CHAPTER 2
LITERATURE REVIEW

2.1 Gamification in Language Learning

Gamification in Language Learning utilizes game elements and systems into a non-game related education context (Johnson, 2013). With improvement in technology, gamification be applied to Mobile Assisted Learning through devices like the tablets, smartphones, and most commonly laptops/computers. As mentioned in the background section, gaming elements include in-game rewards, levels, quests, leaderboards, achievements, etc. The main goals of using these game elements is to immerse the students within the activity which increases motivation and engagement with the learning material (Csíkszentmihályi, 1990).

As shown in Figure 2.1, there are five core mechanisms when applying gamification to second language learning (Zourou, 2013). Not all elements have to be presented altogether but sometimes only parts of it can be used.

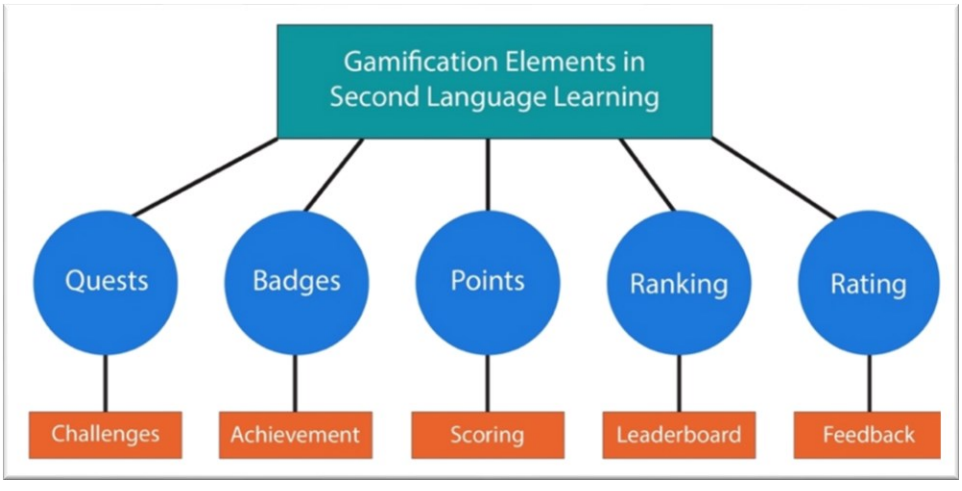

Figure 2.1 Gamification Elements

These elements include quests, achievements, point systems, ranking, and rating systems. Quests, or "challenge" are in-game tasks that must be completed. These goals can either be achieved individually or within a group. In a secondary language e-learning environment, quests can be written or oral assignments in sentence structure or vocabulary. Achievements or "badges" are small graphical rewards that keep track of the students' goals and challenges. These are often awarded after completing tasks and displayed in their profile for everyone to see. For example, once a student completes their daily tasks for the week, their profile shows a badge showing their achievements for that week. Points, or "scoring systems," is the main currency of gamification. Students receive in-game points each time they participate or complete a task. For example, each time a student completes their homework or scores well on a test, then they receive more points. The ranking, or "leaderboard system," then determines the high achievers, or people with the most points and ranks them at the top within the list of students. These can be localized within a certain geographical location or it can expand globally with everybody participating. Lastly rating systems are placed to receive human feedback regarding the student, teacher, and the course material. This is a subjective strategy to assess the quality and the effective of the gamification model.

The TESOL International Association summarizes six of the most common gamification principles when applied to their English teaching as shown in Figure 2.2 (Healey, 2013).

Figure 2.2 Gamification Principles

The first principle is Cascading Information where information is broken up into smaller chunks for the students to consume. This prevents students to be overloaded with information and thus unable to comprehend the course. For example, instead giving the entire study material for one chapter in a book, gamification can divide this into several different segments, pausing with either a quiz or achievement before moving on to another segment. This method helps students to focus the task at hand instead of being too distracted with the overall lesson.

The second principle is Achievements where students know they have completed a task and they are aware of it. People can be motivated by achievement as it can be one form of validity of their capabilities or their superiority from their peers. In a gamification, welcoming graphics, jingles, and words of encouragement are all strategies to validate the user's achievement for completing the task. For example, each time, the student correctly answers a question, there is a nice smoothing ringtone. With this, it creates a positive reinforcement for the students to continue achieve high standards.

Third principle is community collaboration where people form groups in order to complete a task. Collaborations can ease the task at hand by sharing the workload and even motivate students who like to socialize. For example, a forum is a good tool for users to learn from each other as people can ask their questions their can get answers from other students who are taking the same course. Another method is to assign group projects with bigger and harder tasks. Having collaborations within learning provides accountability that helps students do their respective jobs well.

The fourth principle is points or values given for the student's actions. These points serve as progress marks that the students can refer back to see how they are doing with the game. For example, users usually start at zero points. As they progress through the lesson, they gradually see their points rising.

The fifth principle is loss aversion or avoiding penalties. In game, the losers are punished for their loss and this principle states that not wanting to receive a penalty can be a motivator for players. The sixth principle of gaming principle is behavior momentum. This is the human habit of once they enjoy

something, they continually repeat the activity. This principle states that the game must engage with the players in order for them to be hooked and to keep playing the game.

2.2 Personalized Learning

Personalized learning creates a curriculum that adapts to the input and interest of students using an intelligent learning system such as AI, data mining, or other context-aware tools. In this type of learning all the resources such as the teachers, peers, and content, are all readily and flexibly available to the students' learning needs. As shown in Figure 2.3, there are three main aspects of personalized learning (Wong, 2016).

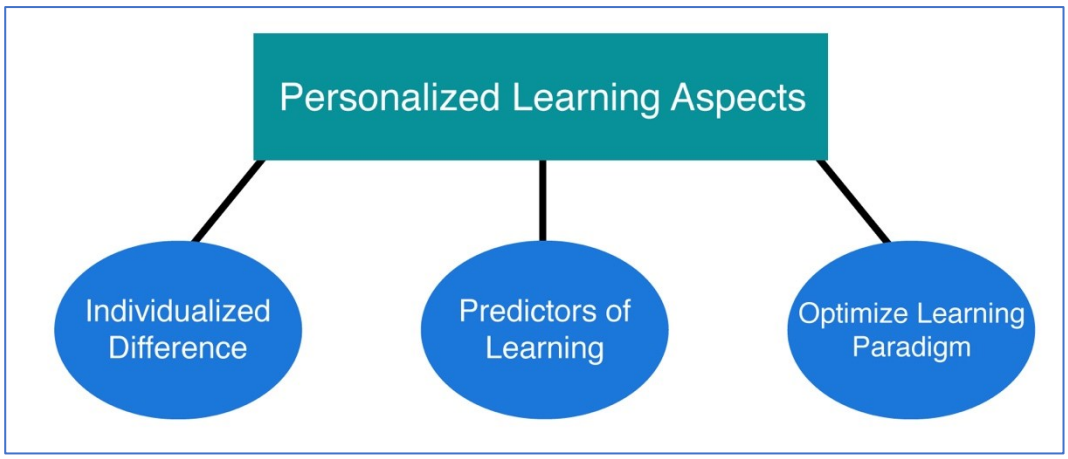

Figure 2.3 Personalized Learning Aspects

1) The first factor is "Individualized Difference in Learning" where different students takes different methods and time to acquire a language skill. Not all students process and understand information the same way. Here it is important to stress the importance of not just what is being learned (content) but how it is being learned also by the individual (learning styles).

2) The second factor is Predictors of Learning. These predictors range from genetics, growing environment, mental health, and working memory. A thorough understanding of the students' societal, biological, and financial background are variables on how a student learn and understand the materials. The more information that can be gathered on the person's personal information, the more specific learning materials can be curated.
3) Lastly and most importantly is to use the predictors to optimize a learning paradigm for the students. An ideal learning paradigm varies for individual students according to their individualized differences and predictors of learning. Therefore, it is important to understand that different learning strategies can still meet the expected education and behavioral goals when personally catering to an individual.

2.3 Big Five Personality Traits

One of the most effective application of personalized learning is using an individual's personality type to determine a specific learning structure and method. A common and reliable measurement of individual personality is the Big Five Personality Traits proposed by Costa and McCrae. As shown in Figure 2.4, the model provides five uniquely different personality traits that are often abbreviated as OCEAN: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (Costa & McCrae, 1992).

Figure 2.4 Big Five Personality Traits

To measure these personalities, individual scores are given to a person for each of the five personalities. A high score in one personality reveals stronger tendencies specific to that respective personality trait (Aidt & Rauh, 2018). The research shows that these five different personalities are all measured on a spectrum scale and everybody has, to some degree, each of the five personalities. The explanation of each personalities are as follows:

1) Openness is often associated with aesthetic appreciation and intellectual curiosity. Individuals who score high in Openness tend to be more creative, curious, and open-minded. They are described to have wild and imaginative thinking and are excited try out new and novel experiences.

2) Conscientiousness personality trait often relates with sense of responsibility and adherence to social norms. People who score high in Conscientiousness have a strong sense of work ethic, responsibility, organization, and performance. These people often become successful people in society where they are celebrated by their hard-work and achievements.
3) Extraversion personality deals with an individual's self-confidence and self-worth. People who score high in Extraversion are not afraid to speak out what they are thinking. They are often seen by society as those who are energetic, talkative, bold, and care very little about what others think of them.
4) Agreeableness personality trait is associated with sociability or the likelihood of keeping good relationships with others in society. People who score high in Agreeableness are often peace makers who are striving for a positive social change in the community. They enjoy engaging in communal activities and being able to help those who are in need.
5) Neuroticism relates with a person's negative emotions. Compared to the other four personalities, Neuroticism measures the scale of negative human emotions such as anxiety, instability, insecurity, and social distress. People who score high in Neuroticism are often difficult to deal with in society as they often display irregular and sporadic thoughts and behaviors.

2.4 Felder-Silverman Learning Styles

Every student has their own unique way of taking in information and processing data. This is referred to as the students' "learning styles" or the various ways student see the world and response to their current environment (Felder & Spurlin, 2005). Understanding students' personal learning styles is necessary in advancing academic achievement as it increases students' enjoyment and motivation in learning. As shown in Figure 2.5, the Felder-Silverman Learning Style Model provides four dimensions of learning styles to categorize students' preferred learning methods (Graf et al., 2014).

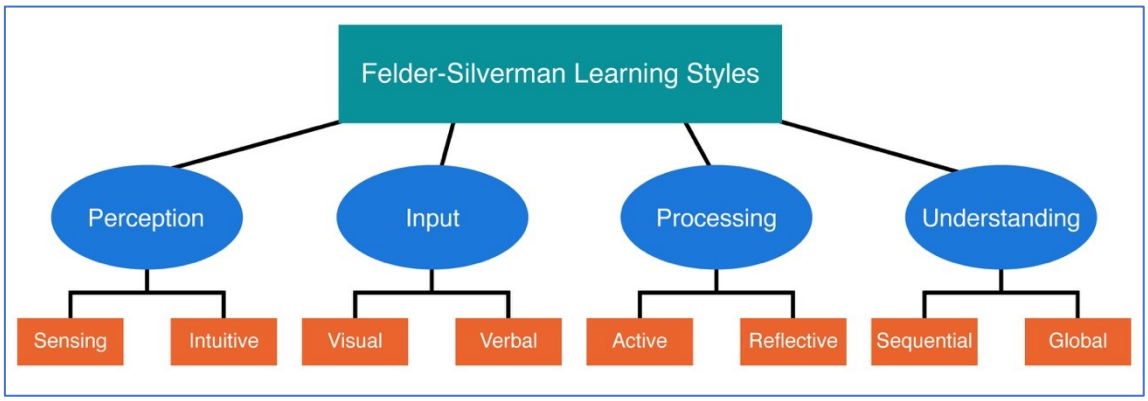

Figure 2.5 Felder-Silverman Learning Style Model

The four dimensions of learning styles are as follows:

1) Sensing-Intuitive dimension relates to preference on how one perceives or take in information. Sensing learners likes to focus on the details with the practicality of the subject matter and they tend to enjoy scientific facts and real-world applications. Intuitive learners tend to think creatively and thus enjoy consuming information that are more theoretical and abstract
2) Visual-Verbal dimension relates to the preference on how the information is presented. Visual learners tend to remember things better when they see

the related information in forms of visuals such as charts, pictures, and graphs. Verbal learners, on the other hand, tend to remember things that are spoken to them or they have seen in plain writing without the noise of the visual stimuli.

3) Active-Reflective dimension relates to the preference on how information is processed. Active learners enjoy processing the information through hand-on interactions with the source material and they prefer large group learning and communication rather than individual learning. Reflective learners, however, prefer thinking and mediating about the material and tend to enjoy learning alone or with a group of very close individuals.
4) Sequential-Global dimension relates to the preference on how information is organized and progress toward understanding information. A sequential learner prefers learning in processed step-by-step logical format; a learning that has a clear beginning, middle, and an end. Global learners, however, enjoy a more holistic learning, where they can meaningfully piece together random bits of information into one big picture.

2.5 ARCS Motivation Measurement

An established theory to measure motivation is the ARCS Motivation Measurement (Keller, 2008). As shown in Figure 2.6, Keller proposes the ARCS model that defines the four aspects of motivation for learners.

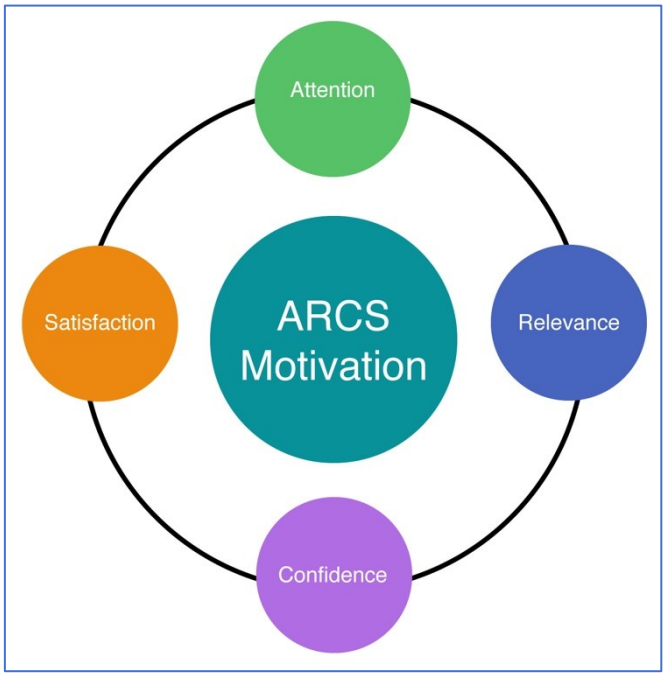

Figure 2.6 ARCS Motivation Model

The four motivation aspects are as follows:

1) The first A stands for attention or how attractive is the learning material in order to incite curiosity and attention for the user.
2) The second R stands for relevance, which refers to the relation between the learning material and real-life scenarios. Here the focus to create learning within the context of the individual to self-determination and intrinsic goal orientation.
3) The third C stands for confidence or the student's perception on his ability to learn and complete the material.
4) The four S stands for satisfaction or how positive the learners feel after completing the material.

Additionally, Keller also includes a fifth principle which is Volitional or self-regulatory principle relating to the motivation that allows the learner to continue and persist in his learning.

2.6 Related Works

The most influential Mobile Language Learning Application currently is *Duolingo*. *Duolingo* is a free platform that teaches language through the means of gamification. Even in 2016, it provided almost 60 language courses in 23 different languages (Huynh, 2016). The model incorporates basic gamification principles which was discussed earlier. The first is achievement where users are awarded "lingots," or in-game currency, as they complete a course material. These lingots are can be spent on their virtual shop in order to gain better lessons and customization capabilities. Moreover, they also award special badges or tokens when they have shown their capable skills. Secondly the model incorporates the principle of behavior momentum by having a level-system that tracks the students' daily activities and achievements. As students can see their levels increase, it creates motivation for them to continue using the application in order to reach higher levels and goals. Particularly *Duolingo* provides experience points (XP) as a means to increase one's level and these can be achieved by using the application frequently. Lastly, *Duolingo* incorporates the principle of loss aversion by having a leaderboard system. When players are ranked high, they don't to lose their top-ranking spot which makes the application more fun and addictive for users in order to maintain their top rankings.

The basic interface of *Duolingo* consists of a language course that focuses on vocabulary and short phrases of the language through the use of simple

multiple choice and fill in the blanks. However, it is still lacking in its effectiveness to learn speaking skills as it is often a one-directional learning or the absence of a dynamic teacher. Also, the program covers only basic entry-level materials without a linear progression in their lesson plans. The paper discusses how the gamification model can be improved from the current *Duolingo* model.

Researchers from Budapest Business School, conducted the effectiveness of their Mobile Assisted Language Learning (MALL) project *busuu* with three main criteria: Performance, Motivation, and Feedback (Ketyi, 2016). To measure performance, they conducted two tests on the material: pre-test and post-test results. Pre-test are placement tests are taken by students prior to the MALL project and Post-test are results of how much they have improved or decreased om their tests. They also gave the students a questionnaire regarding their motivations on learning the course material both prior and after the research was conducted. The questions were categorized into five groups: the benefits of language learning, impressions on learning a new language, outside forces that influenced their language learning motivation, and finally their commitment to spend time learning the language. Then the two results are compared to understand their effectiveness. Lastly, the researchers measured their feedback, or the students' satisfaction regarding their MALL. Students filled out a questionnaire related to Strengths and Weaknesses of the program and their initial reactions. These questionnaires were given out twice: once shortly after they used the program and twice again after a couple of months into the program. This research also uses these same three measurements (performance, motivation, and feedback) to

objectively assess the effectiveness of the gamification within the current mobile language learning applications.

Researcher Garrido and his team developed an architecture that uses AI planning and Case Base Planning to create a personalized educational learning route, named *myPTuto*r, that caters to students' needs (Garrido, 2016). As shown in Figure 2.7, the model follows a series of 4 main components.

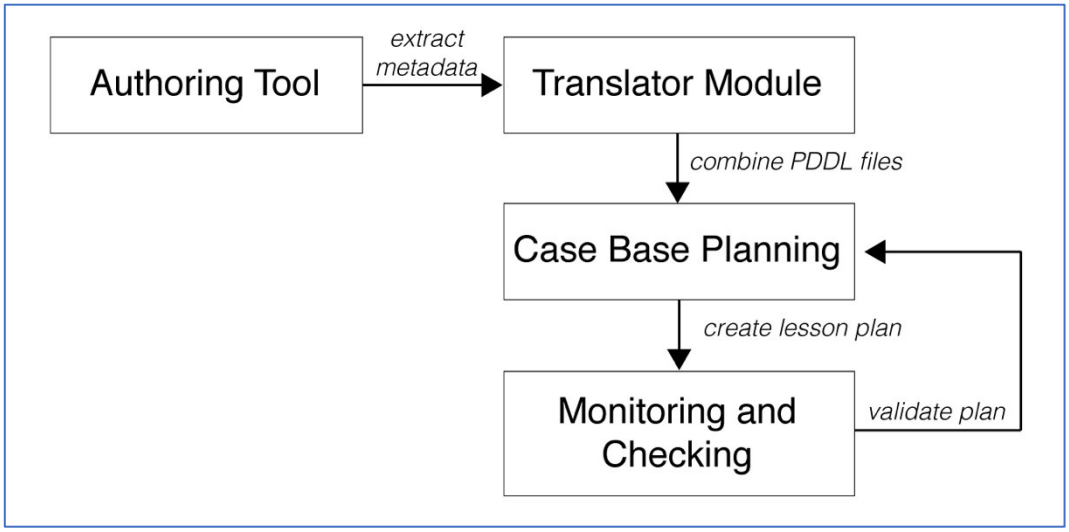

Figure 2.7 myPTutor Architecture

The first is an authoring tool to define the course. This tool extracts metadata information from the huge database to select a course. Then a Translator Module compiles all the Planning Domain Description Language (PDDL) files such as the domain and the problem. Then using Case Base Planning, it solves the problem and creates an initial lesson plan or even adapt to an existing plan based on merging techniques. The plan is validated by a human teacher before it manifests itself in Learning Management Systems (LMS). The system always monitors and checks the progress to check for discrepancies and executes another CBP accordingly.

The Personalized Creativity Learning System (PCLS) uses Data Mining technique specifically decision tree to optimize learning for students (Lin, 2013). This Personalized Creativity Learning System uses four agents to mine learning information. The User Interface Agent first collects information that the student provides during registration. Then a Path Agent assigns a learning path to a learner at random. After several interactions with the random Path Agent, a Creativity Game Agent creates a game-based activity and scenarios that is recorded in the Learning Profile Database. Finally, the Questionnaire Agent will use tree algorithm and feature selection to optimize learning results based on the Learning Profile Database from the Creativity Game Agent.

In his personalized gamified model, Ku created a gamified learning activity that users can customize accordingly (Ku, 2016). He assigned a toolbar on the bottom of the screen to change game elements according to user preferences. The three aspects that the user was able to change was first the Narrative. Having a narrative engages the user more by evoking curiosity and imagination through a story. Secondly, there was an option to display hints. His researched showed that students who had specific detailed hints were better than general hints and hints are a great way for students to not give up when they are currently stuck at a problem. Lastly, he had the option to play music during the learning process as the selection of music can increase the learner's enjoyment and reduce the tension and anxiety of learning.

One research study examined the relationship between students' personality and students' preferred learning style (Siddiquei & Khalid, 2018). The research used the Big Five Personality to measure students' personality and the

Felder-Silverman Learning Style Model to describe the learning styles. The results showed that there is a correlation between the two variables; a student's personality can be a predictor for his or her preferred learning styles.

For example, students with high Openness had a significant positive correlation with active and visual learning styles. This implies that they enjoy learning that is hands-on and graphic, different from the traditional conventional learning methods of just simply reading and writing. Accommodating to their tendencies, the learning model that best suits them is one that is gamified learning where gamification elements are heavily integrated within the learning system for them to actively learn and try out. Gamification elements such as a challenge, points, chance, and rewards benefitted this group of learners (Khaleel et. Al, 2016). Conscientiousness personality is positively correlated to the sensing and intuitive learning style. They like taking in information in a systematic and organized way and prefer concrete, practical thinking, concerned with facts and procedures. These self-motivated students tend to learn best by themselves and do not require a lot of external gamification stimuli to get them motivated to learn such as the point systems and rewards. Regardless, subtle gamification elements such as progress report and hint is helpful for them. Agreeableness personality is positively correlated with active, sensing, visual, and sequential learning styles. These students enjoy learning together to better improve one another. They are active and visual learners in which gamification elements such as challenge, points, and rewards are helpful to them. Thus, a learning model appropriate for this group is gamified group looking where students learn by competing with one another. Extraversion personality is positively correlated with all of the four

learning styles while Neuroticism personality is negatively correlated with all four learning styles. As a result, a specific learning model cannot be created due to having too many learning style variables.

Currently, there exists individually separated models that incorporates only either the gamification model or personalized learning model in e-learning. Even the one model that combined the gamified personalized system is still novel and offer only a few customization tools. This thesis further discusses on the research method to create a more practical and effective e-learning model.