6 M-Learning Instructional Application

In this chapter you will learn:

- How to apply Understanding by Design (Wiggins & McTighe, 1998) and Kolb's Experiential Learning Model (1984) to instructional planning via three case studies.
- How instructors can create m-learning spaces using the information presented in this text about app selection, assessment and infrastructure considerations.

This chapter presents three classroom-tested mobile device and app inclusive instructional activities. These activities have been implemented across grade levels and represent how educators currently use mobile devices in elementary, high school and college environments to assist students in developing communication, collaboration, construction, critical thinking and information literacy skills. These activities also demonstrate how formal learning can occur with mobile devices in addition to the informal ways that students have used their devices for academic purposes. Furthermore, these case studies depict examples of mobile device and technology use that engage learners in the subject content while also meeting students' expectations and desires to learn with technology which may result in a transferrable skillset to other more broader contexts (e.g., courses, careers). Each instructional activity could be modified and utilized with different learner ages/levels. The following case studies are analyzed using the information presented in Chapters 1–5.

6.1 Theoretical Perspectives Revisited

This text has introduced you to the theories of Understanding by Design (UBD; Wiggins & McTighe, 1998) and Kolb's Experiential Learning Model (ELM; 1984). It has also presented information about infrastructure needs when creating m-learning spaces as well as app/device evaluation and assessment of student learning. To assist you with better understanding these concepts, three case studies are presented and deconstructed using the information in this book. To get started, let's briefly revisit some key points of the topics covered thus far.

6.1.1 Understanding by Design (UBD)

Understanding by Design (Wiggins & McTighe, 1998) is a curriculum planning process involving a series of specific overarching questions that guide an instructor's conceptualization of how to design a course. These guiding questions are: what do you want students to know, how will you measure their learning and what instructional activities will be incorporated in a course to help students understand what is to be learned. The UBD process consists of three stages supported by questions related to each stage. The UBD stages and questions are noted in Figure 6.1 (see Chapter 2 for a complete explanation of UBD).

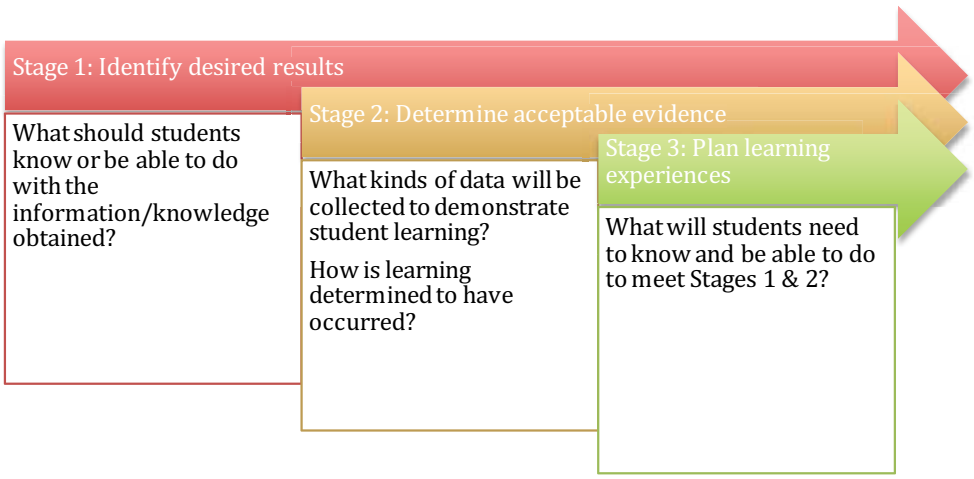

Figure 6.1: Understanding by Design Stages (Wiggins & McTighe, 1998)

6.1.2 Kolb's Experiential Learning Model

Like UBD, Kolb's ELM is also a process or stage model; however, it explains how learners process and perceive information. The ways in which a learner processes and perceives new information reveals a learning style. As previously noted, learning styles refer to the way in which a learner prefers to engage new information in a learning context. According to Kolb's ELM, there are four basic learning styles: accommodator, assimilator, converger, and diverger (see Chapter 2 for a detailed discussion about Kolb's ELM and learning styles). Learners are categorized based upon their preferences for doing/active experimentation OR watching/reflective observation AND feeling/concrete experience OR thinking/abstract conceptualization. Figure 6.2 provides a brief explanation of each learning style.

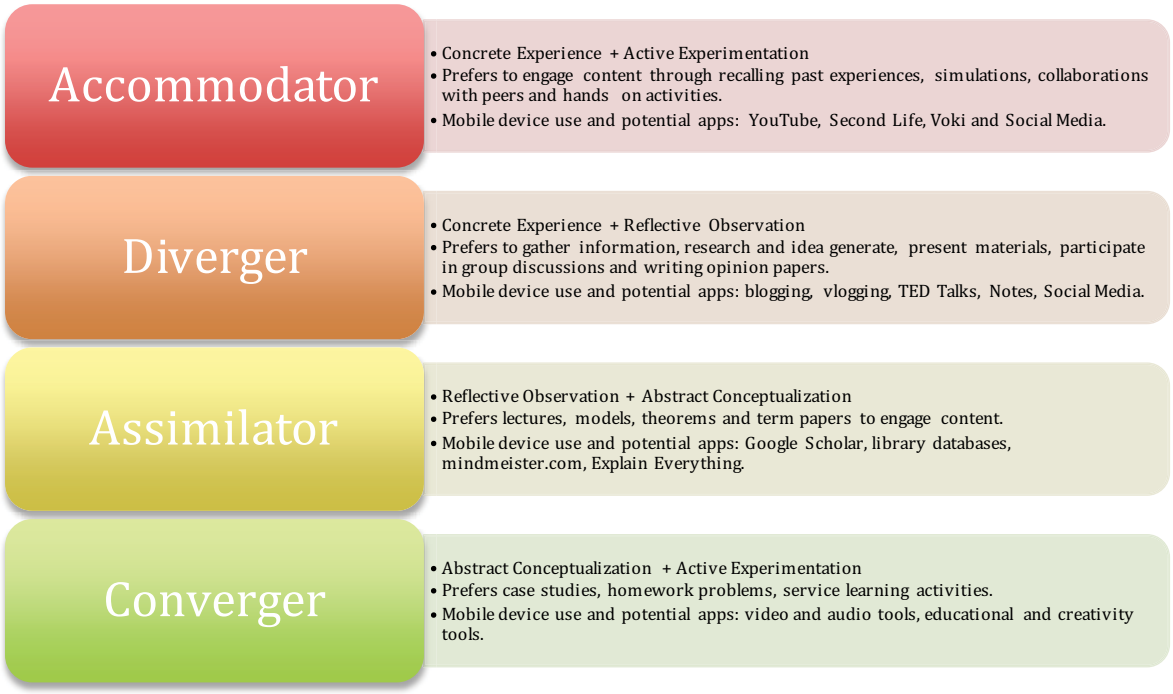

Figure 6.2: Kolb's ELM (1984) Learning Styles and Characteristics with Preferences for Learning with Mobile Devices

6.1.3 Assessing Tools and Ways to Assess

Chapter 3 presented information on tool assessment and ways to assess mobile devices and apps. This chapter noted the prevalence of mobile devices and apps and called for instructors to consider carefully how the mobile device would be used and how various apps might interact with the device. Four specific app categories were also introduced to you: productivity/creativity, e-books, subject specific and educational game apps. Figure 6.3 explains each app.

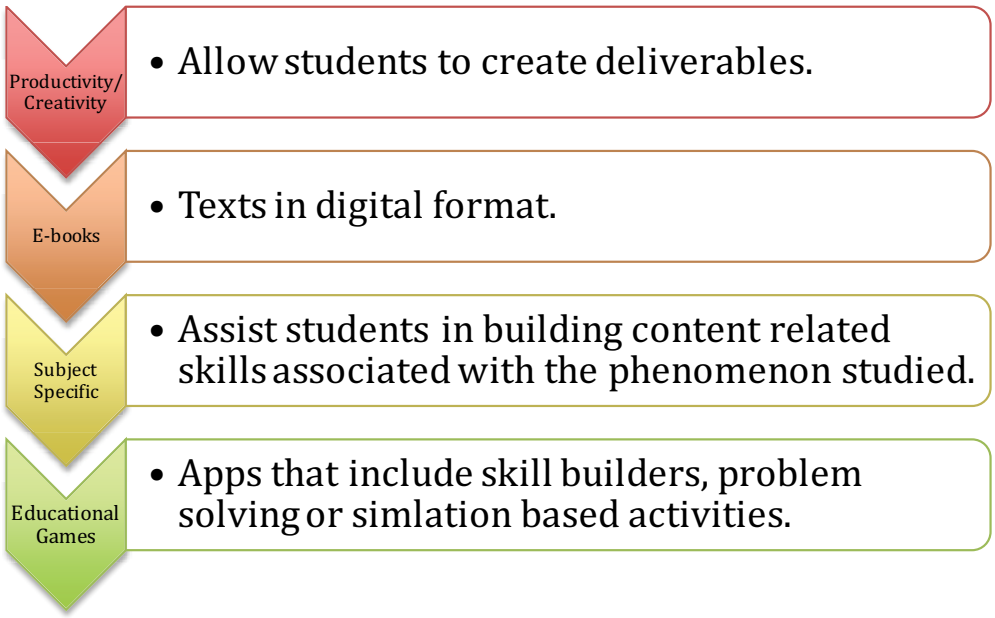

Figure 6.3: App Categories and Descriptions

When adopting mobile devices and apps, instructors must evaluate additional factors as well. The following diagrams highlight some of these considerations when creating an m-learning space. For more detailed information about mobile device and app considerations, revisit Chapter 3. Tables 6.1, 6.2, 6.3, and 6.4 provide a summary checklist to assess each app type as instructors make decisions about the tools required of instruction.

Productivity/Creativity Apps

Name of App:_____
Instructions/Support: Yes No
Reported Grade Level_____
Type of app: productivity, creativity, other_____
Export Media_____
Opportunities for collaboration: Yes No
Developer:_____
Intended use: formal, informal, both
Cost:_____
Operating System:_____

	Meets Needs	Slightly Meets Needs	Does Not Meet Needs	Criteria not relevant	Comments
Relevance	The purpose of the app is relevant to the student and the instructional situation.	Limited connection between the purpose of the app and relevance to student learning.	The purpose of the app does not connect to instruction and is not relevant to students.		
Engagement	Students will be intellectually invested when using this app.	Some students might be engaged with this app.	Students will quickly lose interest.		
Utility	The app includes all the utilities and features necessary to create the desired end product.	Limited utilities and features. Students can create a basic end product.	Utilities and features are lacking. The end product that students can make is not desired.		
Usability	Students can easily manipulate the application without too many special gestures.	Special gestures are required.	It is not clear how to use the app.		
Export End Product	Student product is saved on app and can be exported to the teacher is a manner that is acceptable to the institution.	Student product is saved on app but can NOT be exported.	Student product is NOT saved on app and can NOT be exported to the teacher is a manner that is acceptable to the school.		
Unlimited student products	No limits on the number of end products students are able to make.	Reasonable limit on the number of end products.	Major limits.		

Summary of app/recommended alternatives:

Table 6.1: Productivity/Creativity App Evaluation Tool

Electronic Books

Name of Book:_____
Reported Grade Level_____ Media_____ Megabytes on device:_____
Instructions/Support: Yes No Developer:_____
Type of book: general reading, reference, textbook, other_____ Cost:_____
Intended use: formal, informal, both Operating System:_____

	Meets Needs	Slightly Meets Needs	Does Not Meet Needs	Criteria not relevant	Comments
Relevance/ Standards	The purpose of the book is relevant to the student and the instructional situation.	Limited connection between the purpose of the book and relevance to student learning.	The purpose of the book does not connect to instruction and is not relevant to students.		
Engagement	Students will be intellectually invested when using this app.	Some students might be engaged with this app.	Students will quickly lose interest.		
Usability	Students can easily manipulate the controls for the book.	Special gestures are required.	It is not clear how to manipulate the book.		
Annotations	Students can input many different types of annotations, highlight, notes, on page comments, etc.	Limited annotations.	No annotations.		
Tags	Students are able to tag specific pages.	Limited ability to tag pages.	No tagging.		
Index/TOC	Index and table of contents available.	Limited index or table of contents.	No index or table of contents.		
Search	Search feature available.		No search.		
Unlimited purchase	No limits on how long students have access to the book.	Reasonable limit on access to book.	Major limits.		
Multimedia	Multimedia extends content and contributes to learning.	Multimedia tangentially contributes to content.	No multimedia.		
Dictionary	Extensive dictionary.	Limited dictionary.	Minimal dictionary.		

Summary of book/recommended alternatives:

Table 6.2: E-book Evaluation Tool

Subject Specific Apps

Name of App:_____
Instructions/Support: Yes No
Reported Grade Level: _____
Type of app: general content, skill builder, simulation, other_____
Megabytes on device:_____
Username required: Yes No
Developer:_____
Opportunities for collaboration: Yes No
Cost:_____
Intended use: formal informal both
Operating System:_____

	Meets Needs	Slightly Meets Needs	Does Not Meet Needs	Criteria Not Relevant	Comments
Alignment to standards	App aligns to standards.	App is loosely tied to standards.	Not aligned to standards.		
Engaging	Students will be intellectually invested when using this app.	Some students might be engaged with this app.	Students will quickly lose interest.		
Usability	Students can easily manipulate the controls for the app.	Special gestures are required.	It is not clear how to manipulate the app.		
Students needs	This app meets an educational need of my students.	The app might meet the needs of some of my students.	Doesn't meet my students educational needs.		
Performance summary	Student specific performance summary or student product is saved on app and can be exported to the teacher in a manner that is acceptable to the school.	Student specific performance summary or student product is saved on app however data is not exportable.	Specific performance summary or student product is NOT saved on app and can NOT be exported to the teacher.		
Feedback	Specific feedback is provided to the student.	Student is provided basic feedback.	Limited feedback.		
Differentiation	App will meet the needs of all classroom groups, with multiple difficulty levels and multiple presentation styles.	App has more than one level of difficulty and/or information is presented in only one manner.	App has one level of difficulty and is presented in only one manner.		
Group or Individual	Teams of students or an individual can use this app.	Mainly intended for individual but may be ok with a group.	Only an individual can use this app.		

Summary of app/recommended alternatives:

Table 6.3: Specific Subject App Evaluation Tool

Educational Games Apps

Name of App:_____
Instructions/Support: Yes No
Reported Grade Level_____
Type of game: skill builder, problem solving or strategy, simulation, other_____
Megabytes on device:_____
Username required: Yes No
Developer:_____
Opportunities for collaboration: Yes No
Cost:_____
Intended use: formal informal both
Operating System:_____

	Meets Needs	Slightly Meets Needs	Does Not Meet Needs	Criteria not relevant	Comments
Relevance	The purpose of the game is relevant to the student and the instructional situation.	Limited connection between the purpose of the game and relevance to student learning.	The purpose of the game does not connect to instruction and is not relevant to students.		
Feedback	Specific feedback is provided to the student.	Student is provided some feedback.	Limited feedback.		
Engagement	Students will be intellectually invested when using this game.	Some students might be engaged with this game.	Students will quickly lose interest.		
Usability	Students can easily manipulate the controls for the game.	Special gestures are required.	It is not clear how to manipulate the game.		
Replay varies	Game varies with replay.	Game is predictable when replayed.	Same game when replayed.		
Reporting	Summary data is electronically available to teacher.	Student briefly has access to summary data.	Summary data not available.		
Levels of difficulty	Wide range of difficulty that will engage ALL students in the class for a long period of time.	Some range. The game will be useful for some for some time.	Minimal range of difficulty app will not be used long.		
Thinking skills	Game encourages the use of higher order thinking skills.	Mostly lower order thinking skills.	Limited to the lower order thinking skills	Yes No	
Storyline	Game has a complex storyline with characters users care about.	Has a basic storyline.	No storyline.	Yes No	
Replicates real-world	Game replicates the real-world.	Some what realistic.	Game not realistic.	Yes No	

Summary of app/recommended alternatives:

Table 6.4: Educational Games App Evaluation Tool

6.1.4 Infrastructure and Learning Spaces

Beyond assessing apps and mobile devices required of m-learning, instructors must also examine the spaces in which learning will occur and what kinds of resources will be needed to support this new environment. Because m-learning spaces involve mobile devices and apps as well as different classroom functions, learning environments are both digital and physical. Consequently, instructors must account for a number of variables ranging from class configurations (e.g., will learners work as a class, small group, pair or individual) to wifi access and electrical outlets to how technology will be used to meet learning outcomes. Figure 6.4 details task spaces and configurations while Table 6.5 outlines activities that can be conducted via mobile devices and related technic considerations in these configurations.

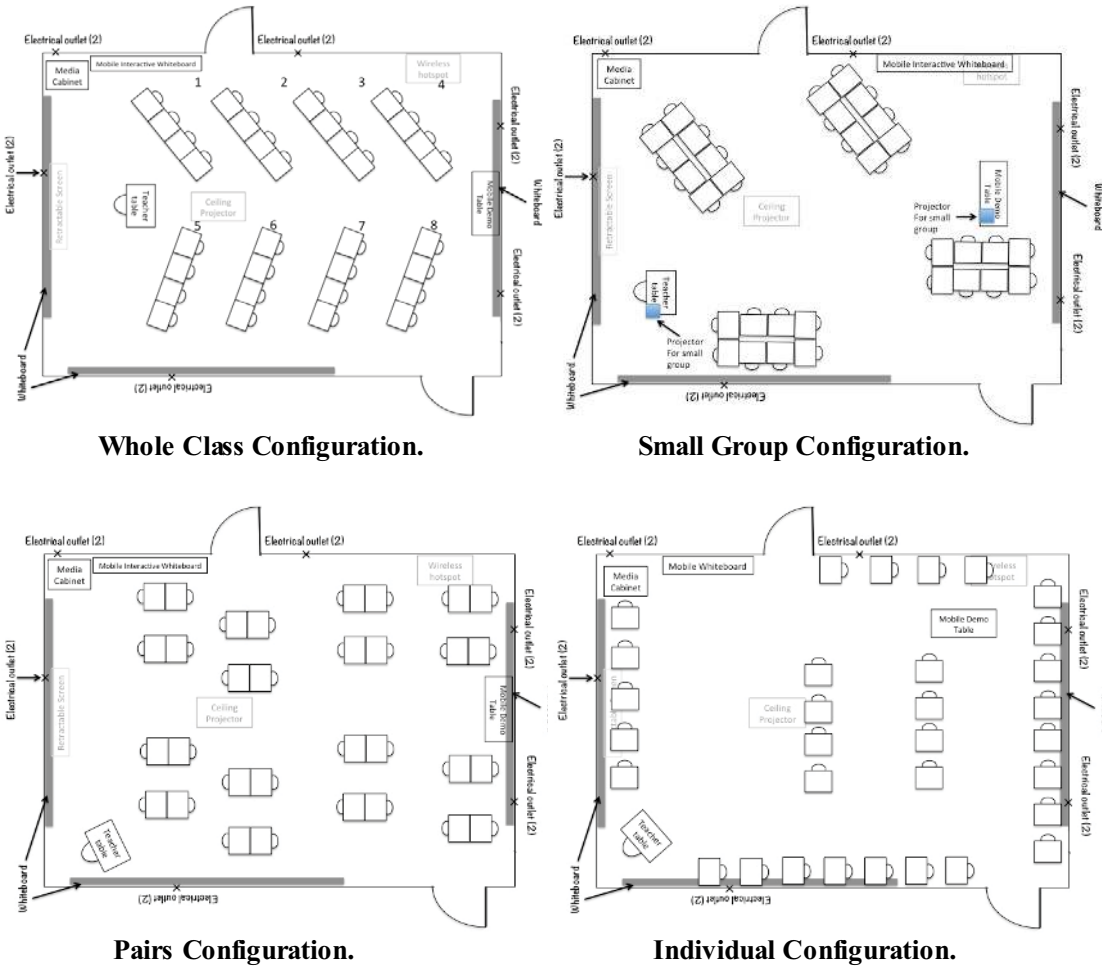

Figure 6.4: Classroom Configurations for Physical Instructional Space.

Functional Architecture Examples of type of instruction	**Technics (mobile devices enabled)**	
	Asynchronous	Synchronous
Whole class Examples: lecture, presentations, video (formal learning)	• Multiple options for content presentations: including video, audio, narrated slide show, text supplemented with video and photos. • File sharing • Reference websites • Podcasts • Discussion boards • Wikis or other collaborative documents	• Interactive online presentations (often referred to as Webinars) • Interactive Web Conferencing • Shared whiteboard • Student response systems
Small group Examples: small group discussions, learning tasks, research projects, problem solving exercises, case studies (formal & informal learning)	• Discussion boards • File sharing • Blogs • Wikis or other collaborative documents	• Interactive Web Conferencing • Shared whiteboard • Chat
Pairs Examples: role play, peer critiques (formal & informal learning)	• Peer review system • Discussion boards • File sharing • Blogs • Wikis or other collaborative documents	• Interactive Web Conferencing • Shared whiteboard • Chat
Individual Examples: Read and reflect, practice, simulations (formal & informal learning)	• File management • Access to remediation website or online resources • Access to online textbooks and textbook resources • Personal electronic portfolios • Online quizzes • Simulations and games	• Access to online technical help • Access to homework assistance/tutoring sites

Table 6.5: Virtual Learning Places, Infrastructure Considerations

6.1.5 Mobile Technologies and Assessment of Student Learning

As noted in Chapter 5, a fundamental component of instruction is the assessment of student learning. Instructors assess student learning using formative and summative assessments. Formative assessment is used to assess student learning as they progress through a module or unit of instruction. This kind of assessment is usually performed for a grade. Informal assessment involves tools that students can use to self-assess their own learning and understanding of content and usually isn't associated with a formal grade on their performance. Both of these assessment types are used to convey to students their degree of understanding of course concepts throughout instruction and prior to a summative assessment. Summative assessments are administered after instruction to measure student learning of course concepts or units of instruction. Assessments can be objective (e.g., multiple choice, true/false or short answer), performance-based (e.g., presentations or task demonstrations) or portfolio developed. As noted in Chapter 5, mobile devices can be utilized to develop, access, administer and collect various formative and summative assessments.

We will now turn our attention to analyzing the case studies that follow via an application of what's been discussed thus far.

6.2 Case Study 1 (Elementary School): Advancing Creative Writing Skills via Student Generated Multimedia Books

Luke teaches the fifth grade creative writing unit. Last year he noticed that his students would spend very little time reworking their text. He noticed that most of the time students turned in their initial draft of their writing. While Luke taught his students about the writing process (Prewriting, Drafting, Revising, Editing, and Publishing/Evaluating), the practice of the students was very different.

This year Luke is determined to have his students fully participate in the complete writing process. He truly believes that they will build the skills necessary to continue to use the entire writing process in their personal writing. He decided to have the entire class use the process multiple times over a series of days so that they would become comfortable with the process. They would then create multimedia books that parents could view during their school's next open house.

To begin, Luke created a brief 5-minute video, using a screen casting software that explains the complete writing process. He asked his students to review the video prior to class. At the start of class Luke provided a quick review of the writing process. He then gave the students a writing prompt "the snow came down like soft cotton balls and all the children…." The whole class took 5 minutes to brainstorm story elements that would be appropriate to the topic while Luke quickly wrote the notes on the interactive whiteboard in the front of the room. The results of the whiteboard were then displayed on several screens in the room.

After the five-minute brainstorming session was over, the students worked independently on their own winter snowfall story. The students spent five-minutes free writing, either typing directly on their mobile device or by using a speech-to-text converter (using headphones and attached speaker). Then they spent 7–8 minutes working independently on the first draft of their story.

Luke then asked his students to work in pairs and provide each other with a peer review of their work. Once the peer review was complete the students then revised their short story based on the winter snowfall theme. Luke continued having the students revise and edit their stories two more times until the students had revised the story a total of 4 times.

6.2.1 Understanding by Design

In planning this instructional activity, Luke began the process by moving through the stages of UBD and responding to the related questions. Below are Luke's responses to this part of the planning process:

Stage 1: What should students know or be able to do with the information/knowledge obtained? After instruction, students should be able to demonstrate the writing process (Prewriting, Drafting, Revising, Editing, and Publishing/Evaluating) via a summative assessment (performance-based) in the form of a multimedia book project.

Stage 2: What kinds of data will be collected to demonstrate student learning? How is learning determined to have occurred? Luke will collect the students' brainstorming ideas for crafting the essay verbally and depict them on the whiteboard. He will also gather the students' first draft of the practice essay with peer-reviewer comments. The student-created multimedia books are the final deliverable of this assignment that demonstrates student mastery of having learned the writing process.

Stage 3: What will students need to know and be able to do to meet Stages 1 & 2? Students will need to know the steps of the writing process and have an opportunity to practice the process individually, in pairs and as a class. Students will also need to have feedback from Luke and their peers about their independent free writes as well as their multimedia books to further revise their writings.

6.2.2 Kolb's Experiential Learning Model and Learning Styles

Luke's instructional activity engages each of Kolb's learning styles. The relationship between the activity components and the learning styles is noted below.

Accommodators were engaged in learning the writing process by doing the hands on activity of brainstorming and writing an essay as well as collaborating with their peers in the peer-review process and class discussion components of the activity.

Divergers were engaged in learning the writing process via idea generation, participating in a group discussion and writing their essay.

Assimilators were engaged in learning the writing process by examining the model of writing (the process components), overview (mini-lecture) of the process and creating the essay.

Convergers were engaged in learning the writing process by solving a problem via the prompt, "*the snow came down like soft cotton balls and all the children….*"

6.2.3 Tool Identification and App Selection

Because Luke wanted the students to work through the writing process, he selected productivity/creativity apps to fulfill the learning outcomes. To help the students through this process, Luke created a 5-minute video using a free screencast software that students would view outside of class. He then used the class whiteboard to display information related to the class discussion about the writing process and prompt. Mobile devices with a writing app (e.g., Notes) or speech to text app such as SpeakIt! were then incorporated into the activity to engage learners in the content on the writing process. These apps were selected because they were free, had a small learning curve and are user friendly across devices. These apps also allow for finished deliverables (like the essay) to be emailed to Luke or collected elsewhere for assessment and providing student feedback about their learning. These apps also relate to varying learning styles. For example, accommodators are engaged by videos while divergers enjoy activities like blogging or writing with technology. Assimilators relate well to tools that permit constructing a deliverable like the essay (via Notes or SpeakIt!) and convergers are engaged best with apps that involve video or audio tools.

6.2.4 Infrastructure Considerations

Luke also had to think through a number of other classroom circumstances to create an effective learning experience for his students. One of his first considerations involved physical space and how he might arrange the space to accommodate student engagement and learning. This instructional activity required students to work individually (from home viewing the video and in constructing their essay), as a class (to brainstorm) and as teams (during the peer-review process). Consequently, Luke had to determine how best to organize the class so that students could move between these learning contexts and arrangements.

Luke had to also consider the logistics of this activity. For example, Luke had to identify how the whiteboard would be used, the video shared for home/individual viewing, the apps that the students would use and file sharing pertaining to the students' sharing of essays for the peer-review aspect of the activity.

6.2.5 Assessment of Student Learning

This activity exemplifies formal formative assessment. During the instructional activity, students are provided peer feedback and instructor feedback about their performance. This activity isn't graded but allows for student practice in mastering the course content while also providing valuable information from their instructor and peers about their writing performance as they progress through the stages of the writing process. Summative assessment will occur upon student submissions of the multimedia book assignment.

6.3 Case Study 2 (High School): Exploring Biological Concepts via Student Created Video Projects

Rachel has been teaching biology at the local high school for three years. She has found that students always grapple with meiosis and mitosis. These are important concepts in biology. Rachel has found that if students don't have a strong understanding of these concepts they will have problems with other related biology concepts that they will be learning as the course progresses. She decided to dedicate more time than usual on meiosis and mitosis to assure that all of her students fully understand these concepts.

Prior to coming to class she asked her students to visit websites that explain what cancer is and how it relates to meiosis and mitosis (note: cancer is the uncontrollable growth and reproduction of cells—in other words when mitosis is uncontrollable).

When the students came to class after they reviewed the websites, Rachel used a student response system on the mobile devices to check students' understanding of the topic. Depending on how the students answered the questions, she was then prepared to review and remediate as necessary.

Once Rachel was sure that the students had a solid understanding of mitosis and meiosis she has the students to work in small groups to make movies on the concepts. The students were asked to use their cameras on the mobile devices to take pictures of drawings of the stages of meiosis and mitosis. The students were then instructed to create movies using the photos of their drawings accompanied by an audio voiceover explaining the stages.

6.3.1 Understanding by Design

In planning this instructional activity, Rachel began the process by moving through the stages of UBD and responding to the related questions. Below are Rachel's responses to this part of the planning process:

Stage 1: What should students know or be able to do with the information/knowledge obtained? After instruction, students should be able to demonstrate their understanding of meiosis and mitosis via a series of questions they answer using a student response system accessed from a mobile device and by creating a video about these biology concepts.

Stage 2: What kinds of data will be collected to demonstrate student learning? How is learning determined to have occurred? Rachel will collect the students' responses to the questions about meiosis and mitosis using a student response system on a mobile device. The final deliverable is a small group-produced video, which will also provide evidence of student learning.

Stage 3: What will students need to know and be able to do to meet Stages 1 & 2? Students will need to know what meiosis and mitosis are as well as some variables that impact them. Students will need to read materials about the concepts prior to the class response system activity and the small group video activity. Students will also need to have feedback from Rachel during the response system activity to assess if they have an understanding of meiosis and mitosis prior to moving forward with the video making process.

6.3.2 Kolb's Experiential Learning Model and Learning Styles

Rachel's instructional activity engages each of Kolb's learning styles. The relationship between the activity components and the learning styles is noted below.

Accommodators were engaged in learning about meiosis and mitosis by doing the hands on activity with the student response systems, collaborating with peers on the video project and in viewing websites about the topic.

Divergers were engaged in learning about meiosis and mitosis by participating in a group discussion, drawing the stages of meiosis and mitosis and presenting their group's finished video.

Assimilators were engaged in learning about meiosis and mitosis by examining the diagrams and models of the concepts, the content on the websites, and assembling the video components.

Convergers were engaged in learning about meiosis and mitosis by solving the problem of how to create a video that depicts the stages of meiosis and mitosis as well as the use of audio and video materials to learn the concepts.

6.3.3 Tool Identification and App Selection

Because Rachel wanted to provide students with a deeper learning experience, she created a multi-component assignment. The first part of the activity required students to access information online about meiosis and mitosis available on specific websites that she directed them to view. The second part of the assignment required students to create a final deliverable – a group video. This aspect of the assignment called for a productivity/creativity app to fulfill the learning outcomes. To help the students progress from the first part of the assignment to the second component, Rachel ensured student understanding of the readings on meiosis and mitosis by using a student response system app which allowed students to answer a series of questions about the readings. During this time Rachel used the student responses to ascertain what aspects of the concepts needed re-teaching. Mobile devices were used to respond to the questions as well as to capture student produced images and audio, which were then edited into a video about meiosis and mitosis. The apps selected and tools used on the devices were free (e.g., iMovie and the response system app Socrates), had a small learning curve and are user friendly. These apps also allow for the videos to be emailed, texted or submitted to Rachel elsewhere. These apps and tools also relate to varying learning styles. For example, videos appeal to accommodators and divergers enjoy creative activities with technology. Assimilators like creating illustrations and theories while video and audio components of activities engage convergers.

6.3.4 Infrastructure Considerations

When creating this assignment, Rachel considered a number of other classroom variables, too. Because this activity involved independent (website viewing/reading and student response system) and small group work (video creation), Rachel had to determine how she would use the physical classroom space to encourage student learning and engagement. This would require her to contemplate moving chairs/tables as well as how to position students in work groups.

Rachel also considered instructional activity components. For example, Rachel identified what websites to incorporate into student readings, student response app to implement (e.g., Socrates), and what video/audio and editing app to incorporate in the student development of videos. File sharing matters also needed to be resolved.

6.3.5 Assessment of Student Learning

This activity contains formal formative and summative assessment. Formative assessment was conducted via the student response system exercise that provided evidence of student learning of meiosis and mitosis. During this part of the activity, Rachel was able to see what students understood and the areas that learners were struggling with comprehending. When Rachel identified an area of challenge, she was able to provide student feedback during instruction that allowed students to master the concepts through Rachel's re-teaching of the material. Summative assessment occurs upon the submission of the groups' video projects to Rachel.

6.4 Case Study 3 (Higher Education Setting): Investigating Historical Figures via a Class Created Documentary

Larry has been teaching history at a university for over a decade. He teaches primarily introduction to U.S. history classes to first year students in the general education program and some special topics classes that are intended for history majors as well as students looking to fulfill a history/social science requirement in their program of study. Larry has found that in teaching history, students often feel that the courses are unnecessary and outdated. He has been looking for ways to make history more meaningful and relevant to his students. In doing so, Larry is also interested in developing his students critical thinking skills as well as their ability to read closely, research, write and collaborate in teams and as a class. He also wants to include more technology in his instruction as a way to engage students in the course.

To meet these course objectives, Larry created an assignment that requires his students to create a class documentary about a historical figure. To complete this assignment, students will work with mobile devices and varying apps. To start the process, students work in small groups of four to five to brainstorm a historical figure of interest. After each group identifies a person, the teams share with Larry who they would like to study along with a rationale for their selection and a brief summary of the person. Larry then creates a polleverywhere.com site with this information. Using their mobile devices, students access polleverywhere.com and vote on the individual who will become the subject of the class-produced documentary.

Next, the class identifies individual skills that each learner possesses that could contribute to the overall documentary assignment. For example, students who were interested in writing would be responsible for creating the documentary's script and supporting research documents; students who wanted to research the figure oversaw this component of the assignment; and learners who were familiar with digital audio and video recording were in charge of collecting the video and audio components of the assignment along with editing it.

Once students were assigned to a work team, the students had to organize their tasks and coordinate how each of the groups would interact and meet the assignment objectives. This requires the class to develop a timeline, project management strategy, and mechanisms to interact with one another to meet the assignment criteria. Students were given the option to use a variety of different communication and technology tools to assist them in fulfilling their responsibilities. For example, students could use email, instant messaging, video conferencing or social media to communicate and work in- and out-of-the class; the final documentary will be created using iMovie or Movie Maker.

In terms of the final documentary, students would have six class sessions over the course of the semester to work on the assignment; the remainder of the work would need to be completed outside of the course. Additional assignment criteria consisted of the following: a) the movie length was 30 minutes; b) scholarly materials had to be used to create the contents; c) a script must accompany the documentary; d) the movie must be of professional quality and e) students must submit an individual report about their contributions to the assignment which was reviewed by their group and required each group member's signature attesting to the contributions. The assignment was due at the end of the semester and would be viewed by the class as a whole with key university members and individuals the class wanted to invite to the showing.

6.4.1 Understanding by Design

Larry began the instructional planning process by progressing through the UBD stages and responding to the following questions:

Stage 1: What should students know or be able to do with the information/knowledge obtained? After instruction, students should be able to demonstrate their abilities to critically think, **read closely, research, write and collaborate in teams and as a class** to illustrate their understanding of a historical figure by creating a class-produced video documentary using various mobile devices and apps.

Stage 2: What kinds of data will be collected to demonstrate student learning? How is learning determined to have occurred? Larry will collect digital and performance-based/physical evidence of student learning during the six class sessions dedicated to the documentary and work group project deliverables (e.g., annotated bibliographies, summaries of scholarly works, group reports on student meetings, draft scripts and tasks completed) as the assignment progresses. The final deliverable is a class-produced documentary, which will also provide evidence of student learning.

Stage 3: What will students need to know and be able to do to meet Stages 1 & 2? Students will need to know how to conduct research, evaluate scholarly sources, write a video script, and use editing apps to produce the class project. Students will need to read materials about the documentary subject and complete tutorials on research and editing. Students will also need to have feedback from Larry during the class sessions to assess if they have an understanding of the project and its various components as well as the related subject matter prior to moving forward with the documentary filmmaking process.

6.4.2 Kolb's Experiential Learning Model and Learning Styles

The instructional activity Larry created engages the learning styles Kolb identified. The activity as it relates to these learning styles is explained below.

Accommodators were engaged in the instructional activity by doing the hands on work of documentary filmmaking, collaborating with peers on the video project and in viewing audio/video materials about the topic to which they self-selected to work.

Divergers were engaged in the instructional activity by participating in group discussions, class work sessions, outlining the stages of the filmmaking process and showing the group's finished documentary.

Assimilators were engaged in the instructional activity by learning about the film's subject, researching the topic, diagraming film scene sequences and editing the video components.

Convergers were engaged in the instructional activity by problem solving how to create a video that depicts the subject, and the use of audio and video materials to create the final product.

6.4.3 Tool Identification and App Selection

Because Larry's course objectives were to develop his students' critical thinking skills as well as their ability to read closely, research, write and collaborate in teams and as a class, he had to carefully construct a creative assignment that allowed his students opportunities to do so. Consequently, Larry created a multi-component assignment built upon constructivist practices (see p. 15 for a detailed explanation) that empower students to learn formally and informally about a concept defined by the instructor. The first part of the activity required students to identify a subject of study and to vote as a class, using student response systems, on the focus of the documentary. The second aspect of the assignment required students to identify a work group to assist in the documentary filmmaking process. This aspect of the assignment demands that students communicate and collaborate in- and out-of-class on the film and its supporting tasks. Each of the tasks is related to the learning outcomes Larry established for the course. To help the students' progress through the assignment, Larry identified some specific apps for class use. Some of the apps involved social media such as Twitter or Facebook while other apps involved iMovie or Movie Maker. The apps selected and tools used on the devices were free (e.g., iMovie and the response system app Socrates), had a small learning curve and are user friendly. These apps also allow for the videos to be emailed, texted or submitted to Larry elsewhere such as a dropbox. These apps and tools also relate to varying learning styles. For example, videos appeal to accommodators and divergers enjoy creative activities using technology. Assimilators like creating storyboards while video and audio components of activities engage convergers.

6.4.4 Infrastructure Considerations

Larry considered a number of other classroom variables in his planning process. Because this activity involved independent (website viewing/reading and student response system) and small group work on subparts of the assignment (e.g., script writing, editing, researching), Larry had to determine how he would use the physical classroom space to encourage student learning and engagement. This would require him to configure his space in group, team and class workspaces

Larry further evaluated the technical aspects with the instructional activity. For example, Larry identified examples of scholarly sources to be used in the project, websites to incorporate into student readings, tutorial sites for editing and constructing project deliverables, a student response app to implement (e.g., Socrates) for class voting, and the video/audio editing app to incorporate in the class created documentary. File sharing matters also needed to be resolved among the group, as did where to house the finished documentary.

6.4.5 Assessment of Student Learning

This activity contains formal formative and summative assessment. Formative assessment was conducted via the class work sessions and student tutorial quizzes and completions, as well as feedback Larry provided to students who produced annotated bibliographies and references, script writing and individual reports on students' progress and work completed. Summative assessment occurs upon the submission of the class documentary as well as the individual students' reports and documentation of the work they produced to Larry.

6.5 Preparing for Your m-Learning Experience

A significant amount of information has been presented in this book to help inform instructors of ways in which to create m-learning spaces. To further assist you in creating such a space, Table 6.6 consists of a quick reference tool to guide some of your instructional decision-making. These questions are categorized by the topics presented throughout the book and combine some of the key areas of consideration noted in greater detail in the charts and worksheets presented here.

M-Learning Quick Reference Instructional Design Questionnaire

Mobile Devices

- What mobile devices are available on your campus?
- What professional development opportunities or technology support is available on your campus?
- What mobile devices do your students own?
- What apps might you use in the activity you are designing?
- Why do you want to create an m-learning space?
- How does it facilitate students meeting the course learning objectives?
- What challenges have you identified regarding including mobile devices in your course planning? What can you do to address those challenges?

Educational Theories

- What do you want students to learn?
- What evidence will students submit to demonstrate their learning?
- How is experiential learning accomplished with the mobile devices and apps selected?
- How do the activity, device and app(s) engage various learning styles?

Assessing Tools and Ways to Assess

- Have you consulted what the experts report about specific devices and apps?
- Have you researched the devices and apps you are considering?
- Do you wish to use a productivity/creativity, e-book, subject specific or game app to accomplish the activity? Why this app?
- How much does the app cost?
- What device(s) does it support?
- Are there help features or tutorials?
- What kind of instruction and learning does it support? Formal or informal?

Infrastructure: Learning Spaces

- How does the classroom's physical space need to be configured for the activity?
- Does the activity require students to work independently, in groups, as pairs or as a class?
- Is Internet access available? Is wifi?

Mobile Technologies and Assessment of Student Learning

- Are formative or summative assessments being conducted with mobile devices?
- Will the assessments be performance-based, portfolio or objective instruments?
- How will you collect student evidence of learning or feedback about the instructional experience?
- Where will student assignments be stored?
- How will you provide feedback to students about the assignment or learning experience?

Table 6.6: M-Learning Quick Reference Instructional Design Questionnaire

6.5.1 Training and Development Recommendations

Effective teaching requires ongoing training and development. This is especially true as it relates to various kinds of pedagogies and instructional technology like that of mobile devices and apps. Consequently, it's important that instructors remain current in their respective fields of study as well as the pedagogical strategies used to enhance student learning and engagement and the technology tools that can be used to assist students in accessing, communicating, constructing and collaborating in face-to-face and digital contexts. It is our hope that you will utilize the information in this text and complete the Quick Reference Instructional Design Questionnaire noted above to help you identify some instructional areas in need of improvement as you design your future m-learning spaces. Once you have self-assessed your abilities and knowledge base regarding the theories presented here as well as the information about mobile devices, we encourage you to locate professional development opportunities on your campus, at various conferences, workshops or nearby colleges and universities that offer courses for credit or for continuing education hours that can enhance your skillset.

6.6 Summary

In this chapter you have:

- Examined and analyzed three classroom tested m-learning case studies.
- Observed how Understanding by Design (Wiggins & McTighe, 1998) is applied to m-learning environments.
- Revisited Kolb's Experiential Learning Model (ELM) and learning styles in the context of m-learning spaces.
- Reviewed a variety of checklists and planning documents that contain variables of consideration when designing an m-learning environment. Some of these tools consist of assessing mobile devices and apps, learning space infrastructure and assessment of student learning.
- Identified some potential areas of improvement that may require you to obtain professional development and training as you transition into creating your own m-learning spaces.

Reflection to Action

1. Reflect on one of the case studies in this chapter. Consider the following:
   a) If the instructor in the case study were teaching in your classroom, what changes would he/she have to make to your physical space in order to conduct the instructional activity?
   b) What changes would you make to the instructional activity in the case study so that it would work in your physical space?
   c) List all of the things that might go wrong with using this assignment and strategies the teacher might use to overcome those challenges.

2. Create your own m-learning instructional activity. Complete the M-Learning Quick Reference Instructional Design Questionnaire on page 70 to assist you in doing so.
   a) Create an action plan with timelines and locations where you may obtain the training needed.