Dempsey, 2007).

Defining an infectious and a contagious disease, and the subtle differences between the two terms will be one of the foci during academic vocabulary activities. Other generative topics relevant to the unit will be acquisition of and resistance or sensitivity to infectious diseases, and the ways to avoid or avert the process that occurs in everyday life. In this context, such generative topics will help the course instructor's students appreciate how germane the topic is in today's world. Other generative topics will involve students' comprehension of and differentiation among the following vocabulary words: pathogens, contract infectious diseases, epidemic, pandemic, symptom, syndrome, resist, susceptible, vulnerable, vaccination, and several others in both the AC4 textbook and AC4 online lab.

With this unit design, the students will also learn about other pertinent vocabulary regarding humans' combat with infectious or communicable diseases (e.g., battle, wage a war against, overcome, attack, first line of defense against, keep under control, resist, etc.). They will also understand speakers' main discussion points as they listen to unit related lectures. They will comprehensively grasp the entire content with reading passages about the topic.

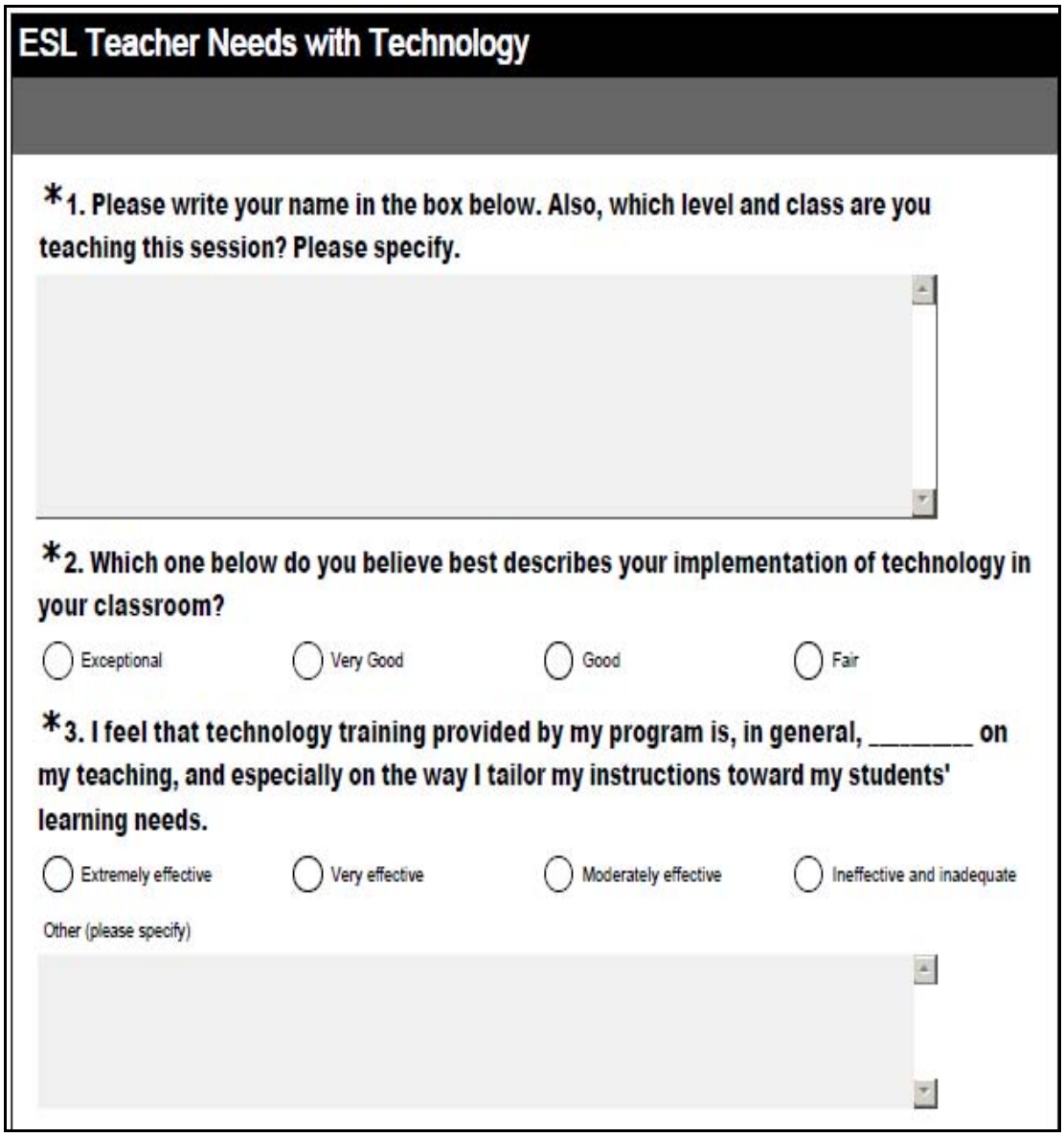
This unit is worth learning, because the students will not only understand content-based academic skills, unit concepts and technical terminology, and acquire better listening skills, but will also be able to debate (i.e.,

speaking skills) on the topic, and write on subtopics that revolve around humans' fight against infectious diseases in real-life. This is worth learning, for, at the end of this unit, students can acquire academic content knowledge enriched with several authentic integrated skills tasks, especially designed for proficiency in the writing and speaking domain. Such an integrated skills approach to their learning will contribute to their understanding, application, evaluation, and critique of real-life cases that occur in today's world.

This lesson is also important for adult ESL students to learn, for by use of emerging educational technologies, they can gradually build upon their newly acquired knowledge of all skills in the language English, which is highly congruent with 21st century digital literacies. The course teacher's instructional practices are particularly critical to support the students' knowledge-building process, because she will initially begin to deliver the academic content via scaffolding her students' learning, and as they improve their understanding and practice of the subject matter, she will gradually let them learn the subject matter on their own; a learning/teaching approach that highly aligns with the constructivist learning pedagogy (Vygotsky, 1978). From an ID viewpoint, another note on the importance of teaching this unit lesson to adult ESL students is that the entire life cycle of this CCDT-generated design work will be predominantly guided by the principles of ADDIE.

Under these particular generative topics, teaching English to speakers of other languages (TESOL) is especially critical—and very timely in the current digital age. Since the English learners in this academic course are adults, appealing to their needs with appropriate technologies, and helping them transform into self-directed learners (Knowles, 1970) could be a real challenge on the part of the instructor. With that in mind, she will deliver the above mentioned generative topics to her learner group with authentic, effective, and engaging (Reiser & Dempsey, 2007) activities supported with a variety of technologies. In order to overcome such potential challenges, and as mentioned earlier, she will base her curriculum on the ADDIE ID framework. Especially the first stage (i.e., analysis) of ADDIE helped the instructor create a *needs analysis survey* (see Figure 5), which she designed with SurveyMonkey. In the conduct of this survey, she collected essential data from her colleagues at school, by sending them an online survey link. This survey simply demonstrated the technology needs of ESL teachers at school. She then designed her weekly syllabi based upon the data she derived from this analysis. The data she collected demonstrated that some of the necessary technology tools are already utilized by teachers both inside and outside of the classroom while some others are not. Thus, the data reported by majority of ESL teachers showed that all teachers needed to be on board as far as their use of cutting-edge technologies in class and in terms of the school administration's attitude toward and encouragement of their use of innovative, digital tools both inside and outside of class. Gagne et al. (2005) contended that instructors need to keep up with the pace of emerging instructional technologies in today's digital world. Taking this into consideration, as she designed this unit lesson, the course instructor began to implement some of the less frequently used and yet popular technologies. With the completion of this academic English course, she will go through all components of CCDT under the TfU framework, and thus further evaluate the extent to which—or how effectively and efficiently—she incorporated these online tools into her teaching this unit lesson. That will be demonstrated under PoUs of this design work.

Figure 5. Technology Needs Analysis Survey for ESL Teachers



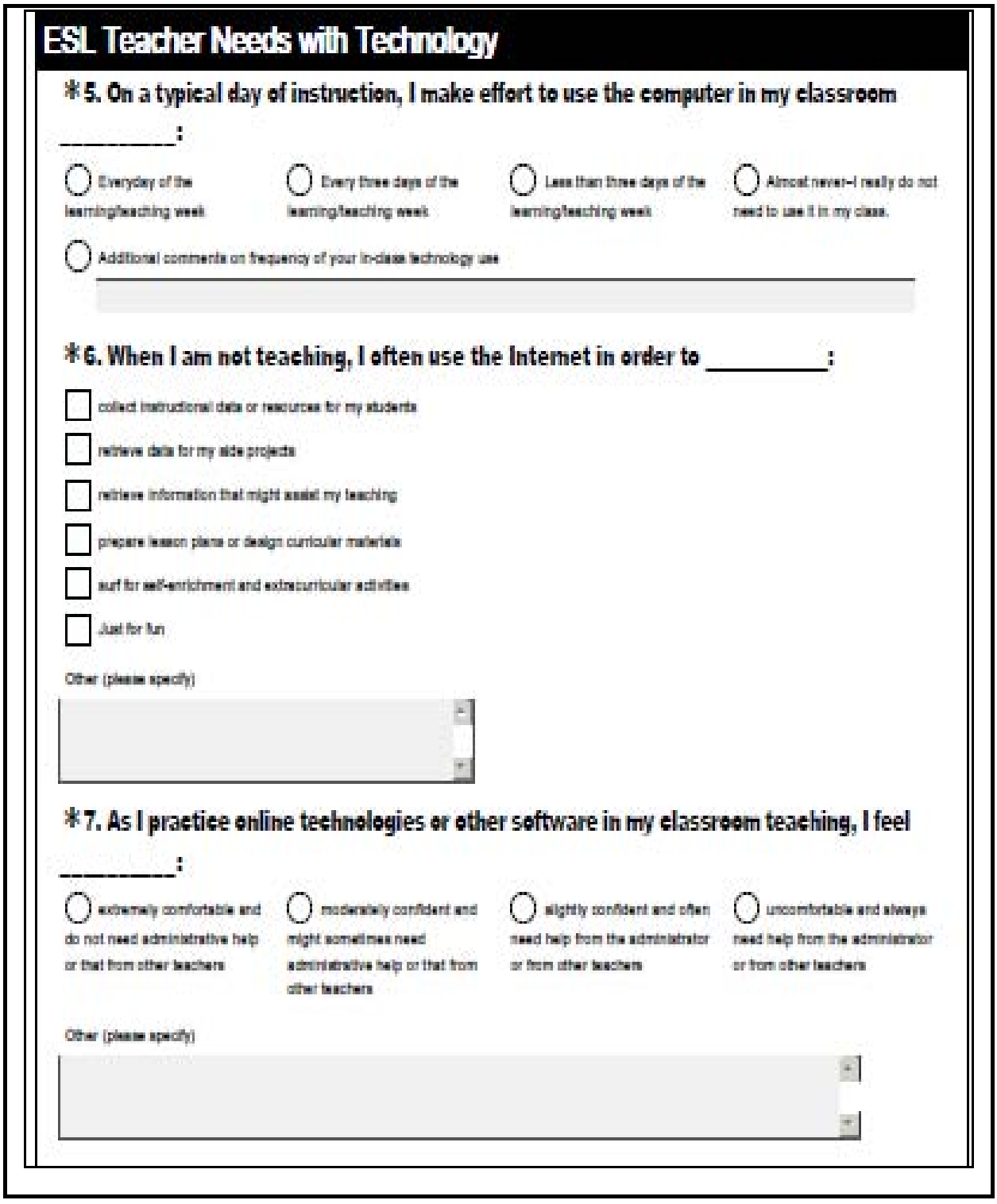
ESL Teacher Needs with Technology

*4. Dear teacher,

Please choose one or more of the questions below and respond in detail. Your sincere response in this question will immensely affect our decision-making process toward developing a training program solely geared toward your technology needs.

Thank you!

Describe where you see yourself in terms of your in-class technology use. What do you believe your technology needs are, as an instructor? Do you think that your students' learning expectations in your class are fulfilled without a collective use of technologies in class--or outside of the class? Have you ever conversed with students in your class, in need of technology-supported ESL learning? If so, share with us. Do you feel that your students' learning needs can often be met with the current techniques with which you have taught so far? Why/Why not? Do you see yourself as a tech-savvy ESL instructor? If not, why not? Please explain what your needs are with regard to your technology needs in your teaching? What specific software tools would you like to learn about and then practice with your students in your class? Your specific answers in this section will greatly help us provide you with the best technology training possible.



ESL Teacher Needs with Technology

*5. On a typical day of instruction, I make effort to use the computer in my classroom _____:

- ◯ Everyday of the learning/teaching week
- ◯ Every three days of the learning/teaching week
- ◯ Less than three days of the learning/teaching week
- ◯ Almost never–I really do not need to use it in my class.
- ◯ Additional comments on frequency of your in-class technology use

*6. When I am not teaching, I often use the Internet in order to _____:

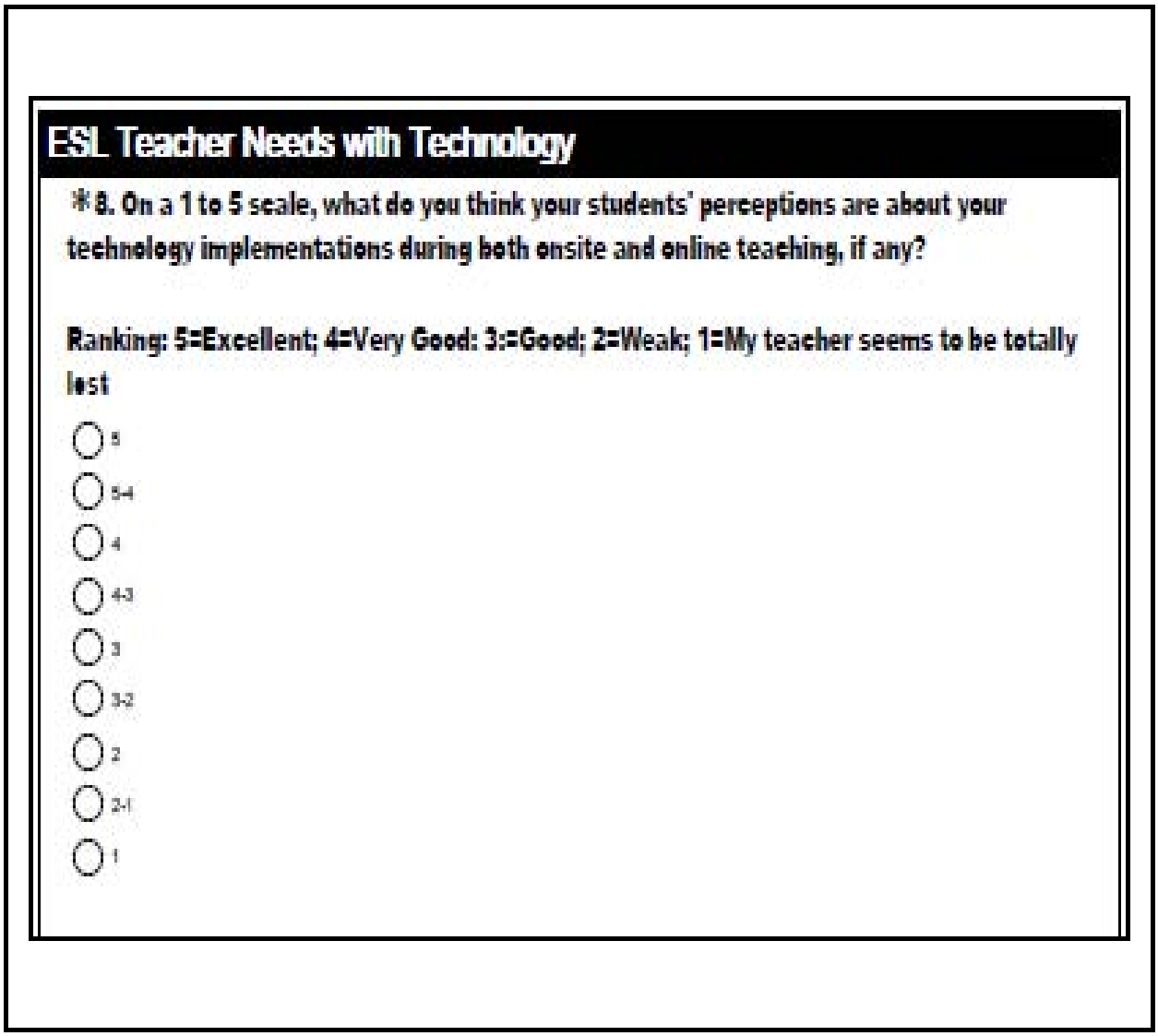
- ☐ collect instructional data or resources for my students
- ☐ retrieve data for my side projects
- ☐ retrieve information that might assist my teaching
- ☐ prepare lesson plans or design curricular materials
- ☐ surf for self-enrichment and extracurricular activities
- ☐ Just for fun

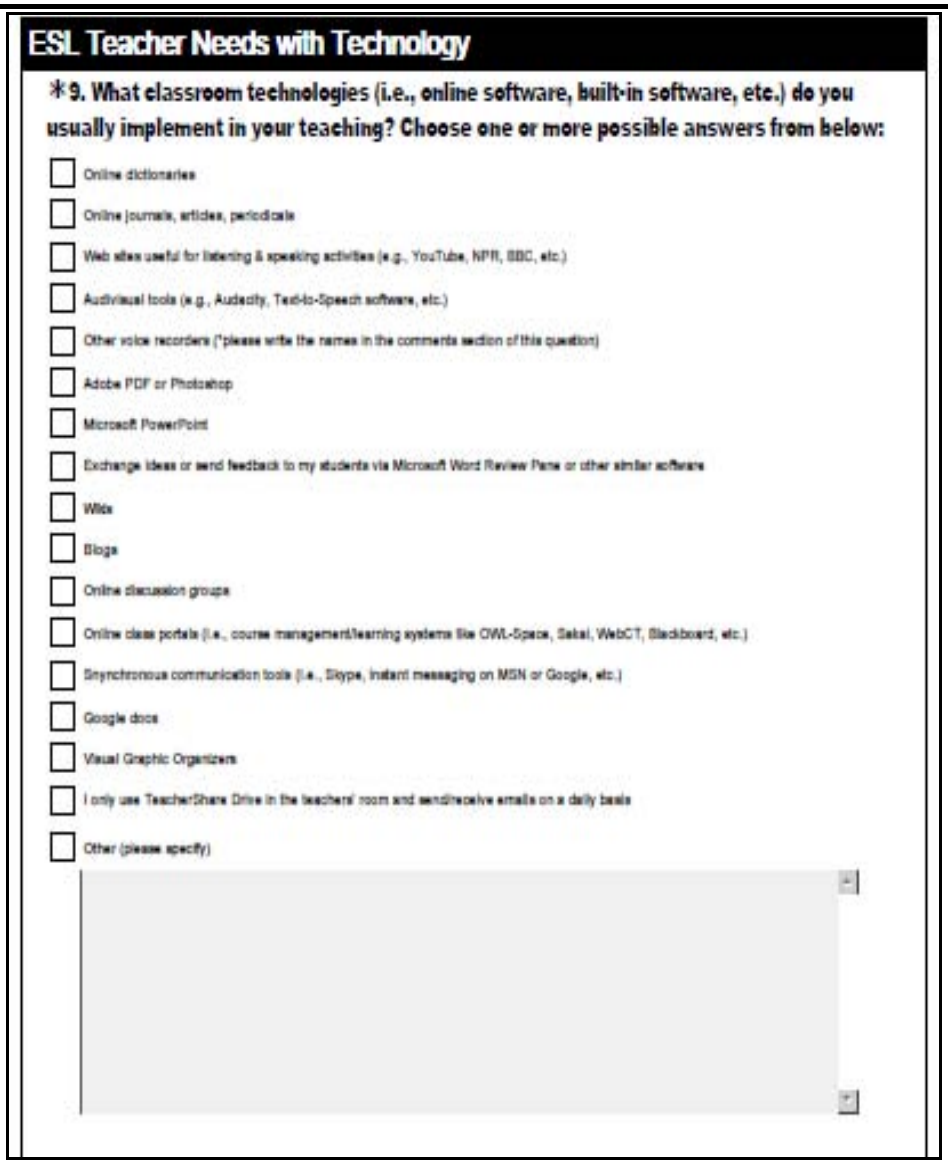
Other (please specify)

*7. As I practice online technologies or other software in my classroom teaching, I feel _____:

- ◯ extremely comfortable and do not need administrative help or that from other teachers
- ◯ moderately confident and might sometimes need administrative help or that from other teachers
- ◯ slightly confident and often need help from the administrator or from other teachers
- ◯ uncomfortable and always need help from the administrator or from other teachers

Other (please specify)





ESL Teacher Needs with Technology

*9. What classroom technologies (i.e., online software, built-in software, etc.) do you usually implement in your teaching? Choose one or more possible answers from below:

- [ ] Online dictionaries
- [ ] Online journals, articles, periodicals
- [ ] Web sites useful for listening & speaking activities (e.g., YouTube, NPR, BBC, etc.)
- [ ] Audiviaual tools (e.g., Audacity, Text-to-Speech software, etc.)
- [ ] Other voice recorders (*please write the names in the comments section of this question)
- [ ] Adobe PDF or Photoshop
- [ ] Microsoft PowerPoint
- [ ] Exchange ideas or send feedback to my students via Microsoft Word Review Pane or other similar software
- [ ] Wikis
- [ ] Blogs
- [ ] Online discussion groups
- [ ] Online class portals (i.e., course management/learning systems like OWL-Space, Sakai, WebCT, Blackboard, etc.)
- [ ] Snychronous communication tools (i.e., Skype, instant messaging on MSN or Google, etc.)
- [ ] Google docs
- [ ] Visual Graphic Organizers
- [ ] I only use TeacherShare Drive in the teachers' room and send/receive emails on a daily basis
- [ ] Other (please specify)

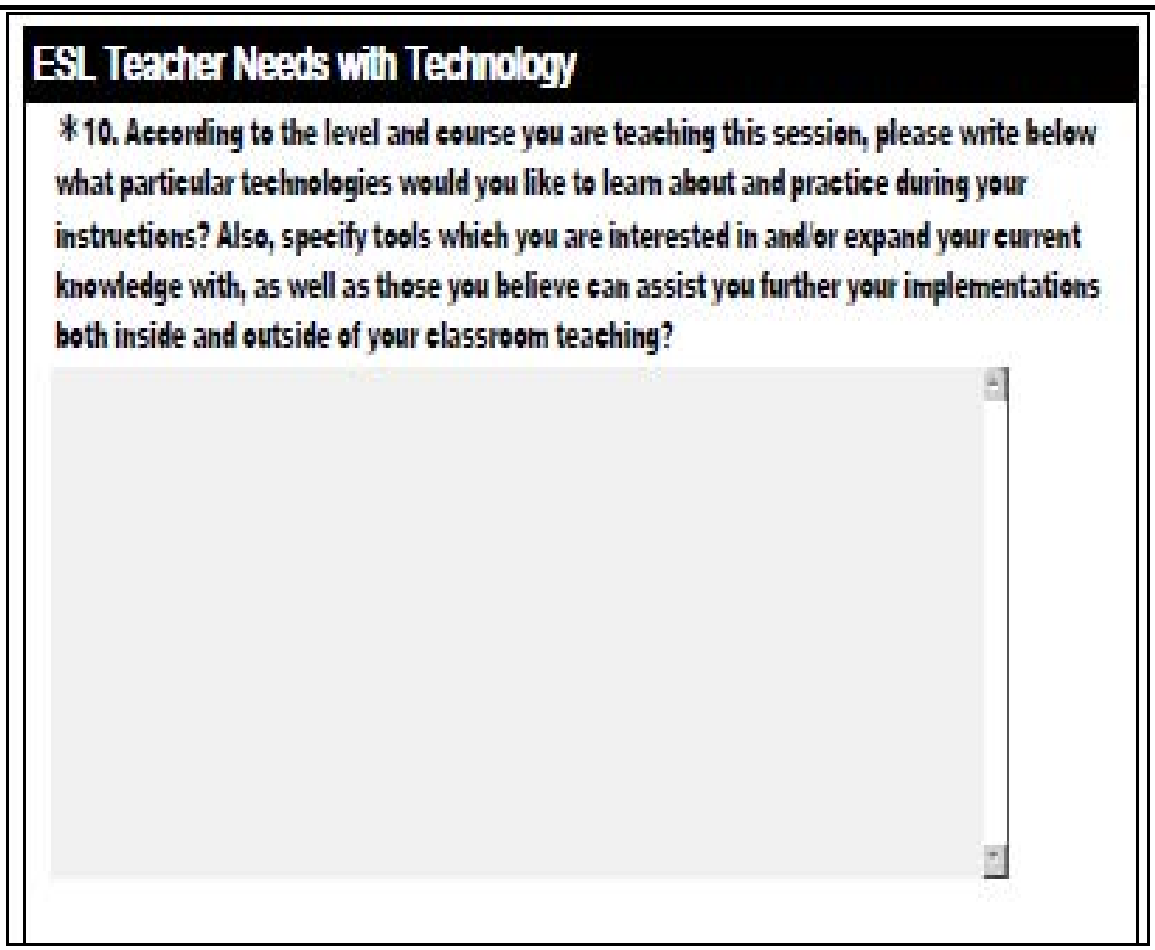


Figure 5. This is an online survey designed with SurveyMonkey sent to ESL teachers in order to decipher their needs with educational technologies to be used both inside and outside of their classrooms. Survey URL: https://www.surveymonkey.com/s/J9JSBGP

UNIT LEVEL UNDERSTANDING GOALS (UGs)

UG1: KNOWLEDGE GOALS

Based on the generative topic of this unit, How to Avert the Spread of Infectious Diseases, the students will develop an understanding of the war-related academic vocabulary.

The first learning goal in this unit (i.e., Microbiology) is to ensure that advanced level ESL students extensively understand and acquire the sophisticated vocabulary words, concepts, expressions, and all of the technical terminology necessary to apply in real-life cases. Knowledge goals align with one of Benjamin Bloom's (1968) educational objectives under the following cognitive domain: knowledge. With knowledge goals, the ESL students in this course will transform into self-driven, intrinsically-motivated learners, which will ultimately affect their achievement levels during our educational activities. Students' metacognitive knowledge about what they know, or self-efficacy with which they can develop about their own learning (Ormrod, 2008) will lead them to extrapolation of what context-based readings, lectures, oral and written expressions, concepts and expressions will mean to them. The students will eventually gain mastery in deriving and constructing their own meanings from within the related texts and terms. By performing integrated tasks on the online course, AC4 online, students will better develop their acquisition of four skills in English, by focusing on humans' combat with contagious diseases in real-life settings.

UG2: PROCESSES

After a list of Microbiology-related vocabulary words is handed out to the students, those consistent with the reading and listening excerpts (see Figure 6) built both in the text book, Academic Connections 4 (AC4) and also in its interactive, online course (AC4 Online) will be covered. Next, topic-related passages will be read, and vignettes with their transcripts will be audibly presented to them. Throughout this process, the students will be

asked to review this vocabulary list, so their vocabulary skills can assessed with a quick vocabulary test. Students are then to internalize some of the technical words necessary for them to be able to write a 5-paragraph process essay about the topic, which will be their culminating writing project as the topic is concluded. The topic title of this take-home writing assignment will be as follows: *How to Avoid the Spread of Infectious Diseases.* Meanwhile, the students will be additionally assigned to complete take-home, online listening quizzes, which they can take via the AC4 online, interactive course.

Figure 6. A Listening Activity from the Online Lab

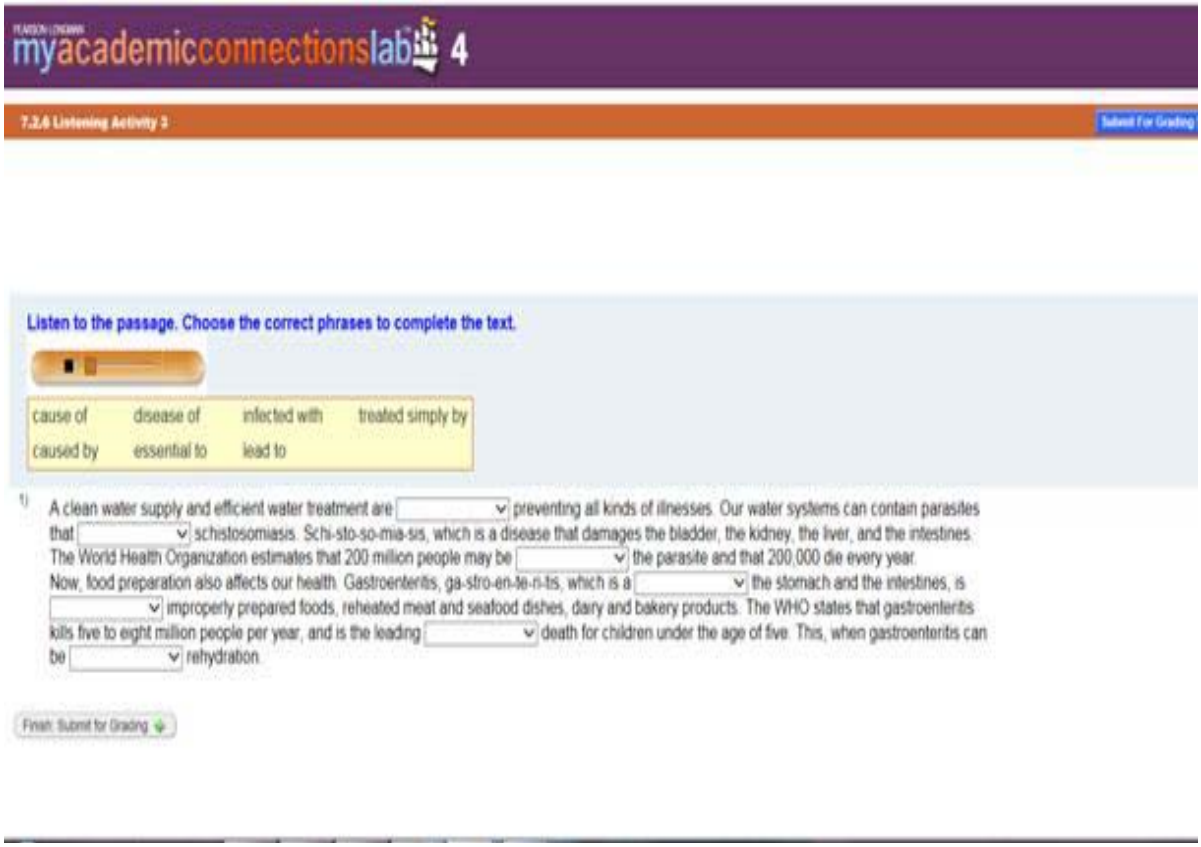


Figure 6. This is an online, interactive listening activity from the online lab (i.e., AC4 online), which assists with assessing ESL students' understanding of the content of Unit 7 (i.e., Microbiology).

UG3: METHODS GOALS

ESL students will understand the purpose and implementation of all of the aforementioned educational technology tools commonly used for exploration, comprehension, demonstration, knowledge, acquisition, application, analysis, synthesis with alternative solutions, and evaluation (Bloom, 1968). With online, interactive tests on AC4 site (see Figure 7 for an exemplary reading activity), the students will especially appreciate the similarities and differences between specific Microbiology-related terms and/or expressions, such as between infection and contagion, or among vulnerable to, resistant to, susceptible to, sensitive to, symptom, syndrome, attack, battle against, be overcome, combat, fight, epidemic, pandemic, etc.

Figure 7. A Reading Activity from the Online Lab

Figure 7. The aim with this online, interactive reading activity is to support ESL students' thorough understanding of the topic, *Resistance to Antimicrobial Drugs*.

UG4: PURPOSE GOALS

Students will come to understand the reason why utilizing a variety of technologies both inside and outside of the classroom will substantially contribute to their comprehension, application, analyses, syntheses, and evaluation in the process of gaining mastery in all four fundamental skills (i.e., listening, speaking, reading, and writing) (Gagne et al., 2005). They will also realize to what extent technology supports them with directing their own learning and constructing their own meanings both individually with their peers together in the classroom. According to Reiser and Dempsey (2007), it is essential that effective instructors/trainers design instruction/training programs with which their learners/trainees can first identify and analyze the learning goals/objectives of the given content, with the purpose of understanding first their own learning needs and next the objectives of the instructional practices to be given. Gustafson and Branch (1997) pointed out that all ID approaches determine a learning objective, which is a very necessary component of the design process. Learners can then understand the particular content, only to prepare themselves toward integrating and applying their newly acquired knowledge into their current academic—or business-related—practices. Understanding the purpose of instruction is congruent with the major ID model of this unit curriculum design, ADDIE (Reiser & Dempsey, 2007).

UG5: FORMS GOALS

This unit curriculum design is empowered by the ADDIE (i.e., Analysis, Design, Development, Implementation, Evaluation) ID model (see Figure 8, retrieved from Gagne et al., 2005, p. 13), whose strength is being iterative and self-corrective.

Figure 8. ADDIE, a Highly Popular ID Model (Retrieved from Gagne et al., 2005, p. 13)

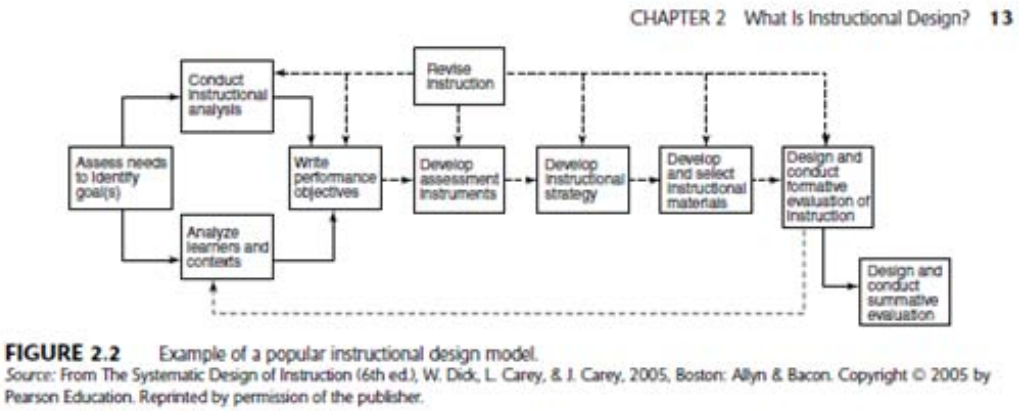


Figure 8. The chart above demonstrates a highly popular ID model in the process of designing, delivering, executing, and evaluating effective instruction. Drawing on the nature of ADDIE, the content of this unit design will be continuously modified and developed, which cannot be possible without the ESL students' corrective feedback at the end of the course (see section entitled *Performances of Understanding* of this design). Given that there is a specific problem and learning need (Gagne et al., 2005) that is to be addressed and rectified, which is that adult ESL students need to master their learning in all skills in English with support of CMI, this particular unit curriculum design was created with the expectation that it can address this issue.

The design involves a highly sophisticated academic vocabulary repertoire for adult ESL students, who fall under a certain age group and educational level. Within this age range and educational level, the students study English as they prepare to go to undergraduate or graduate schools in the U.S. As such, designing this unit consistent with the principles of instruction under the ADDIE model and constructivist learning framework was the primary goal, which can greatly assist with the students' learning for understanding. Such a learning goal can lead one to deeply comprehend and appreciate the epistemological, philosophical, and pedagogical underpinnings of the design.

From an academic viewpoint, with this unit design, students will understand how to use each online module in the AC4 online Lab in order to take various integrated skills tasks such as in writing and speaking, and to master their performances on what they have learnt about the topic, Microbiology throughout the course. Gagne et al. (2005) pointed out that "the idea of mastery requires a change in thinking about instructional design as well as assessment" (Bloom, 1968, as cited in Gagne et al., 2005, p. 274). AC4 Online course is a proper mode and rate of instruction in this adult ESL course as far as all of the understanding goals are concerned, because of two reasons:

1. AC4 Online Lab will not only help ESL students master their own learning throughout the course, but also lead them to get more hands-on with it than ever before;
2. The instructor of this course can more conveniently engage in further instructional practices each time she provides her students with feedback on their academic performances. Also, she can practice further assessments and evaluations—and for her program—which, in turn, can explain the degree to which AC4 online is a very powerful mode of CMI. The impact of AC4 online courseware can be felt both by the instructor and students of this course, especially when the ADDIE ID principles are taken into account (Reiser & Dempsey, 2007).

PERFORMANCES OF UNDERSTANDING (PoUs): CULMINATING PERFORMANCES VIA AC4 ONLINE LAB TOWARD UNDERSTANDING AND APPLICATION OF WAR-RELATED VOCABULARY

Over the course of six weeks, ESL students will understand and apply different meanings of war-related vocabulary in the Microbiology unit, wherein they will learn about how they can fight diseases that are infectious. The students will also culminate their performances, by giving an individual 5-minute impromptu speech in class or a 15-minute group-based oral report which they are to prepare at home, so they can showcase in class at the end of the unit. The learning goal with such impromptu speaking assignments is to help the students demonstrate their comprehensive understanding of the topic. As they showcase their culminating performances both during the semester and at the end of the course, students can go to YouTube and make their own videos by storytelling/narrating. They can also produce movies by using iMovie or other related movie making software. They can additionally design word clouds through tools such as Wordle.net. Furthermore, the students can create blogs and wikis where they can upload several materials regarding Microbiology-related expressions and then demonstrate them in class. They can also build mind/concept maps with a mind mapping tool such as Inspiration.com, while using online synonmys and antonyms dictionaries such as Visual Thesaurus.com or dictionaries such as just-the-word.com (JTW), or wordandphrase.info/frequencyList.asp. For showcasing the root words and prefixes of academic vocabulary they will learn until the end of this six-week course, they can additionally refer to learnthat.org and several such other web sites.

There are additional technologies by which ESL students in this course can perform their learning, such as PPT (Microsoft Office), Prezi.com (via web), Google Drive, Google Chat, WordPress.Org (for Blogs), Wetpaint,com (for Wikis), Skype, Face Time, LINE, and various other applications for voice and video calls. The fact that the students can find the opportunity to create their own designs, vocabulary lists, slides, wikis, and blogs both audibly and visually will help them excel at their learning at the end of the unit (i.e., Microbiology). These PoUs will be engaging, interactive, and fun for all students. Mastery learning (Gagne et al., 2005) with such creative and original PoUs will prove to have an effective, efficient, appealing (Reiser & Dempsey, 2007), ingenious, and authentic impact on instruction not only tailored toward this particular group of adult ESL learners, but also for further groups in future instructional practices, as well. Based on the principles of ADDIE, AC4 Online lab and such innovative technologies can help the students achieve both content and skills-based mastery. Reiser and Dempsey (2007) pointed out under the guidelines of ADDIE that searching for proper modes and rates of instruction with which mastery learning can be achieved is what effective instructors and trainers should do. With that in mind, this instructional design should yield effective instruction and considerably assist with all students' performances.

At the end of each showcase, each of the students will be provided with individual—and corrective—feedback both in one-on-one settings and in groups. Reiser and Dempsey (2007) emphasized the vitality of providing corrective feedback to learners, instead of one given in a right or wrong format. Next, following round-table discussions and team-related activities, all students will find the opportunity to evaluate both their own performances (see Figure 9) and those of their classmates' with *self-reflection and peer-assessment sheets* (see Figures 10.1 & 10.2). Engaging in self-reflection will be highly beneficial to adults ESL students' cognitive development, for it will substantially help raise their self-efficacy and motivational levels, along with their improved learning beginning in this specific level (i.e., Level 6). Also, this type of reflection will be a vehicle for personalized information, demonstrating each student's subjective and sincere opinions both about their peers' and their own. Such data could not be possibly collected through faculty-to-student feedback. Therefore, reliable and valid information collected in the evaluation stage by use of multiple sources is an instructional objective for the ESL teacher instructing this course, a goal which is also consistent with the *evaluation* component of the ADDIE ID model.

Figure 9. Self-Reflection Sheet

Course: Academic Preparation
Unit 7 (Microbiology)
Topic: *Fighting Infectious Diseases*
Activity: Evaluation
Item: *Self-Reflection* (in a To-Go Box®)
Instruction: Seek Rhodimally

Student name: .....

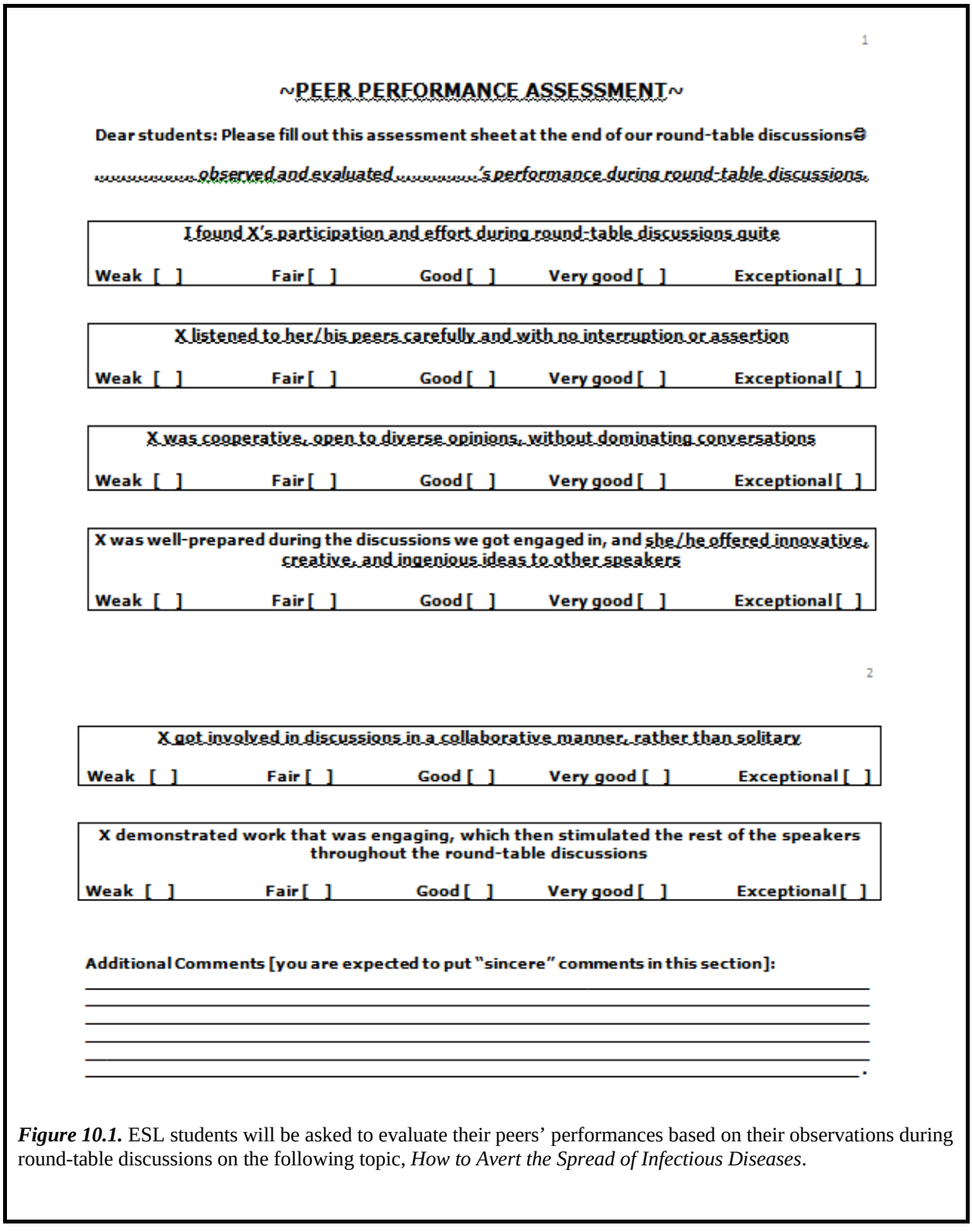
TO-GO BOX

In a short paragraph, please reflect on your learning during this course, and tell me what you are taking home with you at the end of the Microbiology-related topic entitled, *Fighting Infectious Diseases*.

...

Figure 9. At the end of this academic preparation course, by using this self-reflection sheet, all adult ESL students will be asked to reflect on their learning from the pertinent unit, *Microbiology*, and the topic entitled, *Fighting Infectious Diseases*.

Figure 10.1. Peer Performance Assessment Sheet



1

~PEER PERFORMANCE ASSESSMENT~

Dear students: Please fill out this assessment sheet at the end of our round-table discussions☺

.....observed and evaluated.....'s performance during round-table discussions.

I found X's participation and effort during round-table discussions quite

Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

X listened to her/his peers carefully and with no interruption or assertion

Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

X was cooperative, open to diverse opinions, without dominating conversations

Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

X was well-prepared during the discussions we got engaged in, and she/he offered innovative, creative, and ingenious ideas to other speakers

Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

2

X got involved in discussions in a collaborative manner, rather than solitary

Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

X demonstrated work that was engaging, which then stimulated the rest of the speakers throughout the round-table discussions

Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

Additional Comments [you are expected to put "sincere" comments in this section]:

_____
_____
_____
_____
_____
_____.

Figure 10.1. ESL students will be asked to evaluate their peers' performances based on their observations during round-table discussions on the following topic, *How to Avert the Spread of Infectious Diseases*.

Figure 10.2. Peer Performance Assessment Sheet

1

~PEER PERFORMANCE ASSESSMENT~

Dear students: Please fill out this assessment sheet at the end of our team work. Thank you☺

I found my team member X's participation and effort in the collaborative work quite
Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

My team member, X, participated in every session we held regularly and punctually
Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

My team member, X, listened to her/his peers carefully and with no interruption
Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

My team member was cooperative, open to diverse opinions, without dominating conversations
Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

My team member, X, was well-prepared during each discussion we held in our group, and she/he offered innovative, creative, and ingenious ideas to the entire team
Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

2

My team member, X, executed the class project in a collaborative manner, rather than solitary
Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

My team member, X, demonstrated work that stimulated the rest of the team members, by dragging the entire team and inspiring all
Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

My team member, X, did not avoid hard work and/or hard project deadlines
Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

My team member, X, was available whenever we needed his assistance, guidance, or leadership
Weak [ ] Fair [ ] Good [ ] Very good [ ] Exceptional [ ]

Additional Comments [you are expected to put *sincere* comments in this section]:

_____
_____
_____
_____
_____
_____.

Figure 10.2. ESL students will finally evaluate their peers' performances based on their observations before, during and after a team-based activity pertinent to the same topic above.

Finally, the ESL instructor will also hand out to her students an instructor/course evaluation sheet with which they can evaluate her instructional skills. As she receives feedback from these evaluations, she will be able to take corrective actions and hone her instructional methods, or capitalize on her best practices.

By using the modular, online component (AC4) of the textbook, she will work with innovative modules in order to improve each skill. As their instructor and the moderator of the AC4 online lab, she will facilitate the learning environment for her adult ESL students in conducive to their autonomous, mastery learning in each skill. She can additionally promote a learning and teaching environment congruent with higher-order complex cognitive skills (van Merriënboer, 1997) as in the following:

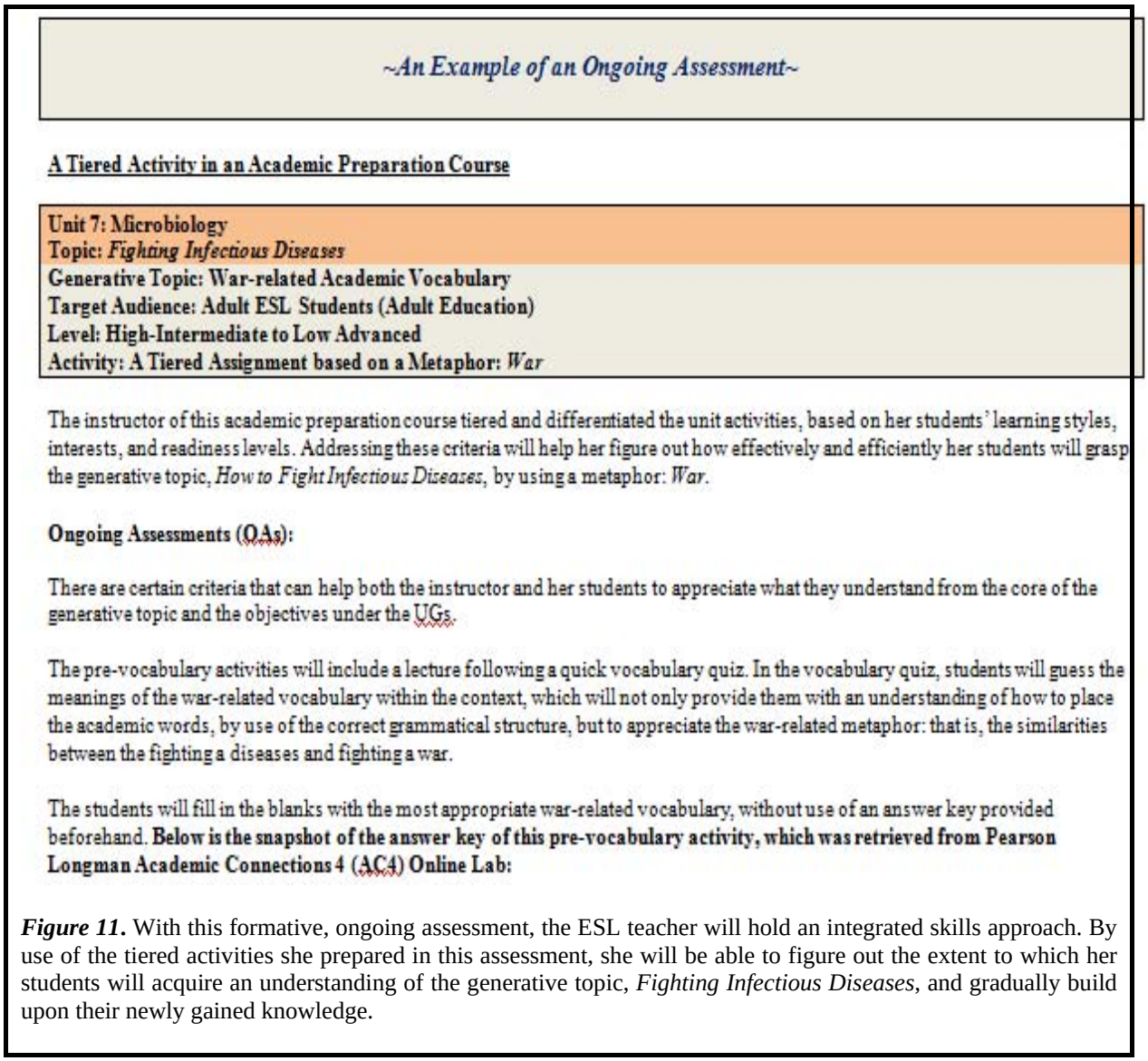
- **A.** Vocabulary + CMI + via associations: cognitive learning;
- **B.** Listening + CMI + note-taking techniques + group work on listening comprehension questions + pair/group discussions: cognitive learning;
- **C.** Reading + CMI + text analyses (individual and group work) + group discussions on texts: cognitive learning;
- **D.** Speaking in real-life settings + CMI + collaborative tasks + pair/group discussions : experiential learning;
- **E.** Writing + CMI + analytical writing + argumentation + critique: experiential learning.

In terms of the nature of this instructional design, fostering all adult ESL learners' complex cognitive skills will be important as they excel at transferring their knowledge of unit content under the principles of first instruction (Reiser & Dempsey, 2007). Epistemologically, it is also a breeding ground for socially constructed knowledge in class based on the constructivist learning approach (Reiser & Dempsey, 2007).

ONGOING ASSESSMENTS (OAs): TIERED ACTIVIES VIA AC4 ONLINE COURSE

There are certain criteria that will help both the instructor and her students understand to appreciate what they understand from the core of the generative topic and the objectives under the UGs. Pre-vocabulary activities will include a quick vocabulary quiz and then a lecture, respectively. In the vocabulary quiz, the students will make educated guess about the meanings of the war-related vocabulary within the context, which will not only provide them with an understanding of how to appropriately place certain academic words—by use of the correct grammatical structure—but appreciate the war-related metaphor: that is, the similarities between the fighting a diseases and fighting a war. The students will fill in the blanks with the most appropriate war-related vocabulary. The answer key will not be handed out to them beforehand. Below is an example of an ongoing assessment in this academic preparation course (see Figure 11).

Figure 11. An Example of an Ongoing Assessment with Tiered Activities



~An Example of an Ongoing Assessment~

A Tiered Activity in an Academic Preparation Course

Unit 7: Microbiology
Topic: *Fighting Infectious Diseases*
Generative Topic: War-related Academic Vocabulary
Target Audience: Adult ESL Students (Adult Education)
Level: High-Intermediate to Low Advanced
Activity: A Tiered Assignment based on a Metaphor: *War*

The instructor of this academic preparation course tiered and differentiated the unit activities, based on her students' learning styles, interests, and readiness levels. Addressing these criteria will help her figure out how effectively and efficiently her students will grasp the generative topic, *How to Fight Infectious Diseases*, by using a metaphor: *War*.

Ongoing Assessments (OAs):

There are certain criteria that can help both the instructor and her students to appreciate what they understand from the core of the generative topic and the objectives under the UGs.

The pre-vocabulary activities will include a lecture following a quick vocabulary quiz. In the vocabulary quiz, students will guess the meanings of the war-related vocabulary within the context, which will not only provide them with an understanding of how to place the academic words, by use of the correct grammatical structure, but to appreciate the war-related metaphor: that is, the similarities between the fighting a diseases and fighting a war.

The students will fill in the blanks with the most appropriate war-related vocabulary, without use of an answer key provided beforehand. **Below is the snapshot of the answer key of this pre-vocabulary activity, which was retrieved from Pearson Longman Academic Connections 4 (AC4) Online Lab:**

Figure 11. With this formative, ongoing assessment, the ESL teacher will hold an integrated skills approach. By use of the tiered activities she prepared in this assessment, she will be able to figure out the extent to which her students will acquire an understanding of the generative topic, *Fighting Infectious Diseases*, and gradually build upon their newly gained knowledge.

ACTIVITY 1: GAP-FILLING

Fill in the blanks below (see Figure 12), by guessing the war-related vocabulary from within the context, before we get to read the passage and listen to the lecture. For this activity, I am asking you to work with a partner of your choice. I suggest you use your previous experiences about infectious diseases and how you fought them in the past. You should consult your partner to figure out the most appropriate battle-related words in each question (see the demonstration on Prezi via http://prezi.com/fgcxhttzyndn/?utm_campaign=share&utm_medium=copy&rc=ex0share).

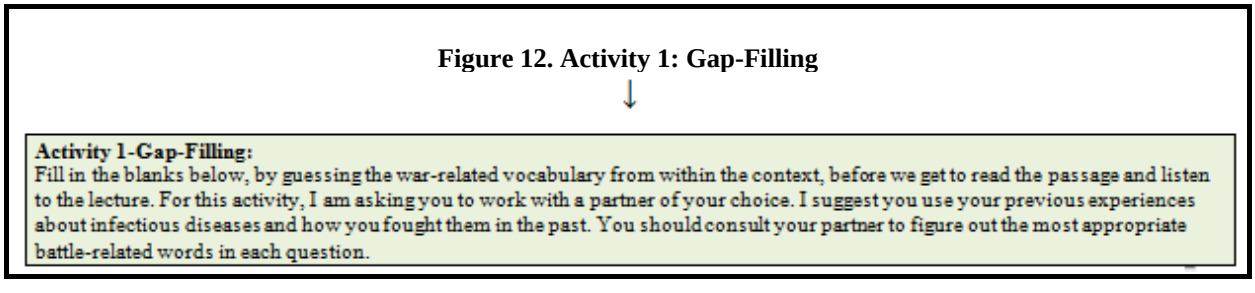
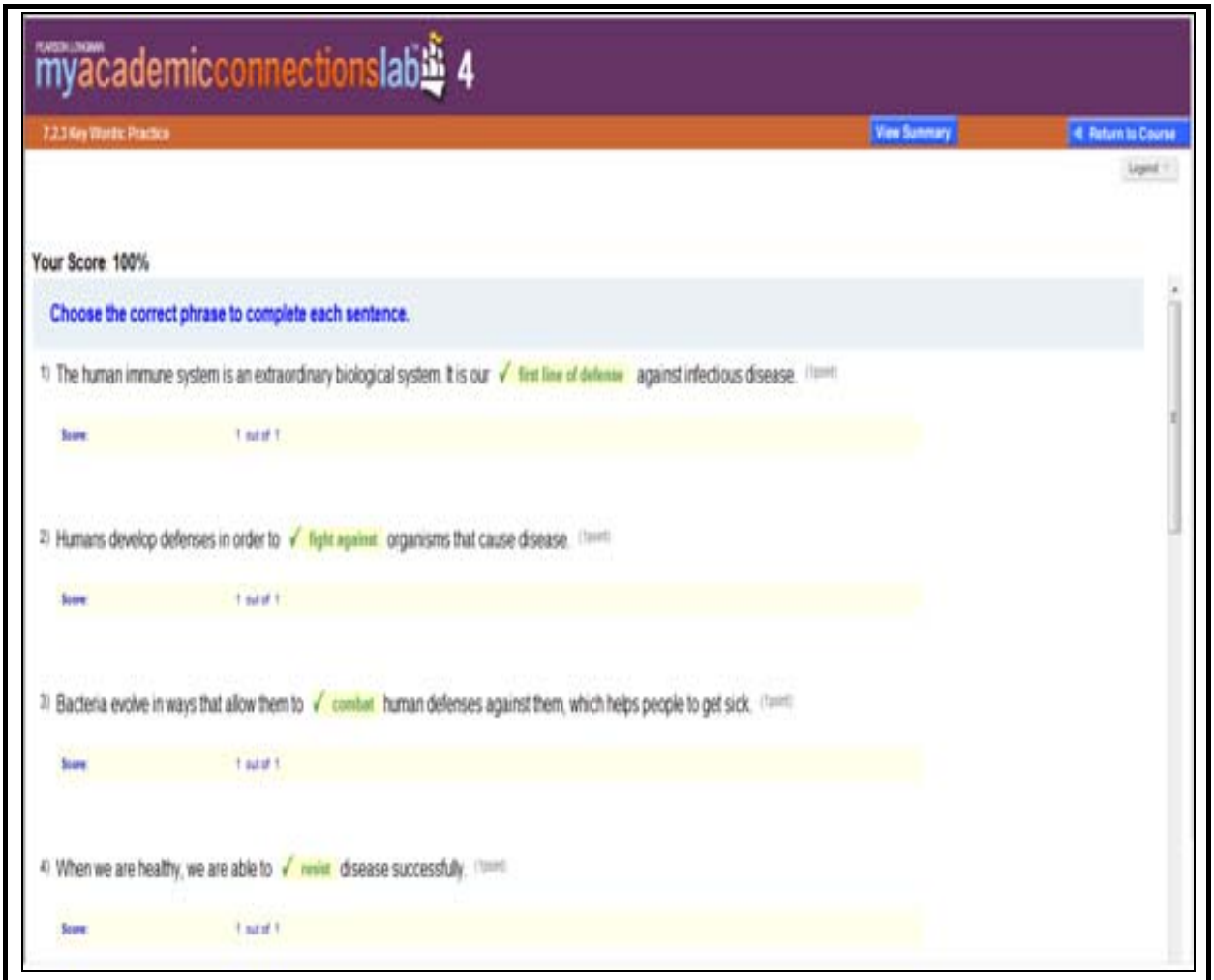
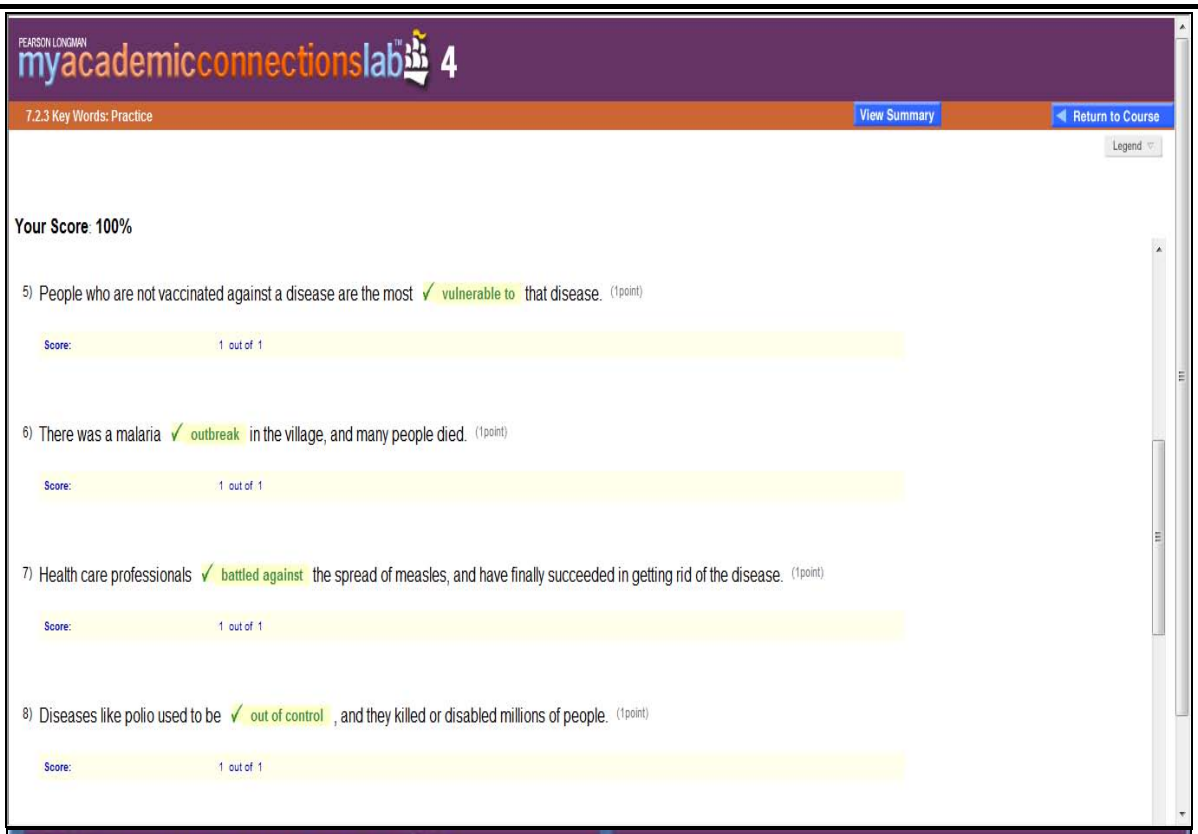


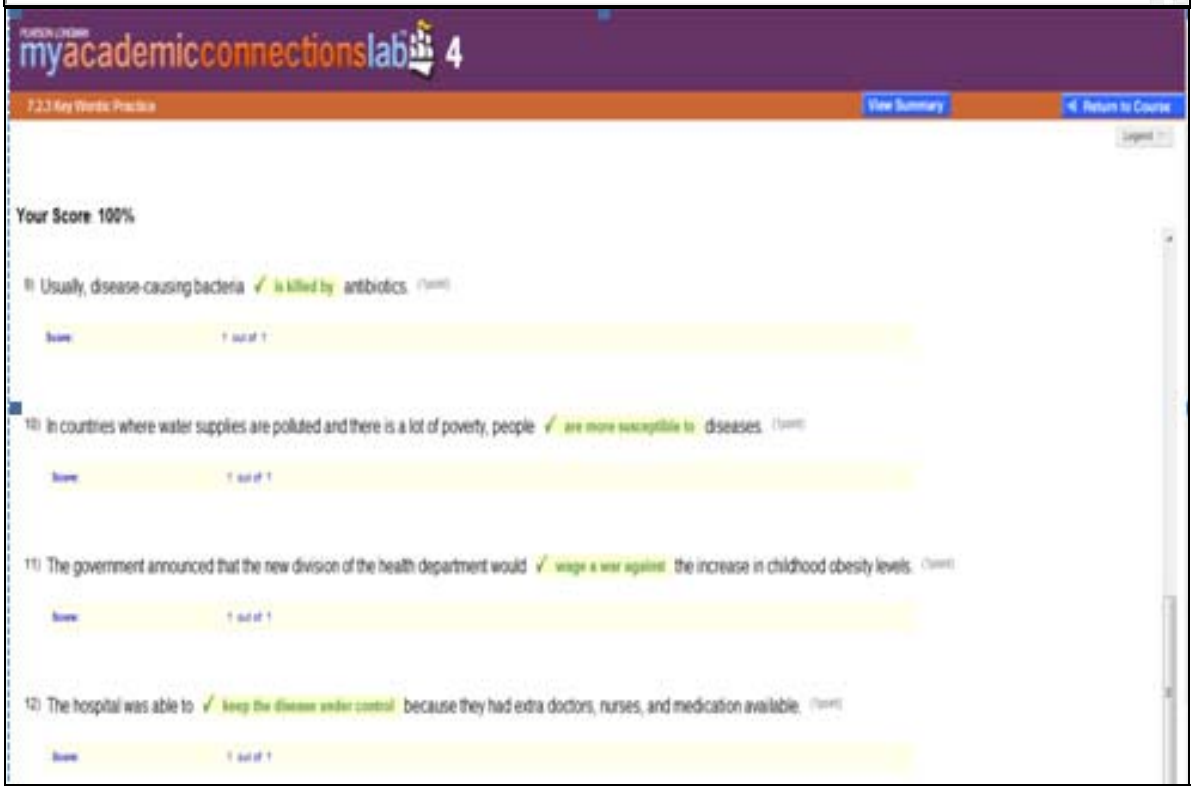
Figure 12. Activity 1: Gap-Filling

↓

Activity 1-Gap-Filling:
Fill in the blanks below, by guessing the war-related vocabulary from within the context, before we get to read the passage and listen to the lecture. For this activity, I am asking you to work with a partner of your choice. I suggest you use your previous experiences about infectious diseases and how you fought them in the past. You should consult your partner to figure out the most appropriate battle-related words in each question.







13) A disease that ✓ attacks the immune system is very dangerous because the body isn't able to fight against new diseases, and people get much sicker. (1point)

Score: 1 out of 1

14) People in the small village were ✓ overcome by a rare disease that couldn't be helped by medicine. (1point)

Score: 1 out of 1

Figure 12. With his gap-filling vocabulary activity from AC4 online lab, adult ESL students are asked to pair up and guess various war-related vocabulary words regarding the context (i.e., humans' fight with infectious diseases). The students are then to fill in the blanks with these words. This is a useful warm-up activity for students prior to their passing onto subsequent activities in other skills such as reading and listening. The scaffolding component in this activity can especially lead to an understanding that the course instructor applies a constructivist learning approach.

ACTIVITY 2: INVESTIGATIVE QUESTION

Look at the picture below. What do you see in this picture?

Figure 13. Picture of a Baby Vaccinated in the Fight with Infectious Diseases

Activity 2:

Investigative Question: Look at the picture below. What do you see in this picture?

Activity 2-Answer the Investigative Question:
Discuss with your partner and then share with the class what speaks to you in this picture. Link your discussion to today's topic, "Fighting Infectious Diseases," before you get to listen to the lecture. Also, please use the academic vocabulary (war-related vocabulary) that you had learned in the previous vocabulary activity **(Activity 1)**.

Figure 13. This visual is used in class as a warm-up activity for discussion among ESL students. Source: https://prezi.com/fgcxhttzyndn/copy-of-copy-of-technology-making-learning-meaningful/

ACTIVITY 3: LISTENING

Now, go to your online course (AC4), and login with your user ID and password in order to listen to the lecture, *Conditions that Affect the Spread of Infectious Diseases* (see Figure 14). What did you understand while listening to the professor's lecture? You could read the transcript of this lecture on Prezi from http://prezi.com/fgcxhttzyndn/?utm_campaign=share&utm_medium=copy&rc=ex0share).

ANSWER THE INVESTIGATIVE QUESTION

Based on your comprehension of the lecture, discuss with your partner how we can avert the spread of resistant bacteria or the spread of infectious diseases. Should you have any confusion while listening to the lecture, check the back of your textbook to also read the audioscript of this lecture.

Figure 14. Unit 7 (Microbiology) Lecture Transcript

Lecture: Conditions that Affect the Spread of Infectious Diseases

Professor: Hello everyone. This is our first lecture on infectious diseases.

Do you remember the outbreak of Severe Acute Respiratory Syndrome (or SARS) in 2003, or the more recent spread of the swine flu? Now, these are cases of infectious diseases that spread on a global scale. How can we keep these infectious diseases under control when they begin to spread? And this is the focus of today's lecture: the conditions that encourage or discourage the spread of infectious diseases. So, first of all, if we're in good health, we are more able to resist disease, and the opposite is also true—if we're nutritionally deficient, or ill with another disease (like cancer) we're more likely to be susceptible.

A clean water supply and efficient water treatment are essential to preventing all kinds of illnesses. Our water systems can contain parasites that lead to schistosomiasis. Schi-sto-so-mia-sis, which is a disease that damages the bladder, the kidney, the liver, and the intestines. The World Health Organization estimates that 200 million people may be infected with the parasite and that 200,000 die every year.

Now, food preparation also affects our health. Gastroenteritis, ga-stro-en-te-ri-tis, which is a disease of the stomach and the intestines, is caused by improperly prepared foods, reheated meat and seafood dishes, dairy and bakery products. The WHO states that gastroenteritis kills 5 to 8 million people per year, and is the leading cause of death for children under the age of five. This, when gastroenteritis can be treated simply by rehydration.

Also, most of us live in large groups, in very large groups, and this makes us more vulnerable to infectious disease. So, let's look at an example to make this more obvious. When a child is exposed to measles, his or her body requires about two weeks to make antibodies to fight the disease. This means that for the measles virus to survive, it must find a new body every two weeks. And this is easily done in a city where children go to school and meet at play groups.

And here's another impact of living together in groups: we have more contact with waste products. We have to manage our waste so that we have as little contact with it as possible because there are many bacterial diseases and parasitic worms that result from contact with human waste. And of course, we have to minimize our contact with animal waste to prevent the spread of disease.

As if this weren't enough, large groups of people attract what we call "agents of disease"—mosquitoes and rats. The kinds of things we do to support large numbers of humans contribute to the spread of disease. Now, to be specific, when we cut down trees for agricultural purposes or for urban development, we create pools of stagnant water, which are breeding grounds for mosquitoes that carry the protozoa that cause malaria. Similarly, large populations of humans tend to attract rats and other rodents that may also be agents of disease.

Our current levels of travel enhance the ability of a disease to spread as well. Like when SARS and the swine flu began to spread, one of the main problems was that unknowingly infected people traveling from one country to another, spread the disease across borders. These people unknowingly spread the disease to populations that had never been exposed to these diseases before. And if you have never been exposed to a disease before, then you have no antibodies, and you're much more susceptible to contracting the disease.

This is nothing new, of course. One of the most horrific examples of this was the Black Death in Europe (in around 1348 to 1350). The Black Death was bubonic plague, caused by bacteria transmitted by the rat flea, which can spread to humans. An outbreak of bubonic plague was recorded in China in the 1330s, and by the late 1340s it had reached Europe. By the end of the epidemic, a third of Europeans, that's 25 to 40 million, had been killed, and we don't know how many Chinese had died. These deaths changed the economic and cultural life of Asia and Europe forever. Similarly, the native peoples of "The New World" also suffered when the European explorers and colonists arrived after 1492. Measles, smallpox, influenza, and whooping cough killed many of the natives throughout North and South America, the Pacific Islands, and Australia. Some populations were completely wiped out, and others had such severe disease rates that their cultures were destroyed.

So all of these conditions influence the spread of infectious diseases:

- how healthy we are
- whether we have access to clean water
- how we prepare our food
- how closely we live with others
- how much contact we have with waste products
- how closely we live to "agents of disease" like mosquitoes and rats
- how much we travel
- how likely we are to be exposed to a "new" disease

These are all conditions that we can take into account in our constant battle against the spread of contagious diseases. Now, the next challenge humans face in the war against infectious diseases is antibiotic resistance. We need to figure out what to do to combat antibiotic resistance. So, antibiotic resistance will be the focus of your reading for next class.

Figure 14. Getting her students to read the transcript of unit 7 lecture as her students listen to it simultaneously, the ESL instructor will decipher where they are. Accordingly, she will pair them up or group them appropriately with their peers, so they can collaboratively discuss the related topic in depth.

It is noteworthy that all of the activities tiered with these ongoing assessments align with the understanding goals (UGs) of this unit topic. Based on the ESL students' learning profiles, interests, and needs, the instructor of this academic preparation course will decipher which student might have inclination toward more assistance as far as his/her deeper understanding of the UGs. The activities were tiered in a way that the students can first figure out the fundamentals of academic vocabulary in their fight with diseases that are infectious. Drawing from this activity, the instructor will then be able pair up or group each student with their peers in a natural process. Grouping with this tiered activity will occur without her guidance—be the sitting arrangement, grouping styles, learners' profiles, etc. From this activity, three learning gains are expected:

1. Grouping will form in its natural progress, and the ESL students will derive context-related meanings of academic words, developing an appreciation of what metaphorical use of the language is;
2. The students will appreciate the application of war/battle-related vocabulary in real-life settings;
3. They will develop an understanding of certain grammatical structures used to facilitate their academic vocabulary use (i.e., vocabulary quiz).

CONCLUSION

In light of everything addressed with respect to this unit design created with CCDT, it is critical to emphasize that all of the technologies that can assist with ESL students' meaning making during their learning process were included in the design in a way that development of each academic skill was supported with a particular technology and specific content delivered resulted in as highly authentic and engaging. Besides CCDT as a curriculum design tool, there was yet an additional technology, Prezi, with the support of which almost all of the components of the design were demonstrated. Prezi gives an overview of what components went into CCDT. It

is an interactive, animated technology where the guiding principles of ADDIE and constructivist learning theory on which this unit curriculum design was grounded can be observed. Therefore, all of these educational technologies and the purpose of this unit design considered, the educational objective with this curriculum design was to facilitate design, development, delivery, and evaluation of effective instruction, teaching and learning for understanding, and enable students' meaningful, comprehensive learning via which they can direct and master their own learning processes. The design was consistent with the guiding principles of the aforementioned theoretical learning frameworks and the core components of the popular ADDIE model. Under this context, both the theoretical basis for and practical aspect of CCDT can have positive implications both on the part of the adult ESL students and the instructor of this academic preparation course. First, the theory and practice of this design created with CCDT greatly helped concert much effort to justify the effectiveness, efficiency, and authenticity of the subject matter delivered through this design. Second, both the art and science of the design are also expected to lead to what the designer of this unit lesson hoped to achieve for all of her students: a comprehensive understanding of and appreciation for the positive impact of CMI-driven learning/teaching in a theme-based adult ESL course. What emerged from this design was a second language learning and teaching environment wherein all of the activities exercised both inside and outside of the classroom can pave the way for "a persisting change in human performance" (Driscoll, 2005, p. 9); in other words, a considerable improvement in not only the instructor's pedagogical, instructional, and CALL-based practices, but most importantly, in ESL students' academic performances in all domains in English.

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