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Memoverbs®: Designing an Online Educational Game for English Learners

Bruna Tadross

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Bruna Tadross

SIT Graduate Institute

bruna@accesschool.com

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IPP Advisor: Dr. Elka Todeva

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Abstract

Technology has reshaped the English as a Foreign Language (EFL) field. A pertinent example is the increasing number of online games and activities for EFL learners. Although having a myriad of technological resources to choose from can promote learning, the quality of these tools varies greatly, leading some EFL students to become frustrated by the cost and time spent on ineffective tools. In light of the above, an online educational game to assist learners with irregular verbs in English, based on Design Thinking methodology, is proposed here as an attempt to strengthen the EFL online niche. This research paper illustrates the game creation process and analyzes data collected from fifty-five students and thirteen teachers from Brazil who piloted the game. The results reveal what makes a tool effective from the learner's and teacher's points of view. Additionally, the suggestions provided can be applied to the creation of other types of educational games.

Keywords: *TEFL, EFL, online learning, educational games, online games, irregular verbs, regular verbs, technology, English, Design Thinking.*

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Memoverbs: Designing an Online Educational Game for English Learners

Introduction

Online games have ceased serving simply as entertainment tools. Rather, they have evolved into learning instruments for educational purposes that allow access to rich content anytime and anywhere. This availability fits perfectly into life's unavoidable demands: rushing from home to work, running errands, getting stuck in traffic jams, amongst many other time-consuming activities. Students enjoy the idea of learning English at the time and place that best suits them – and online learning makes this idea plausible. As a result, schools and social media create many possibilities of online learning tools related to English as a Foreign Language (EFL).

The internet is a vast territory to explore, and potential users, both learners and their teachers, have to take a lot into consideration when choosing a tool: Are EFL websites virus-free environments? Is it safe to submit personal information? Is it a free or a paid tool? Is it safe for teenagers? How effective is it for learning and practicing English? How accurate is the information provided? What do students want to learn from using such a tool?

Alas, the apparent lack of safe and effective online tools for EFL may lead instructors and learners to give up on e-learning. My own experience as a teacher has brought me to difficult times in which the online video I had suggested was not available anymore. Moreover, an internet link on regular and irregular verbs led my fifteen-year-old students into clicking on online dating advertisements. Needless to say that the advertising was not there at the time I added the exercise in my lesson plan. Students rely on teachers to suggest reliable resources. It

can be time-consuming to find interesting online learning tools to cover a specific topic regarding students' learning goals and frustrating when those tools are no longer available.

According to *What video games have to teach us about learning and literacy*, by James Paul Gee (2007), there is a vast territory to explore on connecting videogames to potential learning experiences. For that reason, the present work has elected to adopt Gee's two theories as the main principles used in the designing of the online game: the 'Psychosocial Moratorium' Principle and the 'Regime of Competence' Principle. These principles take into consideration the importance of risk-taking and also doable challenges that must be integrated in a game.

Next, Design Thinking was chosen as the approach to create a highly effective online language tool. The above mentioned approach allows one to tackle a problem through a positive lens and a structured process. In this case, Design Thinking facilitates the creation of an effective educational tool with good learning outcomes. A series of five steps contribute to finding innovative solutions. These are: Discovery, Interpretation, Ideation, Experimentation, and Evolution. These steps were incorporated into the creation of this research project and are reflected in the structure of this paper. A description of the approach from design firm IDEO's Design Thinking for Educators Toolkit (2012) follows:

> The design process is what puts Design Thinking into action. It's a structured approach to generating and evolving ideas. It has five phases that help navigate the development from identifying a design challenge to finding and building a solution. It's a deeply human approach that relies on your ability to be intuitive, to interpret what you observe and to develop ideas that are emotionally meaningful to those you are designing for – all skills you are well versed in as an educator (p. 14).

As the breadth and variety of online learning keep growing, this paper will clearly not cover all the potential opportunities for English e-learning. One specific topic was chosen for the development of a new online educational game, taking into account a major challenge for English learners as determined by Error Analysis data and my personal experience as a teacher of English. Chapter 1 outlines the identification of the challenge, the Discovery step in the Design Thinking process. The starting point of this project was the creation of a survey to find out the most challenging English grammar topics. This survey was administered to fifty-five Brazilian students who go to a language school in Brazil. In addition to summarizing the results, this chapter attempts to identify the main constraints that are preventing learners from attaining proper online practice. The gravity of the problems identified motivated me to begin the designing of an online educational game: Memoverbs®.

Next, Chapter 2 presents step two: Interpretation. The data collected from the first surveys were analyzed in order to understand the aforementioned challenges more deeply. Based on the interpretation of these data, the infinitive, past, and perfect forms of regular and irregular verbs in English were chosen as the main learning goal of the online tool. Gamification research served as the framework for designing an effective game to practice this topic.

Chapter 3 highlights the third step in the process, Ideation, which consists of the planning stage for bringing the idea to fruition. This chapter outlines the development of the main idea to a practical solution to the problems from the abovementioned stages.

Chapters 4 and 5 describe the next steps in the Design Thinking process: Experimentation and Evolution. In fact, prototyping and collecting feedback were the most valuable parts of this methodology, since feedback allowed the creators to assess whether users would accept and truly

benefit from the tool. This section presents students' and teachers' feedback in detail based on a second survey regarding their experience using the game. A discussion of the promising results from pre- and post-tests also appears in this section. Experimentation allowed for refining the original idea of Memoverbs as presented in these chapters.

It is also worth noting that despite the obvious constraints of this research project, designing an online game for memorizing and using verbs in English has triggered many conversations and possible game ideas for the near future.

Chapter 1: Discovery

The Discovery step in the Design Thinking process views a problem as an opportunity to create new ideas. This first step entails deepening one's understanding of the problem and reframing that problem as a possibility (IDEO, 2012). Therefore, understanding what EFL learners and teachers need and want from technology makes meaningful e-learning solutions possible, in this case through designing an online educational game.

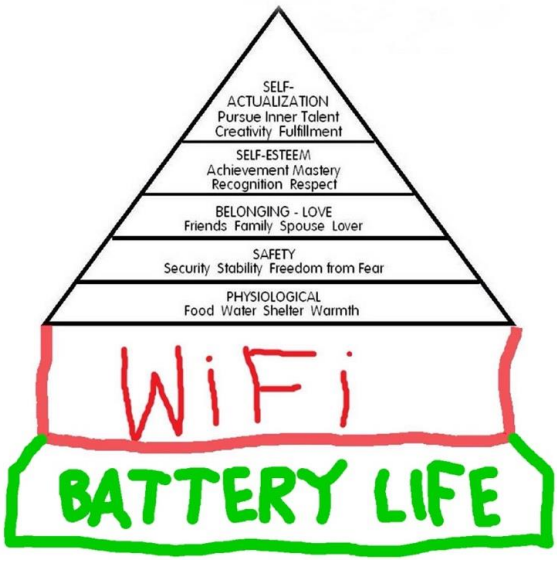


Figure 1. Hierarchy of needs [illustration] from "The [Not So] New Hierarchy of Needs in Banking," by R. Shevlin, October 2, 2014, https://thefinancialbrand.com/47308/the-not-so-new-hierarchy-of-needs-in-banking/.

Figure 1 draws attention to how much technology has been embedded into our lives. Maslow's well-known chart posits a hierarchy of human needs which consists of a bottom-up theory from physiological features to self-actualization. As Figure 1 illustrates, technology has become such a significant and crucial aspect of modern life that people act as if Wi-Fi and battery life are essential for human beings.

Indeed, technology is part of our lives, and it has to be used efficiently to leverage educational outcomes. That is the reason why a great deal of effort has been put into connecting schools around the world to the newest technology offers. For instance, the current report from School Connectivity for the 21st Century (Cisco, 2015) highlights the importance of internet access to improve education and tackle classroom challenges. The report concludes that access to technology enables students to improve cognitive and non-cognitive skills. Moreover, it points out that internet access is responsible for higher enrollment numbers of students entering college after high school.

Despite the potential of e-learning, the online offers for ELLs have often been overwhelming and frustrating. According to the Standards for Technological Literacy (ITEA, 2007), technology deals with creating novelty based on knowledge to meet society's needs to solve problems, but tech-based language learning tools can fail in this regard. A number of online games are just new versions of old mechanical games previously played with slips of paper inside a classroom. Similarly, virtual classes may have the same lesson plan of a face-to-face class. Therefore, I invite you to reflect on Figure 2, which illustrates a possible educational pitfall when one wants to incorporate technology in the EFL community.

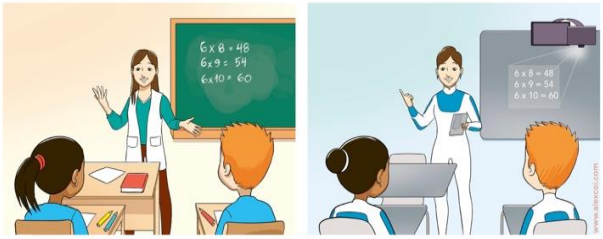


Figure 2. Tecnologia da educacao (Technology in education), by A. Cói, August, 2016.

Why an Online Educational Game?

Technology has played a major role in learning through virtual classes, online assessment, and practice opportunities. Moreover, school curricula have been rewritten to incorporate learning theories and game-based learning strategies. For instance, Quest to Learn, a school located in New York, has been redesigning learning through technology. Quest schools reconstruct the concept of traditional curricula by engaging learners in exciting, empowering, and culturally relevant ways beyond the classroom walls. Learners' outcomes have been quite impressive: more engaged students, more motivated and committed teachers (Institute of Play, n.d.).

As pointed out by Gee (2007), engaging learning theories with game design may have a direct impact on enhancing educational systems, just as the Quest to Learn example shows. Gee states the effectiveness of game design learning theories when he highlights that “video games are good at putting language into the context of dialogue, experience, images, and actions. They are not textbooks full of words and definitions. They allow language to be situated” (p. 36). The present work has realized the engagement of learning theories within game design principles by designing an educational online game for EFL learners and practitioners in which students can practice and use a specific grammar topic. This work has adopted two of Gee’s (2007) game design principles in order to reshape traditional views of online games in the EFL field, the ‘Psychosocial Moratorium’ Principle and the ‘Regime of Competence’ Principle. These principles are explored in Chapter 3: Ideation.

Content Discovery of the Game

Once the decision was made to create an innovative and effective online game, the search for that game's content began, starting with potential learners' goals. Students' goals may vary from being able to converse using basic terms to being able to excel at demanding academic tasks amongst proficient speakers. This vast territory has been defined by the BICS (Basic interpersonal communicative skills) and CALP (Cognitive academic language proficiency) spectrum presented by Jim Cummins (1984). Furthermore, Shuy (as cited in Cummins, 1984) explains this distinction by using his "iceberg" metaphor, illustrated in Figure 3, which represents the divergence between "visible" linguistic aspects (pronunciation, basic vocabulary, and grammar) and less measurable aspects, such as academic functional language and cognitive proficiency.

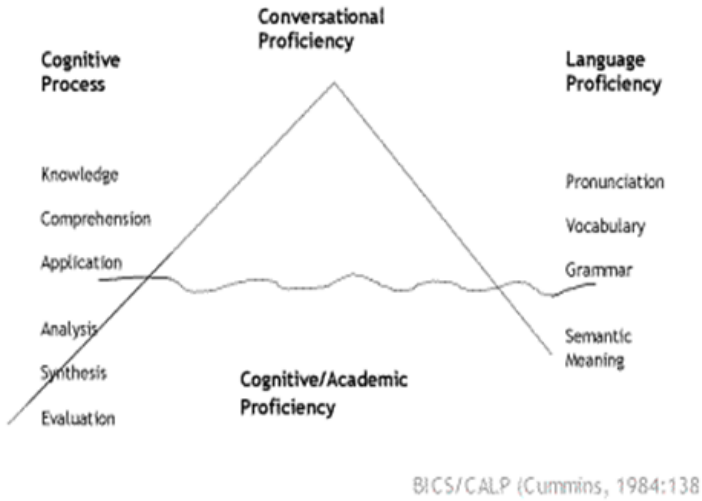


Figure 3. Iceberg metaphor of linguistic features from *Bilingualism and Special Education,* by J. Cummins, 1984, p. 138.

Given the variety of learner goals, it seemed advisable to propose an online educational game that reinforces the learning objectives that fall within both the BICS and CALP framework, as well as structures that students of all levels can benefit from practicing. This common core consists of English grammar points, vocabulary, and pronunciation which learners need to master during their pathway of language learning whether they are aiming at the BICS or CALP proficiency and regardless of language proficiency.

According to the Common European Framework definitions (Council of Europe, 2016) a survey was created featuring four main word-formation topics representing language competence from A1 to C2. (Readers unfamiliar with the CEFR language competence levels may view Appendix A.) Potential learners were asked which of these four topics they wanted to practice through an online game. By asking students their preferences, game designers can ensure that students are more than well catered for in their English learning needs. In fact, not only are students' needs taken into consideration, but also teachers' goals concerning incorporating an online educational game in their class planning. In the next chapter, the results of this first step, discovering the needs and interests of learners and teachers, are interpreted in order to answer two core questions: What do the EFL learners in this study want to learn the most through an online tool? What do EFL teachers in this context look for in an online educational game?

Research Participants (students and teachers)

Building a solid foundation for approaching the ELL's online challenges begins with understanding learners' and EFL teachers' needs. In order to reach a positive outcome from this project and to make this work successful, immersion in context is one of the core foundations for this paper. Research participants surveyed attend Access International School, a language school

located in São Bernardo, São Paulo, Brazil. The study began with the participation of fifty-five students (teenagers and adults) and thirteen teachers. The participants became part of this research at the beginning of 2014 and were still involved at the time of writing. They collaborated by answering two types of surveys:

Survey 1: Challenging English morphemes for learners

Survey 2: EFL online community challenges for teachers: Problems with educational technology inside and outside the classroom

A link to Survey 1 was generated and students, ranging from eleven to thirty-two years old, chose from amongst four main word-formation topics: adverbs, adjectives, uncountable nouns, and verbs. The results, shown in Figure 4, showed that 38%, the highest percentage of any of the topics, chose regular and irregular verbs as the most difficult topic to learn when studying English.

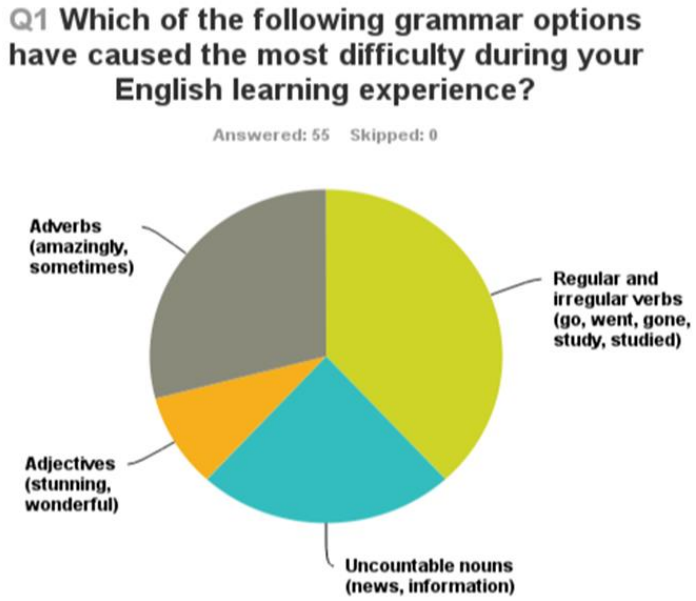
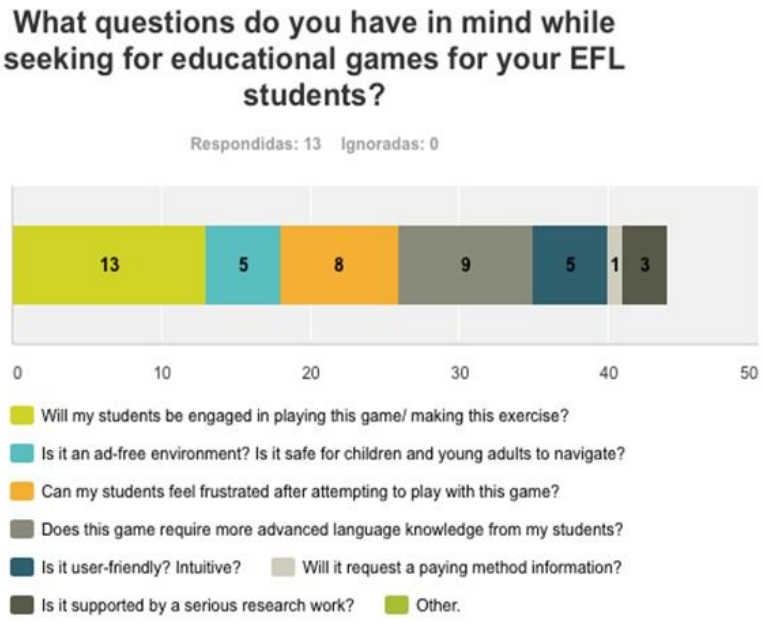


Figure 4. Student-reported grammar challenges.

Additionally, thirteen teachers answered a survey about their challenges in choosing online activities for EFL learners. These teachers ranked the most important questions they have in mind while choosing an online tool for their lesson plans. The results, presented in Figure 5, show the importance of engaging learners and also how frustrated a teacher can become while working with online activities inside his or her classroom. The data collected provided a compass for the designing of the game. The results pointed clearly to an opportunity to connect learners and teachers to an engaging online game to practice and use verbs in English.



ções de resposta	Respostas	
Will my students be engaged in playing this game/ making this exercise?	100,00%	13
Is it an ad-free environment? Is it safe for children and young adults to navigate?	38,46%	5
Can my students feel frustrated after attempting to play with this game?	61,54%	8
Does this game require more advanced language knowledge from my students?	69,23%	9
Is it user-friendly? Intuitive?	38,46%	5
Will it request a paying method information?	7,69%	1
Is it supported by a serious research work?	23,08%	3

Figure 5. Teachers' concerns while choosing online educational tools.

According to the Design Thinking process, Interpretation is the next stage in the designing of the game (IDEO, 2012). During the aforementioned Discovery stage, information was gathered to build a deep understanding about a burning question. This information gathering in Design Thinking generally leads to a clear picture of the problem. As a result of my own discovery process, the question raised was: How can an online game be developed to effectively assist learners in memorizing and using English verbs?

Chapter 2: Interpretation

The first chapter of this paper was meant to raise awareness of the many ways in which technology is embedded into students' and teachers' lives, as well as the challenges and potential of e-learning tools. To provide data for the creation of an online learning game, fifty-five Brazilian students answered a survey on the morphological features they struggle with during the process of learning English as a foreign language. In addition, thirteen teachers elected the most important inquiries they have in mind whilst choosing activities from a broad range of online offers. As a result, the question raised as the starting point for designing the online game is: How can we best assist learners to memorize and use English verbs through an engaging online game?

Immersion in the context generated a broad list of actions on how to improve online game offers. The Design Thinking process reiterates the importance of framing problems as possibilities (IDEO, 2012); hence, a chart of possibilities (Table 1) was generated to serve as guidelines for the creation of the online educational game. The data collected came with an undeniable certainty that the current online educational offers for EFL need improvement. The chart of problems and possibilities was used as a quality assurance checklist (QA) for the process of designing and uploading the game. The fundamental core values of this new game, as can be seen in Table 1, had to include social engagement, navigational safety for all ages, constant feedback, clarity of educational objectives, user-friendliness, access to the full experience without any surprise costs, and last but not least, current research.

In the same context, the students' first survey revealed that the group of students has struggled with regular and irregular verbs in English. Gathering information directly from students about what they find most difficult enables teachers and game designers to view

students as participants in their own learning, as the main focus of the e-learning content. This survey data revealed that creating an effective game for practicing verb tenses in English would be beneficial to the learners surveyed.

Table 1

E-learning Problems and Potential Design Solutions

PROBLEMS	POSSIBILITIES
1. Students are not engaged in the game.	1. Make the tool more appealing. It must have vibrant colors, music, and a score ranking system. Multi-player opportunities may engage students as they play with friends.
2. Some tools are not trustworthy or safe to navigate in an educational environment.	2. Ensure that it is a safe environment to navigate from the beginning to the end of the game. The target public should vary from children to adults.
3. Students can feel frustrated.	3. Provide individual progress feedback. Allow opportunities to try again and learn from experience by practicing more, thereby coming up with a better score. Show the results to teachers and parents.
4. The tools do not specify the main language content.	4. Be clear on the learning objectives for the game.
5. Tools may not be user-friendly or intuitive.	5. Make the tool user-friendly, straightforward to navigate.
6. Paid tools often begin as free games.	6. State at the beginning of the experience whether it is a free or paid tool.
7. Design and tools may not take into consideration current studies regarding how people learn through technology.	7. Base the game on learning theories and current research.

The teachers' point of view in this context was also taken into consideration in order to understand students' struggles with the memorization and use of English verbs. Three teachers from the research group were asked to answer the following question: "In your opinion, why do learners have difficulties using regular and irregular verbs in English?" Find below their answers:

> Even though verbs in Portuguese could be considered irregular, I feel students get more comfortable when there is a clear rule they can follow when learning and speaking English, which is the case with regular verbs. The very idea of 'having' to memorize an entire list of irregular verbs makes them nervous and insecure. That being said, I feel students who watch series, movies, and videos, read books and play games in English are usually much more confident when speaking English (P. Lusvarghi Fernandes, personal communication, October 6, 2016).

> I believe it is because they see it as a list to be memorized for tests; they do not see their immediate use (except for the verbs that are most commonly used). It is also a bit challenging because the irregular verb patterns are various and it is hard for students to find a logical way of classifying them. Even when they do so, they fail to remember what they mean. Therefore, they end up not using most of them (J. Isabela, personal communication, October 6, 2016).

> I think it is because it is illogical and a matter of memorizing the right form of each verb. Only when they reach that point when the language becomes intuitive, and it comes with

time and a certain number of "encounters" with these verbs, they no longer make mistakes in applying them (F. Inglez, personal communication, October 6, 2016).

The answers above have shown how reflecting on a specific grammar topic enables teachers and game designers to hone in on the specific challenges of that topic. Once more, the idea of memorizing a list of verbs and their different forms can become a tedious activity with unattainable results. A word cloud based on the three teachers' responses was generated to give a clear example of how verbs are crucial and, at the same time, can become a painful and stressful topic for learners (see Figure 6).

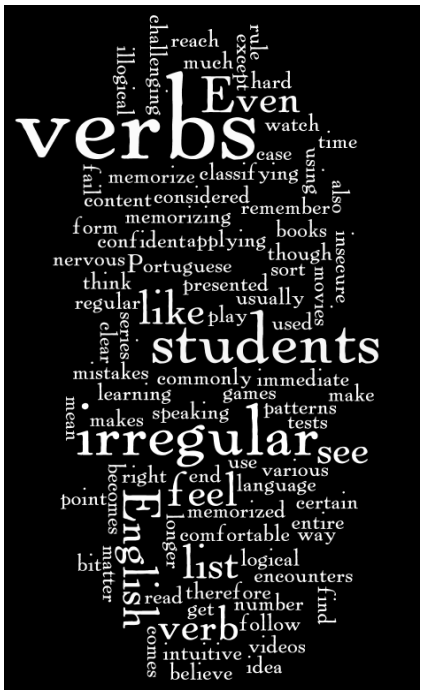


Figure 6. Word cloud: Verbs, generated by www.wordle.com.

The Challenges of English Verbs

English verbs are categorized into regular or irregular. It is a rather simple concept, yet it causes confusion in the mastering of the language as soon as students are presented with the exceptions along the way. A regular verb adds “ed” (played, enjoyed) or just “d” (loved, danced) to form the simple past tense and the past participle used in the perfect tenses, the passive voice, and the perfect modals.

Conversely, irregular verbs pose a bundle of specificities. Some irregular verbs never change (cut, shut). Others use the same irregular version for the simple past and the past participle (bring, brought, brought). Some irregular verbs change their forms in the past simple and past participle (see, saw, seen). Apart from that, some verbs vary drastically and become new, different words (be, was/were, been; go, went, gone). Moreover, some past participle forms also are used as adjectives (broken heart). Typically, teachers may suggest students memorize a list of verbs, referring to it while doing class work as well as homework assignments. Murphy’s (1997) 86 irregular verbs in his book *Essential Grammar in Use* (Appendix B and Appendix C), serves as a model of what this list might be.

According to Steven Pinker (2014), an American experimental psychologist and linguist, the most common verbs in English are irregular, as can be seen in Table 2. Because of how common these verbs are, learners usually encounter irregular verbs as soon as they learn past simple and perfect tenses during A1 and A2 levels (see Appendix A for a description of levels). At this point, they may feel overwhelmed right from the beginning. Teachers and students may rely on an old-fashioned way of learning by memorizing a long list of irregular verbs.

What Can Students Gain from an Online Educational Game on English Verbs?

Practicing English verbs in the present, present participle, past and past participle forms makes it possible for students to master the use from simple to complex grammar structures, such as passive voice and perfect tenses. Games can create shortcuts in the memorization process, making the content fun and engaging. For these reasons, an online game is potentially an excellent tool for learning and practicing verbs in English. Through using the tool, the student becomes the main producer of a learning moment, not only being able to create a course of action but also sharing their creation, tactics, logic, knowledge and talent with their counterparts who also play the game.

Table 2

Common Irregular Verbs

Rank	Verb	Occurrences per million words
1	be	39,175
2	have	12,458
3	do	4,367
4	say	2,765
5	make	2,312
6	go	1,844
7	take	1,575
8	come	1,561
9	see	1,513
10	get	1,486

Note. Adapted from *Words and Rules,* by S. Pinker, 2014, retrieved from https://read.amazon.com.

Some people have reservations about creating online games of this type, which Kapp (2012) considers responsible for "setting up the game beforehand." The author explains that skeptics are concerned that too much is done for the students in advance. He counters this concern by describing this moment as a pre-learning mode, responsible for making students feel more confident in their new learning experiences.

The details which serve games and the gamification of a process were important to scaffold the designing of the new game aimed at practicing and memorizing the verbs in English. Before further exploring the creation of the new game, it is important to define our key terms: Game and Gamification. This paper relies on Kapp's (2012) definitions:

> Game: *A system in which players engage in an abstract challenge, defined by rules, interactivity, and feedback that results in a quantifiable outcome often eliciting an emotional reaction.*
>
> Gamification: *Using game-based mechanics, aesthetics, and efficacy to engage people, motivate action, promote learning, and solve problems.*

The intertwined concepts of *game* and *gamification* provided the core elements in designing the verb-focused game. It had to provide fun and engaging situations and avoid tedious memorization work. The goals of helping students memorize the verb forms, integrating gamification elements, and utilizing the QA list led to the designing of the educational online game: Memoverbs.

At this stage in the process, the specific needs had been discovered and the data had been interpreted. Following the steps in Design Thinking, the Ideation of the project at this point

opened up major possibilities. In the next chapter, the Ideation stage connects information, ideas, and people in order to generate the first prototype of the game.

Chapter 3: Ideation

After gathering information about the challenges facing the learner, and interpreting that data to consider options for solving the problem, Design Thinking arrives at the Ideation stage. At this point, a plan was created to bring Memoverbs to life based on the most promising ideas. The Design Thinking methodology outlines teamwork as essential at this point of the process (IDEO, 2012). Collaboration introduces variety into the development of the solution along with the contribution from different angles; thus, in the creation of Memoverbs, experts who could see the game through different lenses were invited. Indeed, EFL learners and teachers were taken into the realm of the Discovery and Interpretation stages, and they continued to provide valuable input through the Ideation stage.

In addition to the teacher and student input on verbs in English, an Information Technology expert was brought together to take part in the Ideation process of Memoverbs: Tadross Shafik Tadross, a physicist, who graduated from Universidade de São Paulo with a vast background in management, outsourcing, and information technology. In this teamwork context, four principles surfaced as the core elements of the game design. These elements are shown in Figure 7 and rely on the premise of the data collected in the previous chapters.

Trinomial Concept

Memoverbs game is based on the trinomial concept of matching three elements of the same group. According to Oxford English Dictionary ("Trinomial," 2016), trinomial means, among other things, "(of an algebraic expression) consisting of three terms." Applying the trinomial effect to irregular verbs consists of matching the base form, past simple and past participle forms of the irregular verb. Table 3 shows several examples of the trinomial concept in the game.

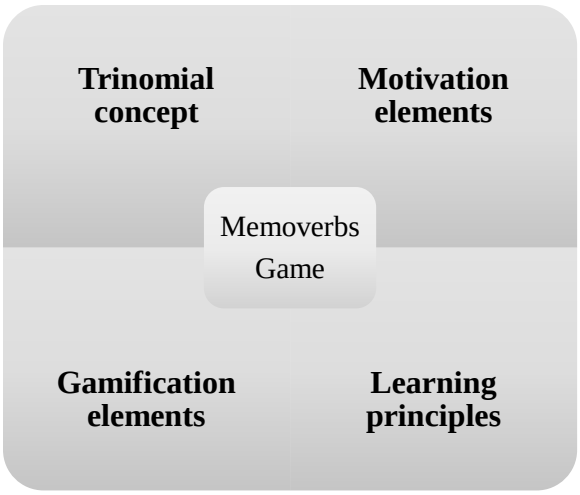


Figure 7. The four core elements on which the creation of Memoverbs was based.

Table 3

Trinomial Concept Applied to Verb Forms

Infinitive	**Past Simple**	**Past Participle**
build	built	built
go	went	gone
see	saw	seen
mean	meant	meant
bring	brought	brought

Note. Provided by T. Shafik Tadross, personal communication, 2014.

Memoverbs employs this concept because matching three elements of the same part can make it easy to retrieve information later on. Based on my experience teaching and learning English, it is clear that playing Memoverbs based on the trinomial effect provides enough practice for learners so they are able to memorize the irregular verbs.

Motivational Elements

Memoverbs seeks to encourage intrinsic motivation in its users. According to Maggie Harnett (2016), intrinsic motivation differs from extrinsic motivation in that intrinsic motivation is based on the enjoyment and interest that participants have while studying a specific content rather than being motivated by some outside source. Positive outcomes have been related to intrinsic motivation, such as being actively engaged, creative, persistent, and also more likely to approach challenges (Harnett, 2016). To encourage intrinsic motivation, Memoverbs uses a different approach than traditional teaching: engaging the user by stimulating curiosity and competitiveness through gamification. During the Ideation process, designers took into consideration the concept of players engaged with the game elements rather than playing Memoverbs merely to study for a class project or test.

Gamification Elements

Memoverbs brings the concept of intrinsic motivation to the forefront of the game dynamics by utilizing gamification elements to deliver an enjoyable and captivating online game. The first element we decided on was the multiplayer function that enables students to play with friends and other gamers. Next, we chose to include a leaderboard display to allow gamers to set goals and keep track of their points. Third, we gave students the ability to go to the next level according to their total score achieved in the prior match. Last but not least, we allowed gamers to share their rankings on social media apps, such as Facebook.

An additional stimulus for engagement is the storyboard of the game. At this stage of the Ideation process, additional specialized professionals were needed, so a marketing and social media company was hired to propose the storyboard as well as a character to give practical use to

the content students would be gaining. The company presented the role-playing concept of a worker at a factory in which players factor a trinomial by collecting boxes from piles of verbs, similar to pulling playing cards from a deck. At this point, we made a music theme available, as well as the pronunciation of all verbs and clues offered by the main character – the Memo elephant (see Figure 8).

Figure 8. Memo Elephant®. (2015).

This Ideation stage delivered the layout of the game itself as well as the brand report (Appendix D). In fact, the logo and colors demonstrated the potential of the project. It inspired the team to keep on exploring and delivering an excellent online game. The components of a fun educational game to memorize verbs in English, which generated the logo and the game's identity, is summarized in Figure 9.

Figure 9. Logo creation: Game Education Verbs. (2015).

Learning Principles

James Paul Gee (2007) posits several principles that embody a good game in his book entitled *What Video Games Have to Teach Us about Learning and Literacy*. Two of these elements have been adopted to scaffold the premise of Memoverbs: risk taking and performance before consequence.

According to Gee (2007), risk taking can be summed up through the **"**Psychosocial Moratorium" Principle. He explains that "learners can take risks in a space where real-world consequences are lowered" (p.65). In this work, the author reiterates that a successful game must motivate students to explore and take up challenges. To mitigate the potential stress of risk taking, Gee (2007) suggests performance before competence through the "Regime of Competence' Principle: the learner gets ample opportunity to operate within, but at the outer edge of, his or her resources, so that at those points things are felt as challenging but not 'undoable'" (p.69).

We ensured that by getting acquainted with the game dynamics, students at levels A1/A2/ B1/B2 (see Appendix A for details of levels) can transit through the levels because the game provides the element of performance before competence. Memoverbs also provides a straightforward feedback report after each match. The report lists the number of trinomials

factored, the number of mistakes, and also the sentences filled in correctly. By receiving detailed feedback, students are able to track their performance and to invest more time at the level they need to win more points. Nonetheless, students may not understand the meaning of a verb; thus, they are able to take risks in factoring trinomials and using given verbs in a sentence. As an individual enters a new level, more challenging verbs are used throughout the game, including phrasal verbs, thereby increasing the risk factor as the learner's competence increases. See Appendix E for a complete list of verbs included in Memoverbs.

The following chapter focuses on the launching of Memoverbs through a prototype. Prototyping, also referred to as Experimentation (IDEO, 2012), creates a realistic environment that is concerned with meeting the goals and principles set forth in the previous stages. For ease of designing, Memoverbs' Experimentation stage was developed in tandem with the Ideation team.

Chapter 4: Experimentation

This chapter describes the prototyping phase of Memoverbs. The elements from the Ideation chapter were interleaved into the creation of the game itself. The Memoverbs online game was brought to life by following the Experimentation concept of the Design Thinking methodology which consists of experimenting with tangible ideas and also learning from the actual experience (IDEO, 2012). Thus, this chapter entails a storyboard of the online game to visualize with a series of pictures the complete game experience. Nevertheless, this phase was not the final product of the game designing process due to the need to collect feedback and also substantiate the engagement of players and the game's learning results.

For ease of consultation, the brainstorming phase for the game dynamics was divided into two stages. The first one was the screen creation stage in which each game screen was displayed with a straightforward description of the functions behind each virtual button. The descriptions and screen layouts were juxtaposed to generate the first prototype of the game. The second stage consisted of the analysis of the game dynamics in order to dissuade doubts regarding the programming details of Memoverbs. A detailed description of the prototype follows.

Stage 1: Screen Creation

The first screen, as shown in Figure 10, introduces the main purpose of Memoverbs: to play an engaging educational game, with a multiplayer option, so that one can learn verbs in English and have fun at the same time.

Login screen. The login screen has two options, as shown in Figure 11. Gamers are able to subscribe by submitting a profile form (see Figure 12) including the following information: name, e-mail address, birth date, school year, name of school, and a password. The second option

is the possibility of logging in by using the gamer's Facebook account. Not having hit the logout button, next time the player accesses the app, he/she will not have to submit the information again. It will be locked in the gamer's login information.

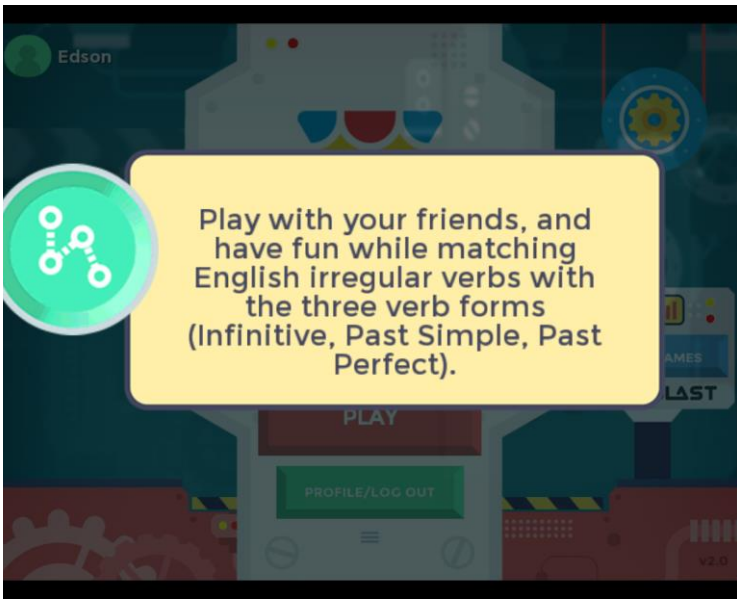


Figure 10. Screenshot of Game Description. Retrieved from http://memoblast.com.br/eng/.

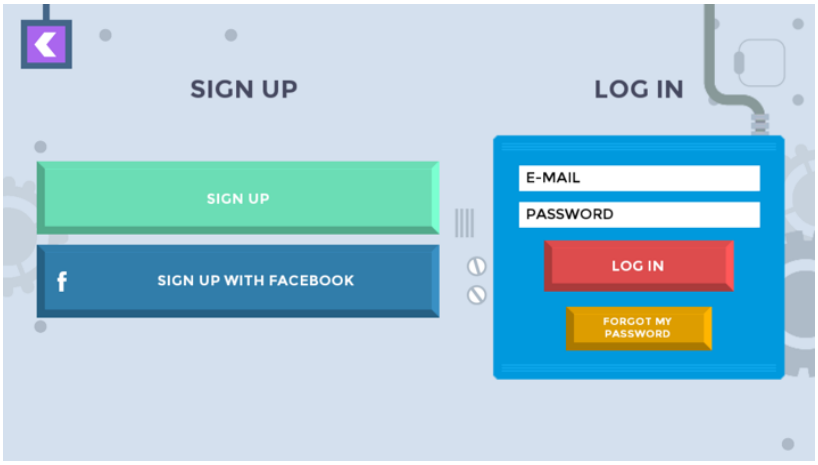


Figure 11. Login Screen. Retrieved from http://memoblast.com.br/eng/.

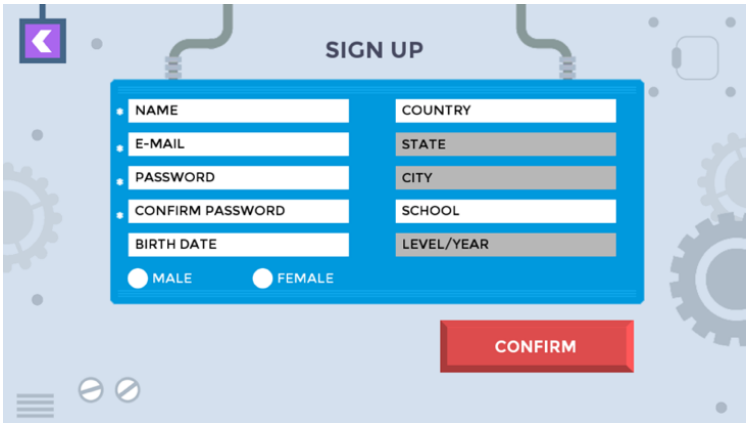


Figure 12. Sign Up. Retrieved from http://memoblast.com.br/eng/.

Getting started. After logging in, as shown in Figure 13, the gamer is prompted to wear headphones in order to hear the theme song, the character's lines in the tutorial screen, and also the full sentences of the verb tester, one of the game's features. The Memo question mark button leads to the tutorial of the game. If gamers want to skip the tutorial, they can click the play button and go directly to the game itself. Students can mute the game, as well as leave the theme song on or off. The language control panel is available in English and Portuguese. These features are shown in Figure 14.

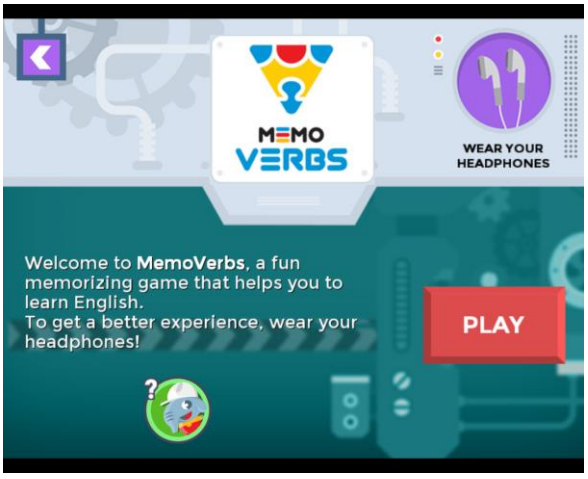


Figure 13. Getting Started Screen. Retrieved from http://memoblast.com.br/eng/.

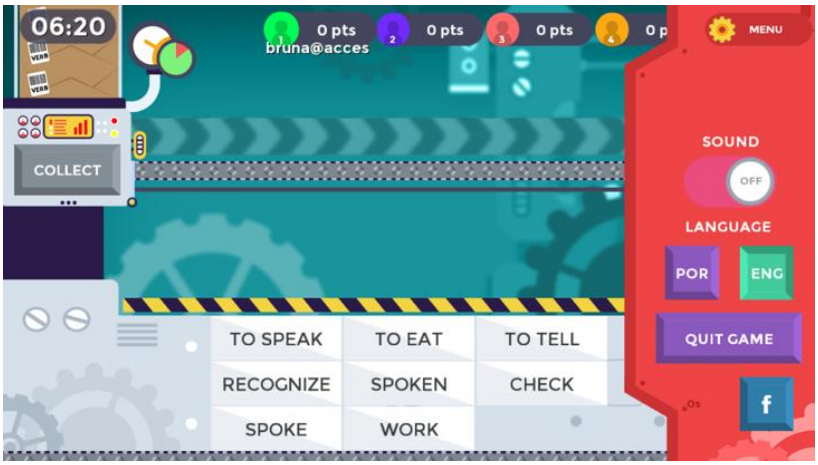


Figure 14. Music and Language Control Panel. Retrieved from http://memoblast.com.br/eng/.

Definition of regular/irregular verbs button. In case students feel the need of revisiting the concept of regular and irregular verbs, a question mark help button is provided. The question mark memo button leads to a summarized version of the concept of regular and irregular verbs, as seen in Figure 15.

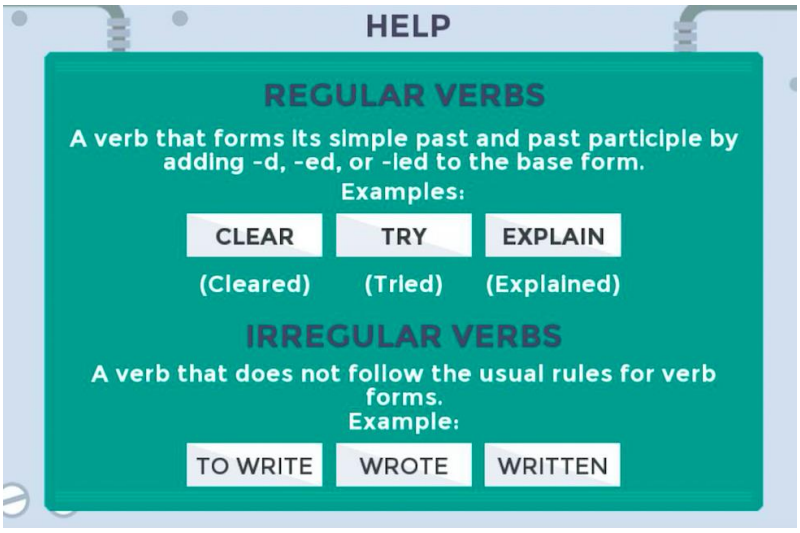


Figure 15. Definition of Regular and Irregular Verbs Button. Retrieved from http://memoblast.com.br/eng/.

Tutorial. The tutorial consists of a guided game conducted by Memo. Memo's lines appear on the screen in a speech bubble (see Figure 16). Gamers are able to listen to the lines as well.

Figure 16. Tutorial. Retrieved from http://memoblast.com.br/eng/.

Playing the game. Students start the game with a few verbs. They touch 'Collect' to collect a new verb and start playing (Figure 17). After collecting a verb, they try to match it. To do this, gamers touch the manufacture button (Figure 18). They drag and drop the verbs into the correct slots. By doing so, they will have manufactured a new trinomial (Figure 19). When a player has finished her/his turn, it is time to end the shift. Gamers end their turn by dragging and dropping a verb into the discard area (Figure 20). Then, it is the opponent's shift. Gamers should look out for any new verbs that they could match in the next round while their opponent plays. Each gamer chooses how long his/her shift takes from three options: 5 minutes, 15 minutes, or 17 minutes. When the opponent's shift is up, students see that the discard area is now filled with verbs. Gamers can collect those if they want to (Figure 21).

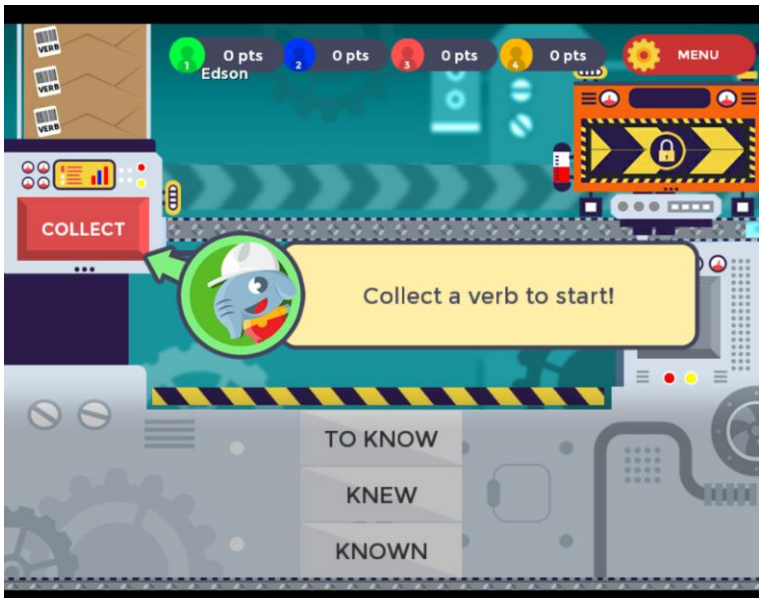


Figure 17. Start of the Game. Retrieved from http://memoblast.com.br/eng/.

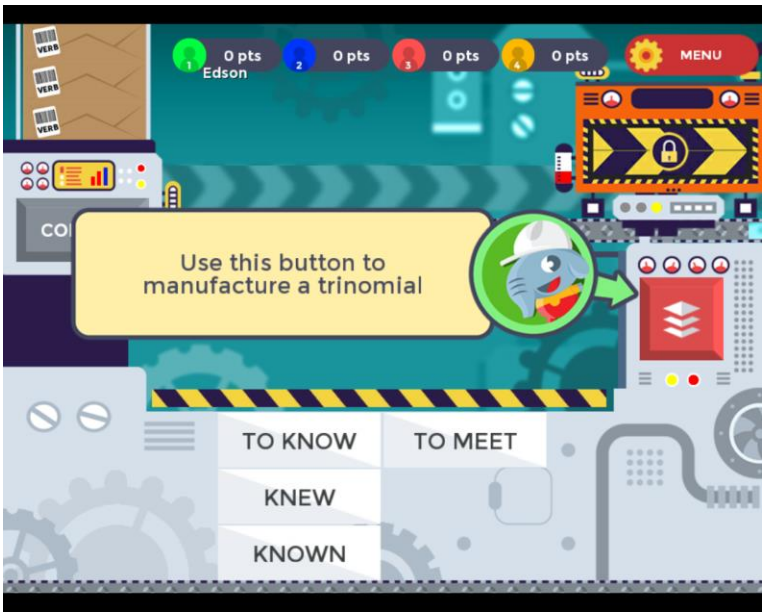


Figure 18. Manufacture a Trinomial. Retrieved from http://memoblast.com.br/eng/.

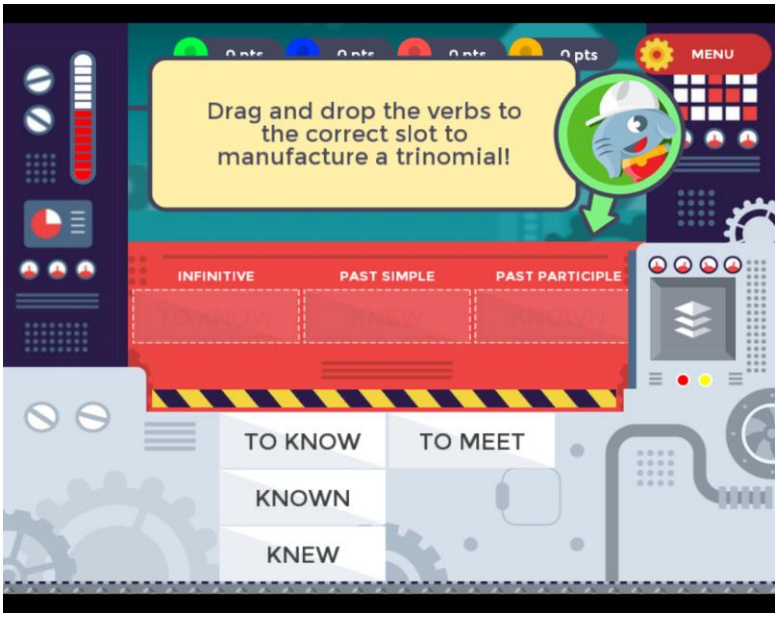


Figure 19. Trinomial Slots. Retrieved from http://memoblast.com.br/eng/.

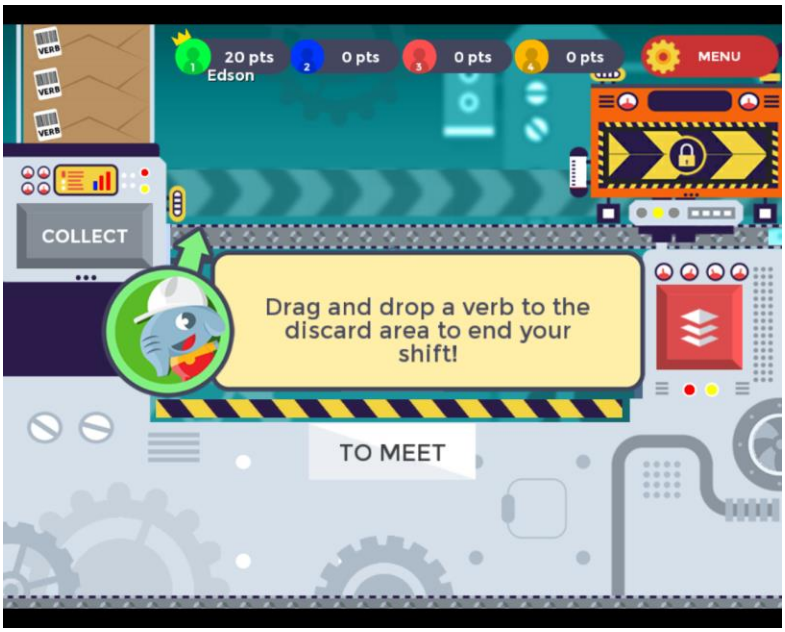


Figure 20. End of Shift. Retrieved from http://memoblast.com.br/eng/

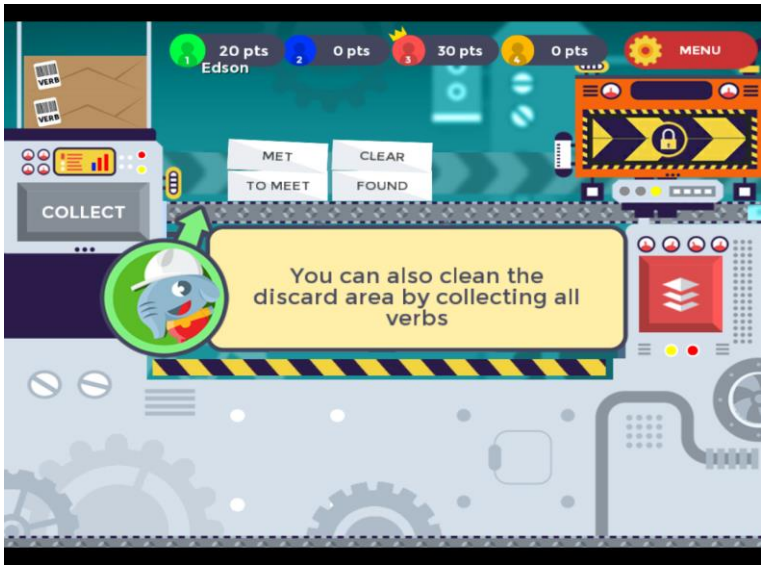


Figure 21. Next Shift. Retrieved from http://memoblast.com.br/eng/.

Regular verbs. Some verbs are not used for matching. They are the regular verbs! Students can discard them into the Regular Verbs slot (Figure 22) to get some points. However, they must be careful; if they place an irregular verb there, they will lose points. It is also important to keep an eye on the score multiplier at the top of the Regular Verbs slot because when gamers discard more than one regular verb during their shift, the points are doubled!

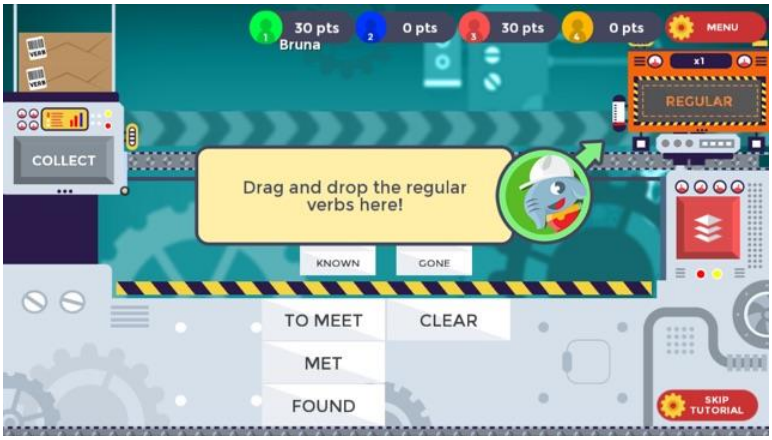


Figure 22. Regular Verbs. Retrieved from http://memoblast.com.br/eng/.

Sentence verb tester. In the verb tester, illustrated in Figure 23, sentences appear on the upper left-hand side of the screen and students have to choose the trinomial to fill in the gap, thus earning more points during the match. The verb tester appears randomly when students have matched verbs. In order to earn points, they must drag and drop the correct verb into the slot to complete a sentence.

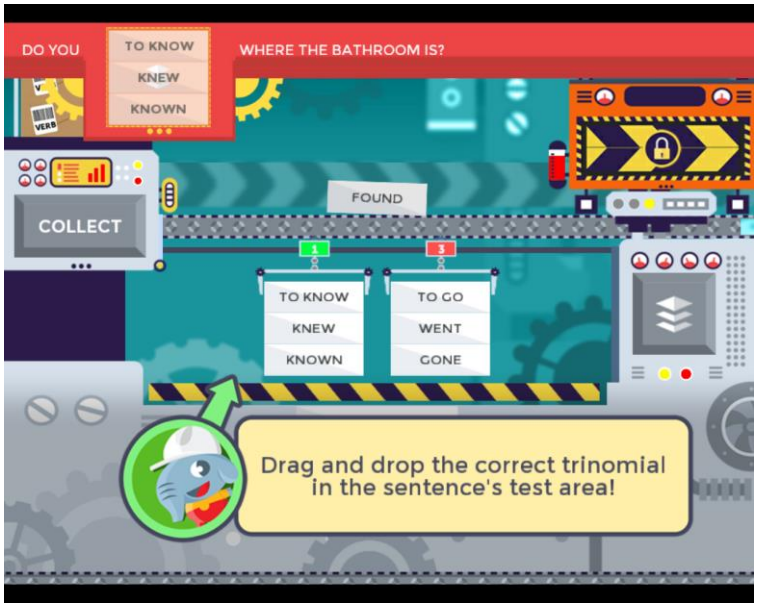


Figure 23. Sentence Verb Tester. Retrieved from http://memoblast.com.br/eng/.

Help button. There is a question mark help button that can be used once per shift (see Figure 24 and Figure 25). This feature offers three options for the gamer:

1) Get extra time for the shift. Sometimes players need more time to make trinomials and discard regular verbs, so they can use the timer help button to get 7 extra seconds for their turn.

2) Organize the verbs alphabetically. Having several cards can be confusing, so players can use the A-Z help button to have the verbs organized in alphabetical order.

3) Highlight matching verbs. The eye help button can be used when a player is in doubt about whether h/she has a trinomial or not. If there is a trinomial, the three verb forms are highlighted and ready to be manufactured in the correct slots.

Figure 24. Question Mark Help Button. Retrieved from http://memoblast.com.br/eng/.

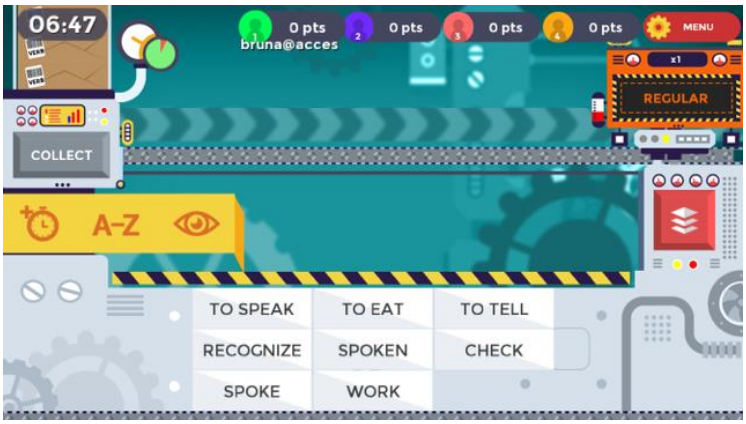


Figure 25. Help Choices: Timer, A-Z, Eye Button. Retrieved from http://memoblast.com.br/eng/.

Feedback screen. After each match, the gamers have access to the feedback display, shown in Figure 26. There they see a report consisting of the numbers of matched trinomials, regular verbs discarded into the regular verb slot, tested trinomials displayed correctly in the sentence verb tester, mistakes they made according to verbs misplaced, and verbs they did not

discard during the shift. Students have the option of sharing their score on social media, playing the same level again or going to the next level.

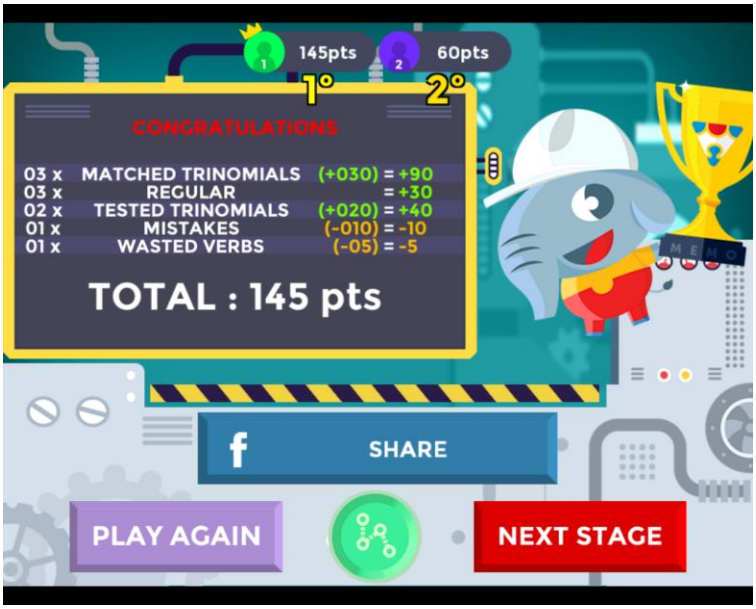


Figure 26. Feedback Screen. Retrieved from http://memoblast.com.br/eng/.

Stage select screen. The next stage (Figure 27) is displayed only if the players have gotten enough points in the previous shift in order to advance. Only after a player finishes level 1 and gets more than 50 points, is h/she able to play the next stage, level 2.

Multiplayer option. Students need to sign up to play online in the multiplayer version. Only after completing stage two, does the possibility of playing as a multiplayer gamer become available. To access the multiplayer mode, they touch the 'Play Multiplayer' button in the stage select screen. The multiplayer mode is accessible by creating a game and then inviting friends by filling out their e-mail information, or by finding a game that has already been created (see Figure 28). The multiplayer version allows two to four players to play against one another by

creating a room (Figure 29). Gamers can invite friends by clicking on the open slots and sending them a link to access the game.

Leaderboards. To access the leaderboards, students need to complete their profile. The rankings are available in four categories, as illustrated in Figure 30: Individual ranking, School ranking, Grade ranking, and Monthly ranking.

Figure 27. Stage Select Screen. Retrieved from http://memoblast.com.br/eng/.

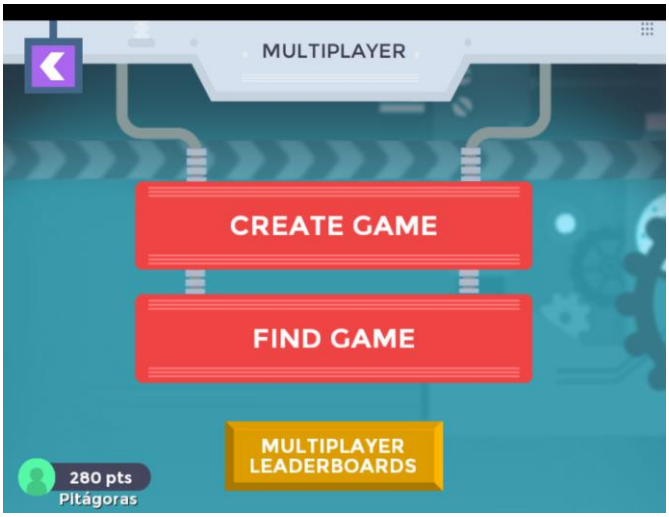


Figure 28. Multiplayer Option. Retrieved from http://memoblast.com.br/eng/.

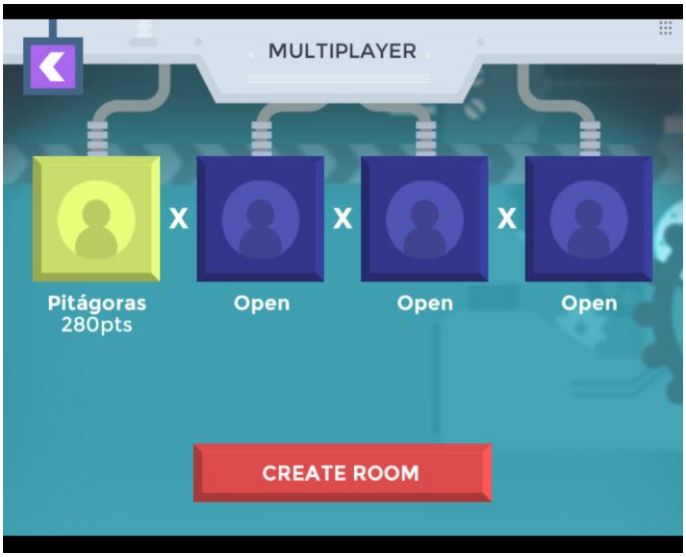


Figure 29. Create a Room. Retrieved from http://memoblast.com.br/eng/.

Figure 30. Leaderboards. Retrieved from: http://memoblast.com.br/eng/.

Stage 2: Dynamics of the Game

According to Hunicke, LeBlanc, and Zubek (2004), game dynamics consist of the game rules and gamers' interaction while playing the game itself. In focusing on this next step, the prototype ideas were presented to the marketing and game design company that took part in the prototyping process. After analyzing the game screens, the company asked fifteen questions about the dynamics of Memoverbs. A Question and Answer (Q&A) form, illustrated in Table 4, was generated and it led to the assessment of the game before launching its first version to the public.

Table 4

Game Dynamics Question and Answer Form

Questions	**Responses**
How many cards are there in each match?	There are 25 irregular verbs, 10 regular verbs, and 25 sentences.
How many verbs do players get at the beginning of a match?	There are seven verbs for each player.
When a player gets a regular verb, does he/she have to discard it immediately?	No, a player can keep the regular verb until he/she finds a suitable moment to use it, to score more points and earn 15 more seconds to continue playing.
When players collect a trinomial, do they have to drag it to the trinomial maker immediately?	It is not mandatory, but when players make a trinomial, they can score points and increase their chances to apply it to the corresponding sentence.
Can players make several trinomials when it is their turn to play?	Yes, for every trinomial, players get 15 more seconds to play the game.
Is the turn clockwise or anticlockwise?	It is clockwise; the next player is always the one on the left.

What happens?	Players have 15 seconds to play. They can draw a verb from the "collect button" and discard another verb. Alternatively, they can draw the cards from the discard area. After that, if they do not make a trinomial or if they do not discard a regular verb, they must discard an irregular verb within the 15 seconds.
What if they do not discard?	If they do not discard, the game will automatically discard one of their verbs.
What if the following happens: It is my turn to play, and I am in doubt if I should draw a new verb or all the verbs from the discard pile. It takes me a while to make this decision and the 15 seconds are over. What happens?	The game will play for you. It will draw a verb and discard it. Then, it goes on to the next player.
Is it possible to increase the playing time or to pause the game?	Yes, it is. Players can increase the playing time under the settings of the game.
Can players use the 'help button' several times?	Players can use this button once per turn.
When players manage to use all verbs, do they win the game?	Yes, they score 10 points and the game is over.
What about the sentences? When do they appear?	After a player makes the first trinomial, the sentences appear for 7 seconds. If a player can match the sentence to one of the trinomials made, s/he gets 5 points.
When none of the players use all of their cards, how does the game finish?	The match lasts 15 minutes, and the winner is the player with the highest score. The second place is the second highest score and so on.
What if the four players are too fast and finish the verbs before 15 minutes?	They keep playing with the verbs in the discard pile until the 15 minutes are over or one of the players finishes all his/her verbs.

In the next chapter, a beta test applied to the research group of students and teachers from Access International School is discussed. As the core of this project is based on a constant

exchange of information, a final report based on their feedback defines the adaptation and corrections needed in order to launch the game worldwide.

Chapter 5: Evolution

The rough early prototype ideas, presented in the previous section, led to the next step of the Design Thinking process, which is receiving a direct response from users to further improve the game dynamics (IDEO, 2012). A game version 1.0 was made available for the students and teachers in the research groups. All participants had complete access to the first version of the game for two months.

Students completed a survey with eight feedback questions related to their game experience. Overall, students rated Memoverbs as a fun and dynamic game through which they could practice and memorize verbs in English. The game experience was described as enjoyable as well as memorable. Besides responding to the detailed survey on the game dynamics, students also rated the game experience from 1 to 5 and gave written feedback. The results indicated a 4.25 average which accounted for 88% of the players rating the game 4 or 5. Most importantly, all students answered that they would recommend Memoverbs to friends. The detailed results of this survey are displayed in the beta test report (Appendix F).

Moreover, the students took written diagnostic tests (Appendix G) prior to playing the game and also after the two-month period. The test results added empirical evidence regarding the efficacy of playing Memoverbs to memorize regular and irregular verbs in English. As Figure 31 shows, students of different ages took part in the study, the majority in the 14- to 18-year-old range, with a sizable amount falling into the 11-13 range and a small percentage in the 19 and above range. Students also had different levels of proficiency, from A1 to B2. All of the students showed improvement from the pretest to the posttest.

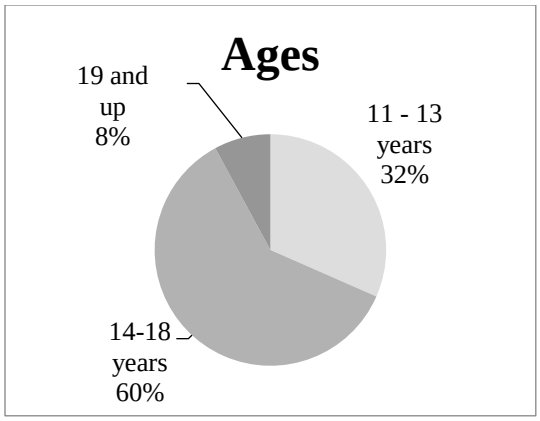


Figure 31. Student beta users by age.

Generally speaking, the group of students who were 19 years old or more improved even more than their younger counterparts. Although the older students showed the worst performance on the pretest when compared to the other age groups, their improvement was the most significant one: In general, they almost doubled their performance, leaving the under 20% zone of performance to surpass the 30% zone. Younger students also improved their performance, but with less intensity: Both younger groups improved around 20%. See Figure 32 for a comparison of all test results. Since all of the intermediate level students (B1/B2) were in the 14-18-year-old group, the results are further broken down to compare performance of all age groups at the beginner level (A1/A2). The beginner level age breakdown and test results can be seen in Figures 33 and 34.

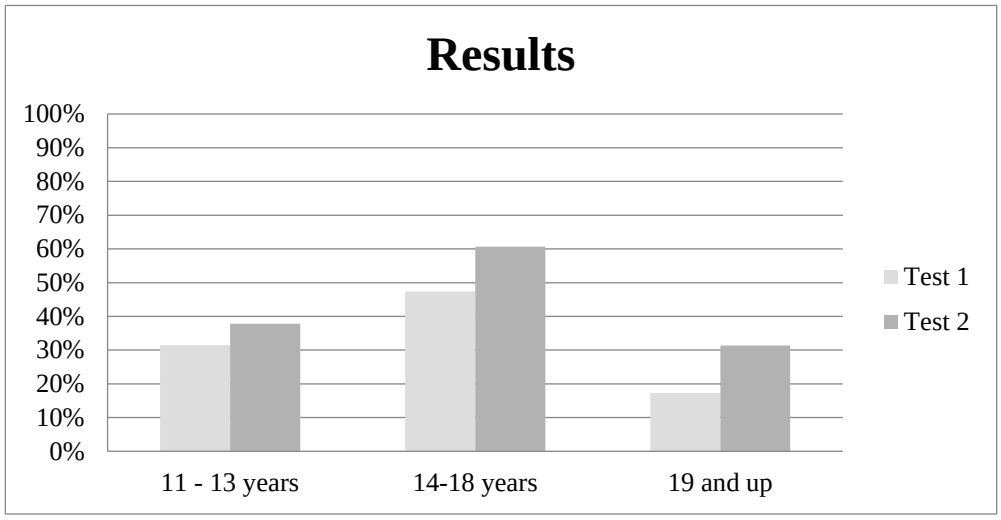


Figure 32. All student beta users' test results by age.

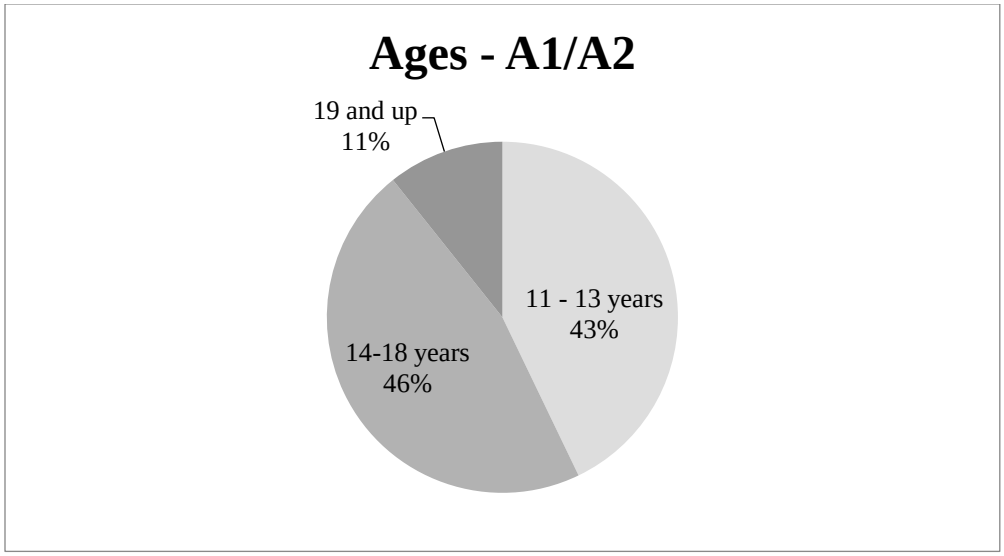


Figure 33. A1/A2 age breakdown.

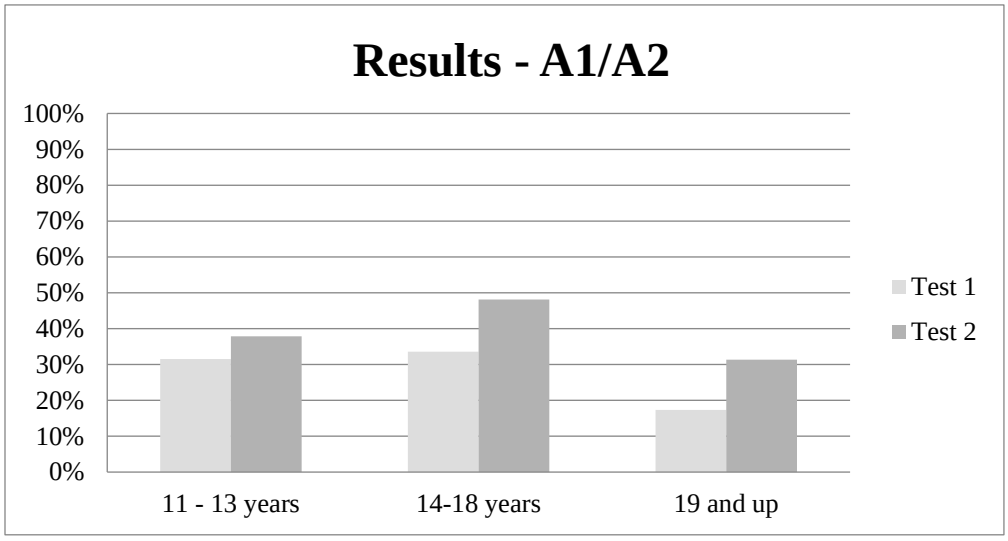


Figure 34. A1/A2 test results by age group. 11-13 years: 5.83% increase, 14-18 years: 14.15% increase, 19 years and up: 14.33% increase.

Even students with good knowledge of the language, B1/B2 level, improved their performance after having played the game for a period. They enhanced their performance considerably, from a score of 65% on the pretest to achieve an 80% score on the posttest (Figure 35). Before the experience of the game, the intermediate group of students (14-18) used to perform just like the second group of students (11-13) and much better than the third group (19 and up). After this experience, they improved by an average of 48.15% while the other two groups did not go that far. One of the causes that may impact this result is related to their continued exposure to the language. In particular, when students at A1 and A2 levels were asked if they had learned about verbs in the past participle form before playing Memoverbs, more than 50% had not been introduced to past participle forms in their English classes. Based on our curriculum, intermediate students have all been exposed to the past participle in their classes. In

other words, it seems that the more exposure the students have to the language, and in particular the content practiced in the game, the better they perform.

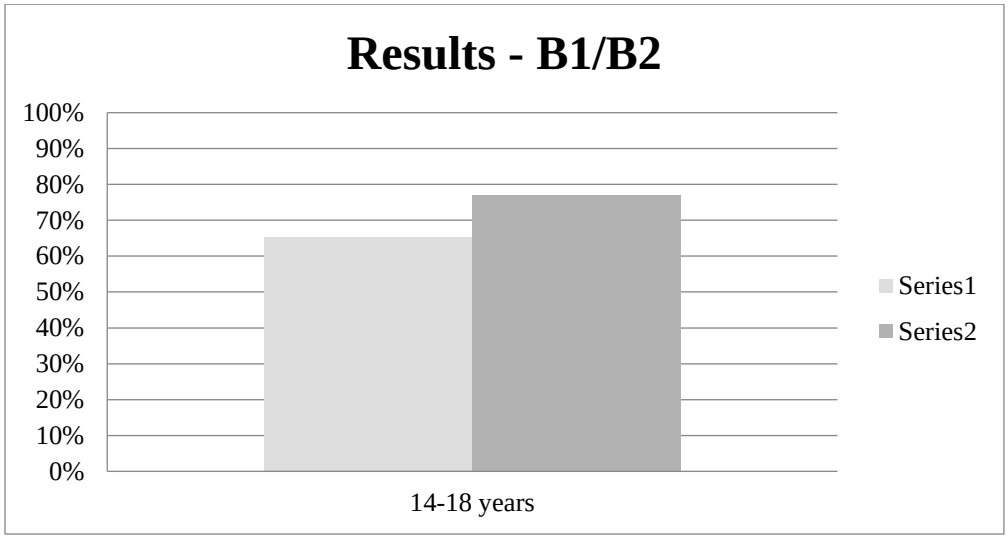


Figure 35. B1/B2 test results.

The teachers' group had the same amount of time to play the game. They also rated the game experience and gave written feedback. The teachers were asked to assess the game as an educational tool to be used in the near future. All participants rated Memoverbs as an excellent educational online game.

All in all, the tests and feedback show that Memoverbs game is another important tool to help students. The game effectively proved it assists all levels and ages of students to memorize and use regular and irregular English verbs considerably better than before using the game. Its memorization mechanism, through which players experience practical use of the verbs in English while they are playing, has proved to be effective in improving one's knowledge of the language.

Based on feedback from the beta test, adjustments will be made, after which, Memoverbs application will be available in Android and iOS versions. Next, the conclusion revisits the

designing process of the game and suggests what the future holds regarding forthcoming possibilities for online educational games.

Conclusion

Excellence in creating an online educational game cannot be achieved until designers are cognizant of how to reinforce game design with the help of learning theories. Looking at the design process of Memoverbs offered valuable data that can be of help to educators who are interested in educational games that optimize the learning experiences of both students and teachers. The researched groups of students and teachers were one of key assets of this project. Their voices were heard and taken into consideration right from the beginning. Students selected irregular and regular verbs as the morphological feature to define the scope of this online game, and the Design Thinking methodology was applied to guide the design process of the online game.

As indicated in Chapter 1, Discovery was the first step towards designing the game. Chapter 2 discusses Interpretation, i.e. making sense of the data collected. Chapter 3 highlights the Ideation stage of designing the game, including brainstorming with regard to its key concepts and naming the game Memoverbs. Memorizing the grammatical elements through the math concept of trinomials, as well as two learning principles from James Paul Gee (2014), served as the guidelines for the Experimentation phase of the process, the prototyping outlined in Chapter 4. Finally, Chapter 5 presents empirical evidence that proves the efficacy of the game.

Benefits of e-Learning

Games can make challenging content fun and engaging. Neuroscience has shown the benefits of incorporating learning and teaching in game-like situations. Game-based learning (Gee, 2014) enables students to shape the trajectory of their mastery of a subject. Though game-

based learning has been shared with the world, schools still struggle with implementing and engaging students in a more realistic and tailor-made learning environment.

Putting the theory into practice is the next step of the journey. Going beyond the theory is necessary. Whether you are a school teacher or a representative of a school district who has made individual efforts, no matter how significant they are, your story may get lost in an ocean of disconnected individual efforts. There is a need to connect. Connect students all over the world. Connect teachers all around. Connect education technology experts. Going beyond individual efforts will guide us to what Shirky (2010) describes as a cognitive surplus, a link between people and actions that improve society. Through this collaboration the world is full of new possibilities to look at life through different lenses.

Memoverbs facilitates numerous possibilities concerning reliable productive connections and significant learning. In fact, in the course of writing this paper, more connections and ideas were introduced to the project, leaving room for a more complex and involved platform. In the future, this big umbrella of which Memoverbs would be a part, will be Memoblast - an educational platform that connects students, teachers, and schools with online tools for learning and practicing different subjects. Memoblast games should aim at boosting one's memory abilities while learning and applying specific content. By following the steps below, one will be able to access the education platform:

Choose a profile: student, school team, teacher or guardian.

Choose an interest: Math, Physics, Chemistry or Languages.

Choose a content area: Arithmetic, Physics, Periodic table, English, Portuguese, French, Spanish, German, or Arabic.

Create an avatar.

Start playing the game. Start learning. Check your results. Compare and make plans.

Invite friends to play with you.

Take part in competitions.

Share your results and knowledge with the world. Become the expert in your field of interest. Make connections.

It is all about making reliable, trustworthy and real connections.

Technology has the ability to give us easy and fast access to information and is conducive to creating an ambiance where more people are connected to reliable data. The more we are connected to information and each other, the more likely we are to build a society based on empathy and much more reliable knowledge.

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APPENDIX A

COMMON REFERENCE LEVELS

Table 1. *Common Reference Levels: global scale*

Proficient User	C2	Can understand with ease virtually everything heard or read. Can summarise information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation. Can express him/herself spontaneously, very fluently and precisely, differentiating finer shades of meaning even in more complex situations.
	C1	Can understand a wide range of demanding, longer texts, and recognise implicit meaning. Can express him/herself fluently and spontaneously without much obvious searching for expressions. Can use language flexibly and effectively for social, academic and professional purposes. Can produce clear, well-structured, detailed text on complex subjects, showing controlled use of organisational patterns, connectors and cohesive devices.
Independent User	B2	Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.
	B1	Can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Can deal with most situations likely to arise whilst travelling in an area where the language is spoken. Can produce simple connected text on topics which are familiar or of personal interest. Can describe experiences and events, dreams, hopes and ambitions and briefly give reasons and explanations for opinions and plans.
Basic User	A2	Can understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment). Can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. Can describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need.
	A1	Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. Can interact in a simple way provided the other person talks slowly and clearly and is prepared to help.

Note. *CEFRL pdf chart is from* Common European framework of reference for languages: Learning, teaching, assessment*, by Council of Europe, October 2016, retrieved from www.coe.int/lang-CEFR, p. 24.*

APPENDIX B

LIST OF IRREGULAR VERBS

Appendix 2 List of irregular verbs (⇒ Unit 24)

infinitive	*past simple*	*past participle*
be	**was/were**	**been**
beat	**beat**	**beaten**
become	**became**	**become**
begin	**began**	**begun**
bite	**bit**	**bitten**
blow	**blew**	**blown**
break	**broke**	**broken**
bring	**brought**	**brought**
build	**built**	**built**
buy	**bought**	**bought**
catch	**caught**	**caught**
choose	**chose**	**chosen**
come	**came**	**come**
cost	**cost**	**cost**
cut	**cut**	**cut**
do	**did**	**done**
draw	**drew**	**drawn**
drink	**drank**	**drunk**
drive	**drove**	**driven**
eat	**ate**	**eaten**
fall	**fell**	**fallen**
feel	**felt**	**felt**
fight	**fought**	**fought**
find	**found**	**found**
fly	**flew**	**flown**
forget	**forgot**	**forgotten**
get	**got**	**got**
give	**gave**	**given**
go	**went**	**gone**
grow	**grew**	**grown**
hang	**hung**	**hung**
have	**had**	**had**
hear	**heard**	**heard**
hide	**hid**	**hidden**
hit	**hit**	**hit**
hold	**held**	**held**
hurt	**hurt**	**hurt**
keep	**kept**	**kept**
know	**knew**	**known**
leave	**left**	**left**
lend	**lent**	**lent**

infinitive	*past simple*	*past participle*
let	**let**	**let**
lie	**lay**	**lain**
light	**lit**	**lit**
lose	**lost**	**lost**
make	**made**	**made**
mean	**meant**	**meant**
meet	**met**	**met**
pay	**paid**	**paid**
put	**put**	**put**
read /ri:d/*	**read** /red/*	**read** /red/*
ride	**rode**	**ridden**
ring	**rang**	**rung**
rise	**rose**	**risen**
run	**ran**	**run**
say	**said**	**said**
see	**saw**	**seen**
sell	**sold**	**sold**
send	**sent**	**sent**
shine	**shone**	**shone**
shoot	**shot**	**shot**
show	**showed**	**shown**
shut	**shut**	**shut**
sing	**sang**	**sung**
sit	**sat**	**sat**
sleep	**slept**	**slept**
speak	**spoke**	**spoken**
spend	**spent**	**spent**
stand	**stood**	**stood**
steal	**stole**	**stolen**
swim	**swam**	**swum**
take	**took**	**taken**
teach	**taught**	**taught**
tear	**tore**	**torn**
tell	**told**	**told**
think	**thought**	**thought**
throw	**threw**	**thrown**
understand	**understood**	**understood**
wake	**woke**	**woken**
wear	**wore**	**worn**
win	**won**	**won**
write	**wrote**	**written**

* *pronunciation*

The following verbs can be regular (**-ed**) *or* irregular (**-t**):

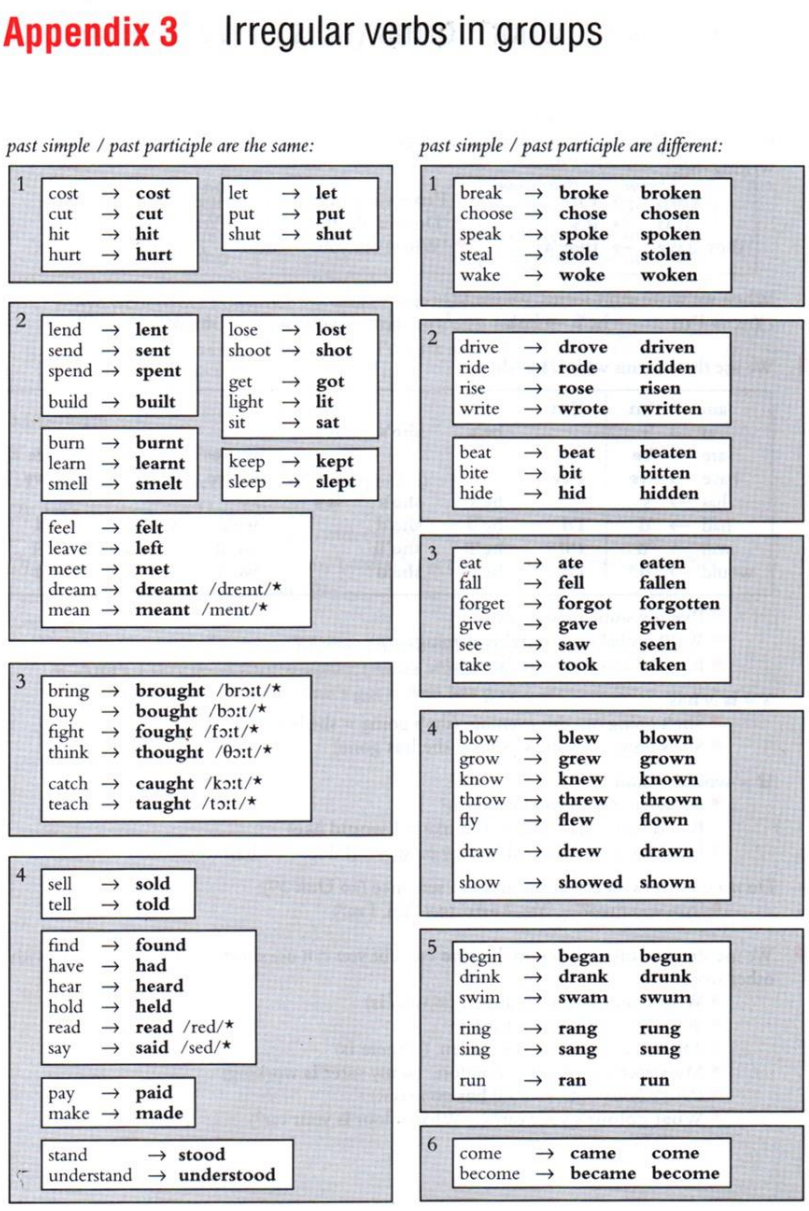
infinitive	*past simple / past participle*
burn	**burned** *or* **burnt**
dream	**dreamed** *or* **dreamt**

infinitive	*past simple / past participle*
learn	**learned** *or* **learnt**
smell	**smelled** *or* **smelt**

Note. Retrieved from *Essential Grammar in Use,* By R. Murphy, M. 1997, Cambridge, U.K.: Cambridge English Press, p.240

APPENDIX C

IRREGULAR VERBS IN GROUPS



Appendix 3 Irregular verbs in groups

past simple / past participle are the same:

1

cost	→	**cost**	let	→	**let**
cut	→	**cut**	put	→	**put**
hit	→	**hit**	shut	→	**shut**
hurt	→	**hurt**			

2

lend	→	**lent**	lose	→	**lost**
send	→	**sent**	shoot	→	**shot**
spend	→	**spent**	get	→	**got**
build	→	**built**	light	→	**lit**
			sit	→	**sat**
burn	→	**burnt**			
learn	→	**learnt**	keep	→	**kept**
smell	→	**smelt**	sleep	→	**slept**

feel	→	**felt**
leave	→	**left**
meet	→	**met**
dream	→	**dreamt** /dremt/*
mean	→	**meant** /ment/*

3

bring	→	**brought** /brɔːt/*
buy	→	**bought** /bɔːt/*
fight	→	**fought** /fɔːt/*
think	→	**thought** /θɔːt/*
catch	→	**caught** /kɔːt/*
teach	→	**taught** /tɔːt/*

4

sell	→	**sold**
tell	→	**told**
find	→	**found**
have	→	**had**
hear	→	**heard**
hold	→	**held**
read	→	**read** /red/*
say	→	**said** /sed/*
pay	→	**paid**
make	→	**made**
stand	→	**stood**
understand	→	**understood**

past simple / past participle are different:

1

break	→	**broke**	**broken**
choose	→	**chose**	**chosen**
speak	→	**spoke**	**spoken**
steal	→	**stole**	**stolen**
wake	→	**woke**	**woken**

2

drive	→	**drove**	**driven**
ride	→	**rode**	**ridden**
rise	→	**rose**	**risen**
write	→	**wrote**	**written**
beat	→	**beat**	**beaten**
bite	→	**bit**	**bitten**
hide	→	**hid**	**hidden**

3

eat	→	**ate**	**eaten**
fall	→	**fell**	**fallen**
forget	→	**forgot**	**forgotten**
give	→	**gave**	**given**
see	→	**saw**	**seen**
take	→	**took**	**taken**

4

blow	→	**blew**	**blown**
grow	→	**grew**	**grown**
know	→	**knew**	**known**
throw	→	**threw**	**thrown**
fly	→	**flew**	**flown**
draw	→	**drew**	**drawn**
show	→	**showed**	**shown**

5

begin	→	**began**	**begun**
drink	→	**drank**	**drunk**
swim	→	**swam**	**swum**
ring	→	**rang**	**rung**
sing	→	**sang**	**sung**
run	→	**ran**	**run**

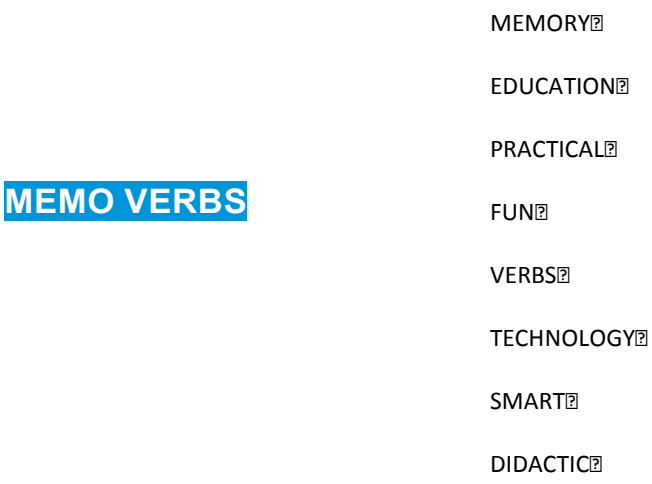
6

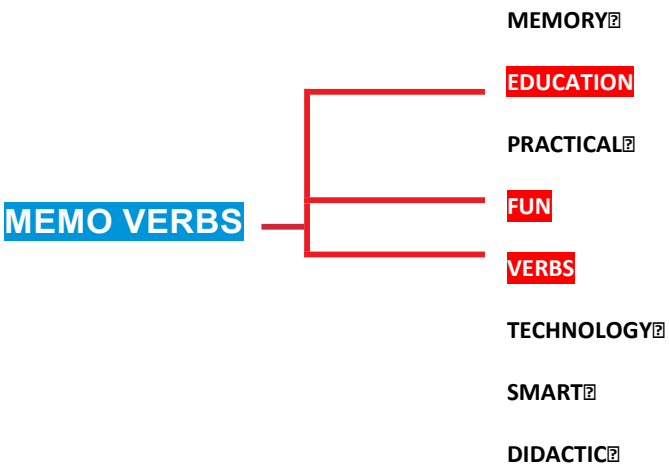
come	→	**came**	**come**
become	→	**became**	**become**

Note. Retrieved from *Essential Grammar in Use,* By M. Brown, 1997, Cambridge, U.K.: Cambridge English Press, p.241.

APPENDIX D

BRAND REPORT PROVIDED BY MUKUTU






R 0 G 149 B 1218
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R 237 G 28 B 36
C 1 M 99 Y 97 K 0
ENERGY AND AGILITY/DYNAMISM
R 253 G 185 B 20
C 1 M 30 Y 99 K 0
CREATIVITY, YOUTH AND JOY

APPENDIX E

MEMOVERBS VERB LIST

	Irregular		Regular
1	arise	1	abandon
2	be	2	accelerate
3	be born	3	accept
4	be off	4	account
5	bear	5	accumulate
6	beat	6	ache
7	become	7	add
8	begin	8	addict
9	bend	9	adjust
10	bet	10	admire
11	bid	11	adopt
12	bind up	12	advertise
13	bite	13	affect
14	bleed	14	allow
15	blow	15	alternate
16	blow out	16	announce
17	break	17	answer
18	break down	18	anticipate
19	break even	19	appeal
20	break in	20	appear
21	break into	21	apply
22	break off	22	argue
23	break up	23	arrange
24	bring	24	arrest
25	bring about	25	ask
26	bring up	26	associate
27	build	27	attach
28	burn	28	attend
29	burst	29	attract
30	buy	30	avoid
31	can	31	back

32	catch	32	bake
33	catch on	33	balance
34	catch up	34	ban
35	catch up	35	base
36	choose	36	behave
37	come	37	believe
38	come along	38	belong
39	come over	39	bite
40	come up against	40	blind
41	come up with	41	boil
42	consume	42	book
43	cost	43	bore
44	cut	44	bother
45	cut	45	broaden
46	cut off	46	bury
47	daydream	47	call
48	deal	48	calm
49	dig	49	camp
50	do	50	cancel
51	draw	51	capture
52	dream	52	care
53	drink	53	carry
54	drive	54	cash
55	eat	55	cater
56	fall	56	cause
57	fall out	57	cede
58	fall through	58	celebrate
59	feed	59	challenge
60	feel	60	cheat
61	fight	61	check
62	find	62	circle
63	find out	63	claim
64	fit	64	clarify
65	flee	65	classify
66	fly	66	clear
67	forbid	67	click
68	forget	68	climb
69	forgive	69	close

70	**forgo/forego**	**70**	**collide**
71	**get**	**71**	**combine**
72	**get across**	**72**	**comment**
73	**get along with**	**73**	**communicate**
74	**get away**	**74**	**compare**
75	**get down**	**75**	**compel**
76	**get dressed**	**76**	**compete**
77	**get married**	**77**	**complain**
78	**get over**	**78**	**complete**
79	**get up**	**79**	**concentrate**
80	**get up**	**80**	**confess**
81	**give**	**81**	**confirm**
82	**give away**	**82**	**connect**
83	**give in**	**83**	**consist**
84	**give up**	**84**	**consult**
85	**go**	**85**	**contact**
86	**go blind**	**86**	**contain**
87	**go off**	**87**	**continue**
88	**go on**	**88**	**contrast**
89	**grow**	**89**	**contribute**
90	**hang around**	**90**	**control**
91	**hang up**	**91**	**convert**
92	**have**	**92**	**copy**
93	**hear**	**93**	**correspond**
94	**hide**	**94**	**cough**
95	**hit**	**95**	**count**
96	**hold**	**96**	**crash**
97	**hold up**	**97**	**crawl**
98	**hurt**	**98**	**criticize**
99	**joy-ride**	**99**	**cross**
100	**keep**	**100**	**cry**
101	**know**	**101**	**damage**
102	**lay**	**102**	**dare**
103	**lay back**	**103**	**date**
104	**lead**	**104**	**debate**
105	**lean**	**105**	**decay**
106	**leave**	**106**	**decide**
107	**lend**	**107**	**declare**

108	**let**	**108**	**decorate**
109	**let loose**	**109**	**decrease**
110	**lie**	**110**	**defeat**
111	**lie down**	**111**	**defend**
112	**light**	**112**	**define**
113	**lose**	**113**	**defrost**
114	**lose touch**	**114**	**delight**
115	**make**	**115**	**deliver**
116	**make out**	**116**	**deny**
117	**make up**	**117**	**depart**
118	**mean**	**118**	**depend**
119	**meet**	**119**	**desire**
120	**mistake**	**120**	**destroy**
121	**Misunderstand**	**121**	**develop**
122	**overdo**	**122**	**devote**
123	**pay**	**123**	**die**
124	**pay up**	**124**	**differ**
125	**pull off**	**125**	**digest**
126	**put**	**126**	**dilate**
127	**put off**	**127**	**discover**
128	**put across**	**128**	**discuss**
129	**put in**	**129**	**dislike**
130	**put on**	**130**	**display**
131	**put up**	**131**	**distribute**
132	**put up with**	**132**	**disturb**
133	**quit**	**133**	**dive**
134	**read**	**134**	**divide**
135	**rewrite**	**135**	**divorce**
136	**ride**	**136**	**dominate**
137	**ring**	**137**	**double**
138	**rise**	**138**	**doubt**
139	**run**	**139**	**download**
140	**run around**	**140**	**drop**
141	**run out**	**141**	**dry**
142	**say**	**142**	**eliminate**
143	**see**	**143**	**elude**
144	**seek**	**144**	**embarrass**
145	**sell**	**145**	**emphasize**

146	**sell out**	**146**	**employ**
147	**send**	**147**	**end**
148	**set**	**148**	**endorse**
149	**set off**	**149**	**enjoy**
150	**set out**	**150**	**enter**
151	**set up**	**151**	**entertain**
152	**sew**	**152**	**equal**
153	**shake**	**153**	**equip**
154	**shine**	**154**	**eradicate**
155	**shoot**	**155**	**escape**
156	**show**	**156**	**establish**
157	**show up**	**157**	**excite**
158	**shut**	**158**	**exist**
159	**sightsee**	**159**	**expand**
160	**sing**	**160**	**expect**
161	**sink**	**161**	**experience**
162	**sit**	**162**	**experiment**
163	**skydive**	**163**	**expose**
164	**sleep**	**164**	**extract**
165	**smell**	**165**	**exaggerate**
166	**speak**	**166**	**face**
167	**speak up**	**167**	**fail**
168	**spell**	**168**	**faint**
169	**spend**	**169**	**fiddle**
170	**spill**	**170**	**fidget**
171	**split**	**171**	**fill**
172	**split up**	**172**	**finalize**
173	**spread**	**173**	**finance**
174	**spread out**	**174**	**fish**
175	**spring**	**175**	**fit**
176	**stand**	**176**	**fix**
177	**stand for**	**177**	**flit**
178	**steal**	**178**	**float**
179	**stick**	**179**	**flood**
180	**sting**	**180**	**flow**
181	**strike**	**181**	**focus**
182	**strike out**	**182**	**fold**
183	**swear**	**183**	**force**

184	sweep
185	swell
186	swim
187	take
188	take care
189	take in
190	take off
191	take out
192	take part
193	take place
194	take revenge
195	take turns
196	take up
197	teach
198	tear
199	tear down
200	tear out
201	tell
202	there to be
203	think
204	think through
205	throw
206	throw away
207	throw off
208	undergo
209	Understand
210	wake
211	wake up
212	wear
213	win
214	wind down
215	wring
216	write

184	found
185	frighten
186	fry
187	fulfill
188	function
189	fuse
190	gain
191	gallop
192	garden
193	gasp
194	generate
195	govern
196	grade
197	graduate
198	greet
199	grieve
200	ground
201	guess
202	hail
203	heal
204	heat
205	help
206	hook
207	hunt
208	identify
209	ignore
210	imagine
211	imitate
212	immigrate
213	impress
214	include
215	incubate
216	indicate
217	induce
218	Infinitive
219	inflict
220	influence
221	inform

222	**injure**
223	**inspire**
224	**install**
225	**install**
226	**insure**
227	**intensify**
228	**interact**
229	**interest**
230	**interfere**
231	**interrupt**
232	**invent**
233	**invest**
234	**involve**
235	**irritate**
236	**issue**
237	**jog**
238	**join**
239	**joke**
240	**judge**
241	**jump**
242	**kill**
243	**kiss**
244	**knock**
245	**label**
246	**last**
247	**launch**
248	**learn**
249	**lift**
250	**like**
251	**limit**
252	**link**
253	**listen**
254	**locate**
255	**lock**
256	**look**
257	**love**
258	**lower**
259	**mail**

260	**major**
261	**mark**
262	**marry**
263	**match**
264	**matter**
265	**memorize**
266	**mention**
267	**mind**
268	**mingle**
269	**miss**
270	**mix**
271	**modify**
272	**move**
273	**mug**
274	**mumble**
275	**name**
276	**narrow**
277	**need**
278	**network**
279	**nominate**
280	**notice**
281	**obey**
282	**observe**
283	**obtain**
284	**offend**
285	**offer**
286	**omit**
287	**open**
288	**operate**
289	**overestimate**
290	**pack**
291	**participate**
292	**party**
293	**pass**
294	**patent**
295	**pave**
296	**perform**
297	**persevere**

298	**persuade**
299	**phone**
300	**pick**
301	**pioneer**
302	**place**
303	**plague**
304	**plan**
305	**plant**
306	**play**
307	**point**
308	**poison**
309	**position**
310	**post**
311	**predict**
312	**prejudice**
313	**prepare**
314	**press**
315	**prevent**
316	**process**
317	**produce**
318	**program**
319	**prohibit**
320	**project**
321	**promise**
322	**promote**
323	**propose**
324	**protect**
325	**provide**
326	**publish**
327	**pull**
328	**pump**
329	**punish**
330	**purchase**
331	**rain**
332	**react**
333	**realize**
334	**rearrange**
335	**recall**

336	**receive**
337	**recognize**
338	**recommend**
339	**record**
340	**recover**
341	**rediscover**
342	**reduce**
343	**refund**
344	**refuse**
345	**regain**
346	**relate**
347	**release**
348	**remain**
349	**remarry**
350	**remind**
351	**remove**
352	**renew**
353	**rent**
354	**repair**
355	**repeat**
356	**replace**
357	**reply**
358	**represent**
359	**reproduce**
360	**request**
361	**require**
362	**research**
363	**respond**
364	**rest**
365	**restore**
366	**restrict**
367	**retire**
368	**revive**
369	**ring**
370	**risk**
371	**rope**
372	**rush**
373	**sail**

374	**scan**
375	**scare**
376	**scratch**
377	**seem**
378	**serve**
379	**settle**
380	**shape**
381	**share**
382	**shift**
383	**shock**
384	**shop**
385	**shorten**
386	**sign**
387	**sip**
388	**skateboard**
389	**ski**
390	**slow**
391	**smile**
392	**smoke**
393	**sneeze**
394	**snow**
395	**specialize**
396	**specify**
397	**start**
398	**state**
399	**stay**
400	**stimulate**
401	**stress**
402	**stun**
403	**submerge**
404	**substitute**
405	**succeed**
406	**succumb**
407	**suffer**
408	**summarize**
409	**suppose**
410	**survive**
411	**symbolize**

412	**talk**
413	**taste**
414	**tend**
415	**test**
416	**testify**
417	**text**
418	**thank**
419	**tick**
420	**train**
421	**transfer**
422	**translate**
423	**treat**
424	**trek**
425	**tremble**
426	**trust**
427	**try on**
428	**tuck in**
429	**turn**
430	**underline**
431	**upload**
432	**use**
433	**varnish**
434	**vary**
435	**vote**
436	**wait**
437	**want**
438	**warn**
439	**wash**
440	**wave**
441	**weaken**
442	**welcome**
443	**whisper**
444	**wish**
445	**witness**
446	**wonder**
447	**work**
448	**worry**
449	**yell**

APPENDIX F

BETA TEST REPORT PROVIDED BY MUKUTU

- On-site observation
- Feedback from teachers who supervised the groups
- Data collected by monitoring tool
- Adjustments and improvements
- Conclusion

On-site observation

Group 1 (children):

The children showed great enthusiasm at playing the game.

We observed a standard behavior, in which the children were guessing answers on the interface of the game because they did not know the meaning of certain words – they had not learned the trinomials and irregular verbs yet.

Girls seem to take the game more seriously, with more concentration, and they also gave more detailed and thorough feedback. They were all fond of Memo the mascot.

A few students had difficulty testing the trinomials. They could not understand what was happening. We decided then to increase the time limit and to allow the players more time to complete the sentences in the Single player mode as well as the Multiplayer mode.

The page with scroll caused a few problems in terms of usability. The possibility of opening the game in a new tab, without interferences or animations must be verified.

According to teachers, many students asked about a version for smartphones because they would like to play outside the school.

In general, the children gave more engaged feedback than the teenagers did, with more specific and detailed information.

The time of the initial shifts for players who were getting familiarized with the interface and the mechanics of the game was too short, so it was increased at the first few phases.

Players continued to be logged in even after shutting down their computers. A system for automatic log-out for inactivity will be implemented.

We realized that children could play the game, in spite of their difficulty making up the trinomials. So we decided to place a reminder at the tutorial, which says “Remember: to make up a trinomial, you have to put the verbs in the correct verb tense.”

Group 2 (teenagers):

Teenagers show restrained enthusiasm and little engagement.

Although their expressions did not show it, according to the teachers, the teenagers’ feedback was quite positive. They even asked to download outside the environment of the school. We observed, in several situations, students having trouble placing the trinomials on the correct spot of the trinomial maker. We will improve the game’s usability in order to solve this problem.

Besides the problem above, no other difficulty with the interface was identified. As soon as first

match, players could create and test trinomials and discard regular verbs. This group presented less rapport among the students, as if they had been together for little time. They did not talk to each other during the game's time and did not try to figure things out together.

Their feedback was simple, with no details.

We considered the fact that teenagers asked about downloading the app to play at home very interesting and a great sign.

We identified the importance of offering the form when the players click on "play online" and also when they pass to level 2, unlocking the multiplayer mode.

As we were discussing the results of that day, one boy played the game voluntarily for 30 minutes. At the end of this time, he sent us the feedback form with the most detailed and relevant answers of the Beta Testing. It was an excellent way to close the test day.

Group 3 (teenagers):

Filling the form and onboarding were carried out without problems. The interface worked pretty well for this group of students.

Some students clicked on their avatars searching for feedback.

They understood the mechanics of the trinomials and regular verbs, and started using them right away.

Memo as a helper in the game is working pretty well. Many times, the students were hesitating about how to proceed, and then they did exactly what Memo told them to do. This group seemed to know each other for longer, because they were talking amongst themselves and helping one another. These teenagers seemed to be more spontaneous.

From the start, we noticed that the students had not understood the possibility of buying from the discard area (which is mentioned in the tutorial). We thought that maybe Memo could indicate

this possibility, even if it is not the best move for the player, just to reinforce the idea.

During the previous night, we developed and applied a few corrections. One of them was to decrease the points needed to go to the next two levels. This modification allowed players to get to level 3 faster. This change avoids some frustration in the first contact with the game and it also increases the feeling of fast accomplishment.

Still about frustration, we got some feedback about the length of the tutorial. We know that not all players have the patience to go through the whole tutorial with attention, and soon start feeling bored. We can add some improvements, such as a progress indicator.

Some teenagers were dancing and celebrating. :)

One of the students in the group was having problems with the game. When we questioned the teacher, she reported that he has learning difficulties. The game must work for students like him as well. We must get closer to these students to find out how to help them to have a better performance.

Some students wanted to continue playing the game after the class. A very positive sign! We found computers with the account logged in again. The automatic log-out will be implemented.

Group 4 (teenagers):

Two of the kids did not leave the room, even after the end of the class. They kept on playing as the room got filled with teenagers.

The form-filling process took place without complication, there were no doubts related to the interface.

The teenagers looked bored again during the tutorial, resting their heads on their hands. However, in general, they were all attentive, reading the messages thoroughly. Again, the feedback from the teacher was that the students were having fun and making (positive) comments about the

game.

After the tutorial, they were all able to accomplish the tasks straight away (making up the trinomials, separating regular from irregular verbs). This group was less 'influenced' by the teacher. They did everything by themselves.

Many students were able to unlock the multiplayer level during the class, but they didn't have enough time to play online and questioned the teacher about it.

The two children who had remained in the room helped some teenagers who were next to them to learn a few things. An interesting interaction – is it frequent? (kids and teenagers interacting?)

The feedback from the teacher was extremely positive.

Qualitative research (post testing):

Number of answers: 55 **Average answering time:** 5:29 min **General evaluation (rate):** 4.25

88% of the players rated the game 4 or 5

(Choose the answer below which best describes your experience with the game; 55 out of 55 people answered this question; 1 – hated; 3 – regular; 5 – loved it!; average: 4.25)

Questions:

1) Did you find anything confusing or any other problem in the game? If so, describe it below, please. Otherwise, answer "No problem".

44 people, or **80%** of the total, answered that the game **did not** present any problems. The 6 answers (11%) which pointed out any problem described the game as 'confusing'; however, 3 of them reported that the confusion was cleared up as they played more, raising the approval to **85%**.

Interpretation: *There is a time for learning any interface and it is not different with Memoverbs. We offer a detailed tutorial and real time tips, which are helpful for most people, although for some it took longer.*

2) If you were able to solve the problem mentioned above, describe what you did to solve it.

Considering only the players who pointed out any problem in the previous question, three players said that they could solve the problem just by playing more.

Interpretation: *See previous question*

3) What did you like most about the game?

Standards observed:

Verbs: 9

Music: 9

Learn while playing: 6

Visual: 6

Everything: 6

The elephant: 5

Trinomials: 4

Challenge: 2

Online: 2

Interactivity: 2

Nothing: 2

No answer: 5

88% of the players reported that they liked something about the game.

Interpretation: *The game is accomplishing its goal to improve the learning process in a fun way very well. Players reported that they enjoyed learning new verbs, and they enjoyed learning while playing. An interesting point is the soundtrack of the game. It is really appealing, which was demonstrated not only in the research, but also by the fact that some students were dancing while playing. It is important to observe this aspect after playing for a long time. Will players get sick of the music?*

4) Would you recommend this game to a friend? If so, how would you describe the game to him / her? If not, describe your reasons below.

Observed standards:

Learn having fun: 15

Very cool: 7

Practice English: 7

Study verbs: 6

Trinomials: 4

Memorize: 3

It is easy to learn: 2

The elephant: 2

Wouldn't recommend it: 4

"Learn having fun", "Practice English", Study verbs", and other expressions came up very emphatically. This proves that the game was recognized as a **source of learning** by the players.

48 players would recommend the game to a friend, or **87%** of the total number of players, which confirms the **4.25** evaluation, with **88%** of rate 4 or 5**.**

Interpretation: *This question was added to validate students' understanding of the aim of the game. When you recommend something to someone, you tend to use your own words, expressing what you really took in.*

5) Would you give any suggestion to improve the game?

Observed standards:

Fewer instructions and rules: 4

Varied music: 3

Higher level of difficulty (too easy): 3

Longer shifts: 2

Interpretation: *Tutorials are boring to any modern player. The music may become annoying after for some time playing the game. As for the timing of the game, changes have already been made after difficulties noticed during the observation.*

6) Question about the trinomial button

Observed standards:

Answered correctly: 49

Couldn’t remember or gave wrong answer: 6

Interpretation: *This part of the questionnaire was created to check if the interface is successfully playing its role, and if the players are associating the appearance of the button to its function in the game. In the case of the trinomial button,* ***89% of the players remembered its function in the game.***

7) Question about the verbs’ discard area

Observed standards:

Answered correctly: 49

Couldn’t remember or gave wrong answer: 6

Interpretation: *As in the previous answer,* ***89% of the players remembered that this symbol represents the regular verbs discard.***

8) Question about the button ‘collect’ a verb

Observed standards:

Answered correctly: 55

Couldn’t remember or gave wrong answer: 0

Interpretation: *All answers were correct, but this was quite obvious.*

9) Question about the trinomial made

Observed standards:

Answered correctly: 21

Answered satisfactorily: 23

Couldn't remember or gave wrong answer: 11

Interpretation: ***80%*** *identified satisfactorily the function of this element in the interface, for instance: "answer the questions."* ***38%*** *answered correctly something very specific, related to* ***trinomials****. Some groups are not familiar with trinomials, which influenced the results, but the interface became intuitive enough for players to make the expected association (trinomial > sentence).*

10) Question about making a trinomial

Observed standards:

Answered correctly: 23

Answered satisfactorily: 29

Couldn't remember or gave wrong answer: 3

Interpretation: ***94% identified satisfactorily*** *the function of this element with answers like "place verbs" or even "drag the verb".* ***41%*** *answered something related to* ***trinomials****, showing a better understanding of the function of this element.*

11) Question about the help buttons

Observed standards:

Answered correctly: 29 Couldn't remember or gave wrong answer: 26

Interpretation: ***47% could not identify these elements.*** *The explanation is that few of them needed help during the game.* ***53%*** *answered correctly or satisfactorily, some even detailed the function of each item, but most associated the elements to "help", which is considered correct.*

12) Any final observations?

Positive aspects: 14, Elephant: 5, Music / sound effects: 1 Improvement suggestions: 4 Didn't answer or answered something irrelevant: 27

Interpretation: *This final question was not mandatory. The idea was to capture validation messages, which complemented what they had answered before. We had 24 validation answers, or* ***44%*** *of the total. The main validation was related to the quality of the game in general and to the mascot. Not one of the players who evaluated the game negatively made suggestions for improvement.*

Verbs **misclassified** as regular:

	347 Porcentagem do total: 5,67% (6.115)
1. Verb: HEARD	**14** (4,03%)
2. Verb: COST	**12** (3,46%)
3. Verb: READ	**10** (2,88%)
4. Verb: TOLD	**8** (2,31%)
5. Verb: FOUND	**7** (2,02%)
6. Verb: SPENT	**7** (2,02%)
7. Verb: TO GET UP	**7** (2,02%)
8. Verb: BROUGHT	**6** (1,73%)
9. Verb: FIT	**6** (1,73%)
10. Verb: GAVE	**6** (1,73%)
11. Verb: SOLD	**6** (1,73%)
12. Verb: THROWN	**6** (1,73%)
13. Verb: WORN	**6** (1,73%)
14. Verb: LOST	**5** (1,44%)
15. Verb: MET	**5** (1,44%)
16. Verb: SHOOK	**5** (1,44%)
17. Verb: BEAT	**4** (1,15%)
18. Verb: BEATEN	**4** (1,15%)
19. Verb: DRUNK	**4** (1,15%)
20. Verb: GOT DRESSED	**4** (1,15%)

Most frequently made trinomials:

Rótulo do evento	Total de eventos ↓
	538 Porcentagem do total: 8,80% (6.115)
1. Verb: TO KNOW	61 (11,34%)
2. Verb: TO FEEL	14 (2,60%)
3. Verb: TO THROW	12 (2,23%)
4. Verb: TO BREAK UP	10 (1,86%)
5. Verb: TO FALL	10 (1,86%)
6. Verb: TO FORGET	10 (1,86%)
7. Verb: TO SING	10 (1,86%)
8. Verb: TO STAND	10 (1,86%)
9. Verb: TO COST	9 (1,67%)
10. Verb: TO HANG UP	9 (1,67%)
11. Verb: TO RUN	9 (1,67%)
12. Verb: TO TAKE OUT	9 (1,67%)
13. Verb: TO WAKE UP	9 (1,67%)
14. Verb: TO WEAR	9 (1,67%)
15. Verb: TO GET MARRIED	8 (1,49%)
16. Verb: TO HIT	8 (1,49%)
17. Verb: TO LOSE	8 (1,49%)
18. Verb: TO THROW AWAY	8 (1,49%)
19. Verb: TO UNDERSTAND	8 (1,49%)
20. Verb: TO BEAT	7 (1,30%)

Verbs most frequently classified **correctly** as regular:

1.	Verb: CLEAR	**52** (15,16%)
2.	Verb: INVENT	**13** (3,79%)
3.	Verb: ASK	**10** (2,92%)
4.	Verb: CONTACT	**10** (2,92%)
5.	Verb: ENTER	**10** (2,92%)
6.	Verb: LISTEN	**10** (2,92%)
7.	Verb: HELP	**9** (2,62%)
8.	Verb: SPELL	**9** (2,62%)
9.	Verb: CHECK	**8** (2,33%)
10.	Verb: JOIN	**8** (2,33%)
11.	Verb: CAPTURE	**7** (2,04%)
12.	Verb: COMPLETE	**7** (2,04%)
13.	Verb: INCLUDE	**7** (2,04%)
14.	Verb: LOOK	**7** (2,04%)
15.	Verb: REPEAT	**7** (2,04%)
16.	Verb: USE	**7** (2,04%)
17.	Verb: CIRCLE	**6** (1,75%)
18.	Verb: COMMUNICATE	**6** (1,75%)
19.	Verb: GUESS	**6** (1,75%)
20.	Verb: RECOGNIZE	**6** (1,75%)

Corrections and improvements:

Add the ‘feedback’ button to the game

Implement ‘logout’ for inactivity in the web version

When there is no trinomial to be made and the player clicks on the trinomial button, Memo’s message appears on top of the slots. This was causing confusion in the interaction with this element. The message must be repositioned so it won’t block the slots.

Improve the interactivity when trinomials are released on the tester and when regular verbs are released on the sorting machine.

Offer the form to players who have just unblocked the multiplayer mode and to those who have not signed up and click on the “play online” button.

Increase the time limit to complete the sentences (trinomial tester) and apply the same mechanics used in the multiplayer mode.

Open the game in a new tab, without scrolling down to find it (only the game and a static picture on the background)

Improve the text on the trinomial tester to make it clear that the player is supposed to complete the sentence, keeping the context of the factory.

Decrease the minimum score to pass the first levels.

Show tutorial any time players sign up.

Increase the length of the shift in the first levels.

Play varied music during the game.

Conclusion:

“Learning having fun”

Memoverbs has received very positive feedback. The acceptance rate is close to **90%** (87%) of

the users signed up, and got **4.25** points out of 5 (equivalent to 85 in 100). Considering Brazilians view on educational games, especially among the youth, this is an expressive evaluation.

Memo the mascot is a strong, captivating character, full of potential. He has special appeal with the children and teenage girls. We received some specific comments and compliments about him.

The soundtrack chosen for the game is another highlight, since it made children and teenagers dance with the game. The group of resources used in the game (the appearance, colors, animations, etc.) suit the theme of the game very well.

The interface and usability were tested and, despite minor corrections already being carried out, the interface has proved intuitive and user-friendly, inclusively for children. Teenagers did not present any type of difficulty interacting with the interface.

Memoverbs, as a supplementary educational tool, focused on *edutainment*, has great potential for application at schools, working as a complement to reinforce what is taught.

The project has proven to be on the right track since only adjustments needed to be made. The next step is to analyze the results of the diagnostic tests done by the students.

APPENDIX G

DIAGNOSTIC TESTS

DIAGNOSTIC TEST 1

Name: _____

Teacher: _____ Level: _____

Date: _____ Total points: _____/50

1. Read the signs about Earth Hour. Choose the correct verbs to complete the sentences:

Earth hour **a. _____ (be)** an event to encourage people to **b. _____ (turn off**) unnecessary lights for an hour to **c. _____ (raise**) awareness on climate change.

John is a fifteen-year-old boy who **d. _____ (take)** part in this action last year. He has **e. _____ (do)** everything he could! In 2014, John **f. _____ (turn off)** business lights at night. Last year, he **g. _____ (commit)** to zero net deforestation. He has **h. _____ (save)** more energy at his home. Now he **i. _____ (ride)** his bicycle to school and he has **j. _____ (be)** doing the best he can to save the planet!

2. Read the sentences about an internet café. Choose the best verb for each space:

a. Last week, an internet café _____ near my house.

opened open to open

b. The place _____ very popular in the neighborhood.

to be is are

c. My sister always _____ there after school.

went goes gone

d. It only _____ her five minutes

taken takes to take

e. to _____ to the café from her school.

got get gets

f. My sister often _____ for her friends there.

waits to wait waited

g. The café _____ different kinds of computer games.

to have had has

h. I _____ that is the best place

thought think to think

i. to _____ with friends.

hang out hangs out hanging out

j. In my opinion, It has _____ the best place to have fun around here.

to become became become

3. Complete the table with the Infinitive, Past and Past Participle form of the verbs given:

INFINITIVE	PAST	PAST PARTICIPLE
		drawn
	fainted	
	beat	
		kept
launch		

4. Complete the table with the Past and Past Participle form of the verbs given:

INFINITIVE	PAST	PAST PARTICIPLE
light		
heal		
tear		
catch		
show		

5. Complete the sentences with the verb given in the correct tense:

a. Last year, she _____ (get) the position in the company.
b. I completely _____ (misunderstand) the question. Could you repeat it?
c. Time _____ (fly) when you are having fun.
d. She has _____ (go) to Paris. She will live there.
e. They _____ (pull off) a last-minute victory last night.

6. Complete the sentences with one of the verbs from the box in the correct tense:

RISE	CHOOSE	SELL OUT	RUN OUT

a. The tickets were all _____.
b. My mom is the one who _____my name.
c. Have you _____of ideas of things to do on a date?
d. Early to bed, early to _____ makes a man healthy, wealthy and wise.

DIAGNOSTIC TEST 2

Name: _____

Teacher: _____ Level: _____

Date: _____ Total points: _____/50

1. Read the signs about Black Friday. Conjugate the verbs to complete the sentences:

Many people have a day off work on Black Friday, which is the Friday after Thanksgiving. Some people **a.**_____ **(use)** this to **b.**_____ **(travel)** to see family members or friends from other areas. Others use it to **c.** _____ **(start)** shopping for the Christmas season. Many stores have special offers and lower prices on some goods, such as toys.

Black Friday has **d.** _____ **(be)** a success in Brazil in the past years, but some stores **e.** _____**(destroy)** its reputation as they don't **f.** _____**(offer)** really good deals.

Last year, for example, Amanda **g.** _____ **(buy)** a brand new TV, but later she **h.** _____ **(find out)** the original price was just 10% higher than the one she had **i.**_____ **(pay)** for. For that reason, some websites were created to alert customers of the most unreliable stores and they _____**j.** **(prevent)** many "fake" sales last year.

2. Read the sentences about a game. Choose the best verb for each space:

a. *Minecraft* was _____ by Markus Persson.

create created to create

b. The main rule is _____and

breaks broke to break

c. _____ blocks in the right areas.

to put was put put

d. To protect from monsters, you _____ walls.

built build to build

e. But as the game _____

grew grown grow

f. players _____ together to create wonderful things.

works worked to work

g. Yesterday, I _____ it with my friends.

played play to play

h. We _____ so much that our moms

concentrate to concentrate concentrated

i. _____ us a hard time later.

give gave given

j. They_____ we were addicted.

said says to say

3. Complete the table with the Infinitive, Past and Past Participle form of the verbs given:

INFINITIVE	PAST	PAST PARTICIPLE
knock		
	translated	
	ate	
		classified
drink		

4. Complete the table with the Past and Past Participle form of the verbs given:

INFINITIVE	PAST	PAST PARTICIPLE
forgive		
lose		
die		
throw		
marry		

5. Complete the sentences with the verb given in the correct tense:

a. Yesterday he _____ (feel) sick after playing outside in the rain.
b. All we know is that Alana has been _____ (bite) by that dog.
c. Adam was very nervous when he _____ (shake) my hand.
d. Don't forget to _____ (feed) the cats before you leave.
e. My parents _____(wake up) at 3am to check the doors.

6. Complete the sentences with one of the verbs from the box in the correct tense:

TEACH	MIX	ARGUE	QUIT	LEAVE

a. Martha _____ me no choice but to finish the chores. She was so angry!
b. My best friend _____ my mom how to play videogames. It was very funny.
c. Why do you always _____ when we have to choose a place to eat?
d. I _____ my job after the meeting we had yesterday.
e. For a great pie, you have to _____ the ingredients gently.