

Designing a Mobile Website to Teach Phrasal Verbs to English Learners

by

Claudia Gomez-Morales

December 2022

Presented to the

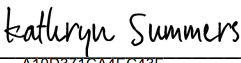
Division of Yale Gordon College of Arts & Science

University of Baltimore

In Partial Fulfillment

of the Requirements for the Degree of

Master of Science

Approved by:  1/24/2023
A10D371CA4EC43F...

[Kathryn Summers, Ph.D., Thesis Advisor]

 1/23/2023
558B9ED8F3874AD...

[Bridget Blodgett, Committee Member]

Abstract

English language learners (ELLs) face many challenges in their English learning journey. For ELLs living in the United States or working with English speakers from this country, one of those challenges is learning and understanding the widely used phrasal verbs due to their number and polysemy. Once ELLs have reached an intermediate or advanced level, they are ready to learn phrasal verbs, but they often find themselves frustrated and anxious by the very difficult nature of these complex grammatical structures.

Using research-based design, this study reviews the literature of methodologies used for teaching phrasal verbs and uses it in conjunction with user research to prototype a mobile website that teaches phrasal verbs to ELLs. Through a user survey of phrasal verb knowledge, a competitor analysis and in-depth interviews with ELLs, the study collects important qualitative and quantitative data for the creation of the initial prototype that is later tested iteratively with ELL participants. At the end of the iterative testing process, this thesis reports the changes made to the prototype based on the data collected through user research and notes the limitations of the study as well as the research that is still needed to create the phrasal verb teaching website.

Acknowledgments

I would like to thank my thesis advisor, Dr. Summers for working with me for the entire year while I developed this project. For your insights, enthusiasm and extra time dedicated to helping me finish this project on time. I have learned immensely from you, and I truly appreciate all the time you have devoted to helping me complete this project.

My most heartfelt appreciation goes to my family from whom I borrowed so much time. I am grateful to my husband. I could have not done this without your support. Thank you for cheering me on and telling me that I could do it. Thank you for taking over my chores, for staying up late with me, for making dinner and bringing me snacks and for everything in between. I feel so lucky to be your wife.

Immense gratitude goes to my children who for a long time felt the emptiness of my absence. I have no words to express how much your understanding meant to me. I am forever indebted. To my mom, I am so thankful to have you in my life. Thank you for supporting me through this journey with your positive words and admiration, for believing in me and cheering me on and for taking on my responsibilities. To my close friends, thank you for understanding when I had to cancel, for cheering me on and for the chats and laughter when I needed a break.

I am extremely thankful to Laurie Fisher, Executive Director of the Literacy Council for distributing my user research flyers and sending participants my way in more than one occasion. Thank you so much for your support, Laurie. Thank you also to all my friends, coworkers and family members who helped me recruit participants for this study.

I am extremely grateful for my research participants. This study could have not been possible without you. Thank you for your patience and flexibility and all the time you dedicated to help me complete this study. Thank you, thank you, thank you.

I am grateful for the University of Baltimore Turner Research and Travel Award for awarding me funds for incentives for my study participants. I could have not been able to afford this research without your help. Finally, I am most grateful to the University of Baltimore for the opportunity to participate in this amazing program.

Table of Contents

List of Tables	9
List of Figures	10
Definition of Terms.....	12
Chapter 1: Introduction	1
Chapter 2: Literature Review.....	3
Multi-Word Verbs	3
Prepositional Verbs.....	3
Phrasal Verbs	4
Transitive Phrasal Verbs.....	4
Intransitive Phrasal Verbs.....	5
Difference Between Phrasal Verbs and Prepositional Verbs	6
Phrasal-Prepositional Verbs	7
Why Learn Phrasal Verbs	8
Methods For Teaching Phrasal Verbs	10
Input Enhancement	10
Data-Driven Learning (DDL) and Task-Based Language Teaching (TBLT)	11
Picture-Elucidation Tasks.....	11
Event Conflation.....	13
Applying the Theory of Conceptual Metaphor.....	15
Engagement in Leisure Activities.....	19
Gamified Teaching Method.....	19
Mobile Assisted Language Learning (MALL)	21
Spaced Repetition in Language Learning.....	26
Less Successful Phrasal Verb Learning Methods.....	30
Selecting Phrasal Verbs to Teach on the Mobile Website	31
Target Population for the Mobile Website	32
Conclusion.....	33

Chapter 3: Methods	36
Recruiting	37
Participant demographics	37
User Survey	39
User Interviews	39
Competitor Analysis.....	40
Prototype Creation.....	41
Iterative Prototype Testing	41
Analysis.....	42
Quantitative	42
Qualitative	42
Chapter 4: Findings.....	45
Phrasal Verb Survey.....	45
Were some phrasal verbs easier than others for ELL's?	47
In-depth Interviews of English Language Learners	52
Goals for Learning Phrasal Verbs.	53
Challenges Communicating in English	53
Logistics of Learning English.....	54
Preferred Pedagogical Methods of Learning Phrasal Verbs.....	54
Participants' English Learning Journey.....	54
Feelings Towards Being an ELL	54
Perceptions of the Behaviors of Others Around ELLs	55
Designing of the Phrasal Verb Mobile Website.....	56
Competitor Analysis and Website Inspiration	56
Some Phrasal Verb Apps Currently in the Market	57
Website Inspiration.....	64
Paper Prototype and Digital Prototype.....	65
Prototype Testing	69
Iterative Prototype Modifications	70

Chapter 5: Conclusion..... 83

 Limitations of the Study 84

 Further Research 86

References 88

Appendix A: Spring’s (2018) List of Phrasal Verb Particles 99

Appendix B: Garnier and Schmitt ’s (2015) List of Phrasal Verbs 102

Appendix C: Phrasal Verb Survey Diagnostic Test..... 104

Appendix D: Participant Tasks During Prototype Testing 110

Appendix E: In-depth Interviews of English Learners 111

Appendix F: Empathy Maps from In-depth Interviews of English Learners 114

List of Tables

Table 1. Survey Participant Demographics.	38
Table 2. Question Difficulty Color Coded and Separated into Levels.	47
Table 3. Survey Quiz Verbs, Scores and Question Difficulty Value.....	48
Table 4. Participant Survey Results Sorted by Skill Level.	49
Table 5. Phrasal Verb Survey Test Question Discrimination Index (d)	51
Table 6. Discovery Interview Insights and Features they Inspired to Design the Phrasal Verb Website	55
Table 7. Teaching Methods Used or To Be Used in Sections of The Mobile Website.	56
Table 8. Some Phrasal Verb Apps Currently in the Market	57
Table 9. Prototype Testing Task Completion Rates	70
Table 10. Prototype Testing Observations, Insights, and Improvements They Inspired for Iterations of the PV Survival Website.	71

List of Figures

<i>Figure 1.</i> Mean lemmatized frequency of correctly formed multi-word verbs per ELL student presentation (Zareva, 2019).	9
<i>Figure 2.</i> Picture-cued task for the phrasal verb <i>hold on</i> (Farsani et al., 2012).	12
<i>Figure 3.</i> Additional picture drawings for the phrasal verb <i>hold on</i> (Farsani et al., 2012)	13
<i>Figure 4.</i> An Example of a Conceptual Metaphor: Time is Money (Lakoff & Johnson, 2003).	16
<i>Figure 5.</i> Overall performance of participants in the three instructional groups (Roohani & Vincheh, 2021).	22
<i>Figure 6.</i> Study mode of Phrasal Nerds: Phrasal Verbs gaming application (Roohani & Vincheh, 2021).	23
<i>Figure 7.</i> Quiz mode in the Phrasal Nerds: Phrasal Verbs gaming application (Roohani & Vincheh, 2021).	23
<i>Figure 8.</i> A screenshot of the Telegram channel (Roohani & Vincheh, 2021).	26
<i>Figure 9.</i> Pimsleur's Graphs of The Probability of Correct Response Recalled Over Time (Pimsleur, 1967).	27
<i>Figure 10.</i> Paper and digital prototype of the phrasal verb website landing screen.	41
<i>Figure 11.</i> Empathy map from in-depth interview (Empathy Map Template from https://app.mural.co).	43
<i>Figure 12.</i> Capture grid from prototype testing (Dam & Siang, 2022).	44
<i>Figure 13.</i> Frequency of phrasal verbs identified incorrectly in the phrasal verb survey.	46
<i>Figure 14.</i> Findings from in-depth interview empathy mapping.	53
<i>Figure 15.</i> English Phrasal Verb Cards App Sample Screens.	58
<i>Figure 16.</i> Phrasal Verbs: Learn and Play App Sample Screens.	59
<i>Figure 17.</i> English Phrasal Verbs in Use App Sample Screens.	60
<i>Figure 18.</i> Most Common Phrasal Verbs App Sample Screens.	62
<i>Figure 19.</i> Phrasal Verbs – Learn English App Sample Screens.	63
<i>Figure 20.</i> Screens used for inspiration.	64

<i>Figure 21. Landing screen (paper and digital prototype).</i>	65
<i>Figure 22. Settings screen (paper and digital prototype).</i>	66
<i>Figure 23. Screens from the Play section of the PV Survival website (paper and digital prototype).</i>	66
<i>Figure 24. Landing screen of the Learn section of PV Survival (paper and digital prototype).</i>	67
<i>Figure 25. Screens of the Learn with Particle Meanings section (paper and digital prototype).</i>	68
<i>Figure 26. Screens of the Learn with Illustrated Meanings section (paper and digital prototype).</i>	69
<i>Figure 27. Pop-up further explaining the meaning of the phrasal verb used in the game.</i>	73
<i>Figure 28. Wording changes throughout prototype iterations of the ‘out’ section.</i>	74
<i>Figure 29. Change in wording and picture when out means exit to distinguish the verb to exit (act of leaving a place) from the noun exit (a way out of a building).</i>	75
<i>Figure 30. Change in wording for the Learn with Illustrated Meanings and Particle Meanings Buttons.</i>	75
<i>Figure 31. Progress bar addition and wording change in Illustrated Meanings section.</i>	76
<i>Figure 32. Audio and wording changes on the out section of the prototype.</i>	77
<i>Figure 33. Some vocabulary words linked to the Dictionary section.</i>	78
<i>Figure 34. Change in button colors from gray to deep yellow with properly grayed out inactive buttons.</i>	79
<i>Figure 35. Learn flow became shorter and more straight-forward by omitting one extra screen in the Learn with Pictures section, and the introduction text is divided into four screens.</i>	80

Definition of Terms

Adverbs

Adverbs are words that usually modify—that is, they limit or restrict the meaning of verbs. They may also modify adjectives, other adverbs, phrases, or even entire sentences. An adverb answers the questions when?, where?, how?, how much?, how long?, or how often? For example, the word *soon* in the following sentence is an adverb: The elections are coming *soon*. Most adverbs are formed by adding *-ly* to an adjective (bold / boldly, solid / solidly, etc.) There are, however, many common adverbs that do not end in *-ly*, such as *again, also, just, never, often, soon, today, too, very, and well*. (Merriam-Webster, n.d.)

Acquisition

The term is used for referring to uptake of vocabulary for consistent usage in the language system (Ellis, 2005).

Direct Object

A direct object is a noun phrase denoting a person or thing that is the recipient of the action of a transitive verb, for example the dog in Jimmy fed the dog. (Oxford Languages, n.d.)

Explicit Knowledge

Knowledge related to deliberate processing (Segalowitz, 2003), clarified with conscious awareness (Ellis, 2005).

Explicit Teaching

A series of supports and scaffolds whereby students are guided with clear statements about the purpose and rationale for learning the new skill, clear explanations and demonstrations of the instructional target and supported practice with feedback until independent mastery has been achieved (Archer & Hughes, 2011).

Implicit knowledge

Knowledge related to subconscious processing (Ellis, 2008).

Implicit learning

Input processing in which subconscious and automatic language development is observed (Hulstijn, 2005).

Interlanguage

The process of learning a second language is characteristically non-linear and fragmentary, marked by a mixed landscape of rapid progression in certain areas but slow movement, incubation, or even permanent stagnation in others. Such a process results in a linguistic system known as 'interlanguage' (Selinker, 1972), which, to varying degrees, approximates that of the target language (Nordquist, 2019).

Intransitive verb

Intransitive verbs are verbs that can stand alone and are not used with a direct object. If something comes after an intransitive verb, that is, in the position usually occupied by the direct object, it doesn't answer the question what? or whom? Instead, it answers a question like where? when? how? or how long? (Merriam-Webster, n.d.) For example: Her car *died* suddenly last week; someone was coughing.

Lexical verb

Lexical verbs are the main verbs (or action words) in a sentence. They can show the subject's action or express a state of being. They fall into several categories: transitive, intransitive, linking, dynamic, and static (Thesaurus, 2017).

Metaphor.

A property of concepts and processes of human thought and reasoning – from a cognitive linguistic viewpoint (Lakoff & Johnson, 1980).

Particle

An adverb or a preposition that can combine with a verb to make a phrasal verb (Hornby, 2000, p. 923).

Prepositions

A preposition is a word or group of words used before a noun, pronoun, or noun phrase to show direction, time, place, location, spatial relationships, or to introduce an

object. Some examples of prepositions are words like *in*, *at*, *on*, *of*, and *to*. (Walden University Writing Center, n.d.)

Prepositional Object

The prepositional object is the noun or pronoun that the preposition affects or describes. For example, in the sentence *the apple in the tree*, the word *in* is the preposition and *tree* is its object. The full prepositional phrase modifies *apple* by telling us where it is. (Straus, 2022)

Spatial Adverb

In English grammar, an adverb of a place is an adverb (such as *here* or *inside*) that tells where the action of a verb is or was carried out. It is also called a place adverbial or a spatial adverb. Common adverbs (or adverbial phrases) of place include *above*, *anywhere*, *behind*, *below*, *downward*, *everywhere*, *forward*, *here*, *in*, *inside*, *left*, *near*, *outside*, *over there*, *sideways*, *underneath*, and *upward* (Nordquist, 2019).

Transitive verbs

Transitive verbs are verbs that require a direct object. The direct object is either a noun, a pronoun, or a noun phrase. The direct object follows the verb and indicates the person or thing that receives the action of the verb. It typically answers the question what? or whom? (Merriam-Webster, n.d.) For example: The children *like* to play soccer; lies really *annoy* mom.

Chapter 1: Introduction

Phrasal verbs are a type of multi-word verbs. They are a combination of a lexical verb plus a spatial adverb that together acquire a new meaning different to those of the verb and the particle (Quirk, 1985). Verbs such as *find out*, *bring up*, *hold up*, and *make up*, are examples of phrasal verbs. These verbs are frequently used in spoken English and usually exhibit figurative senses that are not readily clear to English language learners (ELLs) (Behzadian, 2016). Because phrasal verbs are also polysemic and their meaning might seem arbitrary, students develop a certain attitude of rejection towards them (Bujan Sanchez, 2013). To make matters worse, traditional textbooks for ELLs encourage students toward the misleading conception that phrasal verbs need to be memorized because their verb-particle combinations are formed arbitrarily (Farsani, et al., 2012). In this paper, I intend to discover what studies have found to be the most effective methods to teach phrasal verbs to ELL students in order to improve knowledge and understanding of their figurative meanings. I will use my findings, along with rapid iterative testing and evaluation (RITE) to design a mobile-friendly teaching website that would facilitate phrasal verb learning for this population.

Before discussing the research about the methods for teaching phrasal verbs, I will look at phrasal verbs from a grammatical perspective. There seems to be a lot of confusion about what phrasal verbs are among teachers of ELLs. Many teachers call phrasal verbs any combination of a lexical verb and a particle (Bujan Sanchez, 2013). However, there are other types of verbs that are formed this way and that are not called phrasal verbs. A better term for these kinds of verbs is multi-word verbs. After clarifying what phrasal verbs are, I will then discuss the methods of teaching phrasal verbs found in the literature. Then, I will discuss technologies, mainly mobile applications, used to teach phrasal verbs and the effects of these methods on the acquisition of phrasal verbs by ELLs. Finally, I will investigate the target population for the mobile web application. Generally, when students are at an upper-intermediate or advanced level is when they are ready to learn phrasal verbs (Bujan Sanchez, 2013).

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Introduction

2

This topic is of great interest to me as an English learner myself. Over 20 years ago, I immersed myself in the English language and started learning it for the first time as a life skill instead of a grade school subject. It took me at least three years to be able to understand others and make myself understood without having to translate what I heard in my head. However, completely understanding spoken English has been a process of many years, and I owe most of my difficulty with the language to the struggles I had, and sometimes still have, understanding phrasal verbs. It is my intention to give back to the ELL community by designing and eventually creating a mobile website that aids learners in the acquisition of phrasal verbs.

The research questions for this project are as follows:

1. What are the common phrasal verbs that ELLs find most difficult to learn?
2. What do intermediate or advanced ELLs value in a phrasal verb mobile website interface and believe will help them stay engaged in their learning of these verbs?

Chapter 2: Literature Review

Multi-Word Verbs

Phrasal verbs are a type of multi-word verb. When talking about multi-word verbs, one refers to the combination formed by a lexical verb plus one or two particles. These particles belong to two overlapping categories: Prepositional and spatial adverbs. Quirk et al. (1985) divided these particles into three groups: one group formed only by prepositions, another group including both prepositions and spatial adverbs or prepositional adverbs, and a third group formed by spatial adverbs. Some examples of prepositions are *of*, *at*, *from*, and *like*. *Back*, *away*, *forward*, *off* are examples of adverbial particles. It is important to emphasize that multi-word verbs behave as one lexical or syntactical unit. (Quirk, 1985).

The following sentences are examples of multi-word verb usage:

- a. Herman Melville's book, *Moby Dick*, first *came out* in 1851. (*was published*)
- b. The plane took off without her. (*flew into the air/departed*)
- c. The class lecture *went on* until 8:15 pm. (*continued*).

When looking at the verb part of the phrasal verb, Quirk (1985) divides multi-word verbs into three categories: prepositional verbs, phrasal verbs, and phrasal-prepositional verbs. Bujan Sanchez (2013) underlines the importance of distinguishing the differences between these three types of multi-word verbs. However, she notes that most people do not need to know that verbs do not belong to the same category in order to use them.

Prepositional Verbs

Prepositional verbs are verbs such as *abide by*, *refer to*, *glance at*. They are a combination of a lexical verb and a preposition with which it is semantically or syntactically associated. The verb uses the literal sense, but it also has a fixed association with the preposition. The preposition always comes before its complement (He *applied for* the scholarship) unless the complement is stranded (What scholarship did he *apply for*?) (Bujan Sanchez, 2013).

Prepositional verbs are easier to learn for ELLs . This is because the meanings of prepositional verbs are more literal. They are also widely used in academic English which is the type of English that is often taught to ELLs. Therefore, most prepositional verbs are learned unconsciously. However, phrasal verbs need to be taught more purposefully (Bujan Sanchez, 2013).

Phrasal Verbs

Phrasal verbs are one of the most common multi-word verbs. They consist of a lexical or main verb and a spatial adverb. Spatial adverbs used with phrasal verbs are called adverbial particles (Oxford English Dictionary, n.d.). The most used adverbial particles in phrasal verbs are *at, away, down, in, off, on, out, over, round, up* (Cambridge Dictionary, 2022). The combination of verb and adverb often brings a new meaning different from those of the verb and the particle. (Quirk, 1985). Most of the most frequent phrasal verbs are highly polysemous, having on average 5.6 meanings, although many of those meanings are not regularly utilized (Garnier, 2015). These verbs are not to be confused with free combinations of verbs and adverbs where the meaning of both components is maintained (Quirk, 1985).

Ryan (2009) simplifies the definition of phrasal verbs as the combination of a verb and a preposition that “come together to produce a new unique distinct verb.” If the lexical verb used is not a verb of movement, then the phrasal verb has a new meaning. Lexical verbs of movement next to a preposition result in a phrasal verb that is directly translatable and therefore quite easy to understand for ELLs (Ryan, 2009).

To distinguish phrasal verbs from free verb combinations, Quirk et al. (1985) describes the characteristics of phrasal verbs according to whether these verbs are transitive or intransitive.

Transitive Phrasal Verbs

Phrasal verbs that take a direct object as complement are transitive. These verbs are often confused with prepositional verbs. A way to differentiate prepositional verbs from phrasal verbs is offered after the discussion of intransitive phrasal verbs.

There are instances when phrasal verbs can be transitive or intransitive depending on their complementation patterns in a particular sentence. Sometimes a change in meaning occurs, but that is not a decisive factor. For example, the following sentences use transitive verbs:

- d. The boy *took off* his shirt before swimming. (*removed*)
- e. A single bomb *blew up* the whole city. (*destroyed*)

Under the Intransitive Phrasal Verb section below, j. and k. are the intransitive counterparts of these verbs. From d. to j., the meaning of the phrasal verb *take off* changes from *removed* to *departed*. In sentences e. and k., the meaning also changes from *destroyed* to *exploded*. However, there is a shared semantic notion that gives two distinct roles to *bomb*: Agent with the intransitive form and Affected with the transitive one. The connection between these two meanings can also be recognized as a cause-and-effect semantic relationship: the bomb blew up, *exploded*, and blew up, *destroyed*, the city (Bujan Sanchez, 2013).

As with most intransitive verbs, the particle used in transitive phrasal verbs, or in free combinations, can precede or follow the direct object. For example, the sentence in numeral d. above could also be written as shown in numeral f. When the object is a pronoun, however, the pronoun must always precede the particle, as in example g. (Quirk et al., 1985).

- f. The boy *took* his shirt *off* before swimming.
- g. He *took* it *off* before swimming.

Some verbs, however, do not easily allow the placement of the particle after the object. This usually occurs when there is a strong idiomatic bond between the phrasal verb and the object (numeral h.) or when the object is clausal, such as an *-ing* clause, even if the clause is short (numeral i.) (Quirk et al., 1985).

- h. They *laid down* their arms. (Instead of: They *laid* their arms *down*.)
- i. We *gave up* trying. (Instead of: We *gave* trying *up*.)

Intransitive Phrasal Verbs

These phrasal verbs are usually informal, and the lexical verb is usually followed by particles that are either prepositions or prepositional adverbs. The particle functions like a predication adjunct and usually cannot be separated from its lexical verb (Quirk et al., 1985).

- j. The plane *took off* without us. (*departed*)
- k. A bomb *blew up* unexpectedly. (*exploded*)

One difference between intransitive phrasal verbs and free combinations of verb plus adverb is that the verb and the particle of intransitive phrasal verbs create a new meaning (*departed* and *exploded* in numerals j. and k. and *gives the impression* in numeral l.). In free combinations, the verb acts as a normal intransitive verb, and the adverb has its own meaning (numeral m.). (Quirk et al., 1985).

- l. My brother *comes across* as quiet, but he is very loud. (*Gives the impression*)
- m. My dog, Lucy, *ran straight across* (the street).

Once phrasal verbs are identified, they can be semantically classified as directional or literal, aspectual, or idiomatic. Directional or literal phrasal verbs are completely compositional. Learners can translate them directly. For example, in the sentence *take down the picture*, the expected meanings of *take* and *down* are utilized. Idiomatic phrasal verbs are verbs that need to be learned as a lexical unit. In this case, in the verb *make up* used in the sentence *after some discussion, we finally made up (reconciled)*, the meanings of *make* and *up* seem to be lost. Lastly, aspectual phrasal verbs can be recognized as phrasal verbs that retain the literal meaning of the lexical verbs, but the particle has an idiomatic meaning. For example, *up* in *they ate up all the cookies and drank up all the milk* indicates that the actions are complete. In this case *up* loses its meaning sense of *above* (Armstrong, 2004; Bronshteyn & Gustafson, 2015).

Difference Between Phrasal Verbs and Prepositional Verbs

For ELLs learners, it is difficult to distinguish between transitive phrasal verbs (which take a direct object) and intransitive prepositional verbs (verbs that do not take an object) that contain either a preposition (about, after, along, off, etc.) or a spatial adverb

(above, around, down, in, out, through, up, etc.). This confusion happens because the prepositional objects of the prepositional verbs (for example, the prepositional object *property* in numeral n.) are confused with the direct object of the phrasal verbs (like the direct object *two children* in numeral o.) (Quirk et al., 1985).

- n. You should *invest in* property.
- o. She is *bringing up* two children

These prepositional verbs are distinguished from almost all transitive phrasal verbs by the fact that the particle in prepositional verbs cannot be separated from the lexical verb as shown in numerals p. and q. below.

- p. She *called on* her friends – instead of: She *called* her friends *on*.
- q. She *came across* a problem – instead of: She *came* a problem *across*.

Similarly, the order of particle and pronoun is different:

- r. I *called on* them – instead of: I *called* them *on* (prepositional verb).
- s. I *switched it on* - instead of: I *switched on* it (phrasal verb).

(Quirk et al., 1985).

Phrasal-Prepositional Verbs

There is another category of multi-word verbs called phrasal-prepositional verbs. These verbs include two particles, a preposition and an adverb, in addition to the lexical verb (see example on numeral t.). These combinations are mostly found in informal English. As with other idiomatic expressions, the phrasal-prepositional verbs can be paraphrased with one word (numeral u.) (Quirk et al., 1985).

- t. There was a lot I had to *put up with* today.
- u. Put up with = tolerate

These verbs can also be intransitive, like the example above (numeral t.), or transitive, requiring a direct object:

- v. I'll *let you in on* a secret. *A secret* is the direct object.
- w. He *took his anger out on* me. *His anger* is the direct object.

Why Learn Phrasal Verbs

It is important to learn phrasal verbs because they mark the difference between average and advanced speakers of English whose language sounds more natural (Bujan Sanchez, 2013). Thus, phrasal verbs are an important aspect of the English language and are inevitably part of everyday English (Kijpooonphol & Phumchanin, 2018). Garnier and Smith (2016) tested the knowledge of BA English/TEFL course ELLs of highly polysemous phrasal verbs in English and found that 40% of phrasal verb meaning senses were known on average. The chance of knowing all possible meanings of each phrasal verb was even lower at around 20%. This study confirms that phrasal verbs are a complicated aspect of English vocabulary for many learners, and they deserve more attention either inside or outside the classroom.

Furthermore, English phrasal verbs have found to be used very frequently. For instance, based on a corpus search of the British National Corpus (BNC), Gardner and Davies (2007) estimated that learners would encounter an average of one phrasal verb every 150 words of English they are exposed to. Using phrasal verbs is essential to sounding native-like and being fluent in English (Garnier, 2015).

Zareva (2019) conducted a study of the use of multi-word verbs in ELL university student presentations and found that students used prepositional verbs most frequently, followed by phrasal and phrasal-prepositional verbs (see Figure 1). The results also revealed that ELL student presenters had difficulty producing prepositional and phrasal verbs correctly, which further highlights the special teaching and learning attention these verbs need. Compared with native language presenters (Zereva, 2016), the ELL presenters had much less multi-word verb diversity in their repertoire.

Even at an elevated level of proficiency, students' use of incorrectly formed prepositional and phrasal verbs was clearly apparent. The analysis of incorrectly formed phrasal verbs showed two main patterns:

1. 89% of incorrectly formed phrasal verbs used lexical verbs with the incorrect adverbial particle which resulted in structures with quite different meanings. For

example, *go *about* instead of *go over* the criteria, *go *through* instead of *go over* the hypothesis, *stick *into* instead of *stick to* classical Arabic, when it *comes *in* instead of when it *comes to* the workplace, etc.

2. The rest of the cases (11%) consisted of the wrong choice of phrasal verbs. For instance, *speak out* a paragraph instead of *read out loud*, or *get through* many studies instead of *go over* many studies.

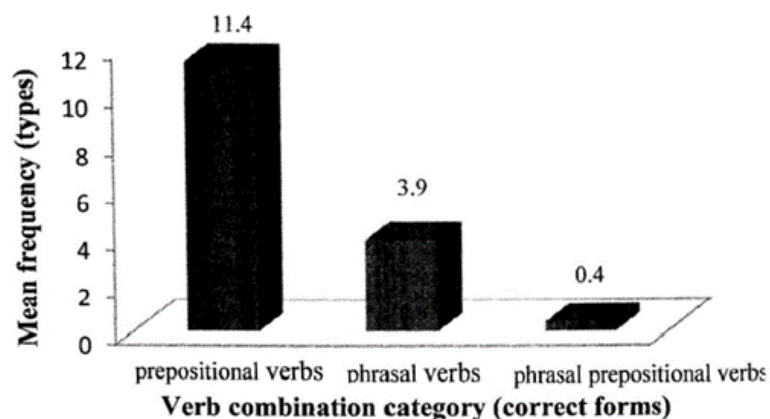


Figure 1. Mean lemmatized frequency of correctly formed multi-word verbs per ELL student presentation (Zareva, 2019).

These phrasal verb usage errors “were all errors that created ambiguity and could potentially result in serious misunderstandings” (Zareva, 2019). It is important to note that most of the verbs used in the ELL student presentations were high-frequency verbs, usually acquired by learners at the beginning stages of the second language acquisition process. This indicates that the difficulty with these verbs, even for proficient ELL speakers, is not due to the verbs’ frequency or the availability in input, but rather “to the verbs’ relative fixedness and partial idiomaticity which requires them to be learned as units rather than combinations” (Zareva, 2019).

Methods For Teaching Phrasal Verbs

Given the grammatical complexity of phrasal verbs, scholars and teachers have disagreed about how they should be taught to ELLs. Even traditional English as a second language (ESL) textbooks encourage learners in the misleading conception that phrasal verbs and their verb-particle arrangements are random and need to be memorized rather than analyzed (Farsani, 2012). To effectively improve their knowledge of phrasal verbs, ELL students might need to combine explicit with implicit learning (Garnier, 2016). Below there is a compilation of methods used in several studies aimed at improving students' knowledge and understanding of phrasal verb meaning. Those methods include input enhancement, data-driven learning, engagement in leisure activities, picture-elucidation tasks, applying the theories of event conflation, conceptual metaphor and spaced repetition, gamification and mobile assisted language learning.

Input Enhancement

Input enhancement consists of the manipulation of texts through different typological changes such as boldfacing, italicizing, underlining or capitalizing. This type of enhancement increases the perceptual saliency of the target structures which in turn increases their chance of being noticed (Sharwood Smith, 1993)

In a study of Iranian ELLs, input enhancement proved to be considerably more effective than concordance-base activities (Behzadian, 2016); which will be explained under the section on data-driven learning below. Earlier studies have also shown that the method of input enhancement has positive effects on second language target features (Shook 1994; Goudarzi and Moini 2012; Rott 1999). This finding is consistent with Sharwood Smith's (1993). Sharwood Smith (1993) first pointed out the pedagogical benefits of input enhancement when he affirmed that input enhancement focuses learners' attention on certain aspects of the input, and thanks to this attention, input changes into intake. In his study, Behzadian (2016) enhanced target phrasal verbs by writing them in bold in order to make them salient enough to draw learners' attention. The results of their ANOVA analysis revealed the superiority of reading with input enhancement in both

acquisition and retention of phrasal verbs compared with the concordance-based group that focused learner attention on a separate list of all occurrences of each phrase (Behzadian, 2016).

Data-Driven Learning (DDL) and Task-Based Language Teaching (TBLT)

DDL is a method where learners read large amounts of authentic language and try to discover patterns in linguistic rules by themselves. Authentic language for DDL is usually taken from linguistic corpora (a big collection of naturally occurring language produced by native speakers) (Johns, 1994). The researchers using this approach argue that exposing learners to context, which exhibits the specific features of the language, facilitates learner's creativity and self-discovery (Batstone, 1995). Proponents of DDL see it as a synonym of TBLT where students are given linguistic materials and asked to look for patterns and rules in them (Johns, 1994). Concordance is central to the DDL. O'Keeffe et al. (2007) describes it as a way "to find every occurrence of a particular word or phrase" (p. 8). In the past, concordance was done manually, but with the advance of technology, concordance programs produce basic sequences of words through concordance lines (Meyer, 2004).

In a study by Girgin (2019), students instructed via six hours of corpus-based activities revealed that the students were able to recognize and understand the form of phrasal-prepositional verbs and to construct the correct forms of these verb while using them to paraphrase sentences. However, it was found that this method was not effective in helping students understand the metaphorical meanings of those structures, making this method inadequate if used by itself.

Picture-Elucidation Tasks

A picture elucidation task is a cognitive awareness-raising task in which the attention of the learner is directed toward salient features of one or a series of pictorial sketches, cartoons or photos showing a more concrete aspect of the meaning of a linguistic expression (Skehan, 1998). Farsani et al. (2012) wanted to know if picture-cued tasks revealing image-schematic concepts behind phrasal verbs would help learners make

inferences from concrete to more abstract senses. He found that picture-cued tasks greatly improved comprehension and proper use of English phrasal verbs and significantly improved inferences of the related abstract meanings of these verbs. The picture-elucidation tasks offer a more concrete meaning of an expression and gradually assist in the recognition of similar salient features in a more abstract respect. Active discovery or identification of relevant elements of the images reinforces learning in this approach (Farsani et al., 2012).

In the study of Farsani et al. (2012), the experimental group of participants was taught using picture elucidation tasks. The group was initially given a picture with accompanying sentences containing a concrete use of the phrasal verbs. They were instructed to carefully read the sentences, look at the picture, and try to recognize the meaning of the phrasal verb in context. The teacher explained to students that the picture represented the meaning they were looking for.

Figure 2 shows two sample picture-cued tasks in the order they were presented to the experimental group. On the left, the first picture presented to learners represents the more literal meaning of the phrasal verb *Hold on*. On the right, the more abstract meaning.



Figure 2. Picture-cued task for the phrasal verb *hold on* (Farsani et al., 2012).

Sometimes, learners received more picture drawings to smooth their transition from concrete to abstract meanings as shown in Figure 3. The idea of the study was that

by “discovering” common attributes among the group of concrete and abstract images, learners would strengthen their association and retention of the verb meanings that were less evident (Farsani et al., 2012).



Figure 3. Additional picture drawings for the phrasal verb *hold on* (Farsani et al., 2012)

Event Conflation

The theory of event conflation suggests that two events can be combined and expressed as a single event (Talmy, 1985). For example, in the sentence *Jill skipped across the park* there are two pieces of information: That Jill was skipping, and that Jill traveled from one end of the park to the other. However, these actions are conveyed as a single event. According to Talmy (1985), this phenomenon occurs differently in all languages. In English, it is usually done using a verb that tells the co-event (what happened or how/why it happened) and a satellite that tells the main event (the change or result of the action). In the previous example, the verb *skipping* communicates the fact that Jack was skipping, and the satellite *across* communicates the change of location (Spring, 2018).

Talmy (1985, 2000, 2008) states that satellites can be prepositions, particles or adjectives in English. Therefore, phrasal verbs are contained in this linguistic construct, as seen in the example above, and can be used to explain many phrasal verb particles. Thus, through event conflation, phrasal verbs can be explained as a combination of two distinct meanings: the co-event coming from the meaning of the verb, and the main event

coming from the particle. This principle can be applied to a variety of common and uncommon phrasal verbs. For example, the meaning *to exit* of the adverbial particle *out* can be used to explain many phrasal verbs such as *walk out*, *run out*, *whoosh out*, *fly out*, etc. In each of these phrasal verbs, the particle retains the meaning of *to exit* and the verb describes how the object was exiting or what it was doing while exiting. Since there are many motion verbs in English, they can easily combine with the particle *out* to create a similar meaning. This way, event conflation could help ELLs deduce the meaning of other generative phrasal verbs that follow this pattern (Spring, 2018).

The theory of event conflation also helps explain the polysemy found in phrasal verbs. Talmy (1985, 2000) indicated that there are five types of events in which conflation occurs: motion, change of state, a realization of goals, aspect, and correlation of actions. The following examples, with italicized phrasal verbs for emphasis, illustrate the five types of events:

- a. Motion: Jill *skipped across* the park.
- b. Change of state: Jill *tied together* the gifts.
- c. Realization of goals: Jill *chased down* the criminal.
- d. Aspect: Jill *ran on*, even though she was tired and wanted to stop.
- e. Correlation of actions: Jill *sang along* with the radio.

When analyzing phrasal verbs through the theory of event conflation, it is evident that the different meanings of the adverbial particles help explain the number of meanings a phrasal verb has. For example, two common meanings of the verb *look up* are to physically look upward and to research. The first meaning indicates a motion event in which the verb *look* indicates what is moving (one's line of vision) and *up* indicates the direction of the movement. The second meaning can be explained as a realization of goal event. In this case, the verb *look* indicates what is happening and *up* indicates that the goal of the verb *look* (i.e., finding what one is looking for) is being realized. In this case the verb *look up* means to look until completion or to look until having the information one wants.

Spring (2018) created a comprehensive, yet concise list of phrasal verb particles with their meanings utilizing phrasal verb corpus studies and the cognitive linguistic theory of event conflation. He used this list to teach phrasal verbs to Japanese learners of English more effectively, as compared to teaching the verbs as whole units through a phrasal verb list.

While creating the list, Spring (2018) first extracted the adverbial particles from Garnier and Schmitt's (2015) 150 most common phrasal verbs list. He found that most particle meanings correspond to either motion or change of state events; only three particles on the list use the realization of goal event meanings (*up*, *down* and *out*); only one takes the aspect event meaning (*on*) and only one takes the correlation of action event meaning (*along*). He combined the three last categories into a *time-related* category for conciseness since there was no overlap between the particles. The final list of particle meanings used to instruct the conflation group in Spring's study (2018) is shown in Appendix A. The table is concise, showing only 17 particles, but it explains the two most common meanings of approximately 95% of the 150 phrasal verbs in the Garnier and Schmitt (2015) list. Quantitative data in Spring's study (2018) showed that the participants in the conflation method group significantly outperformed those in the group who were taught with a list of phrasal verbs as units, although they had demonstrated equivalent phrasal verb knowledge on the pretest.

Applying the Theory of Conceptual Metaphor

According to Kövecses (2017), the standard definition of conceptual metaphors "is understanding one domain of experience (that is typically abstract) in terms of another (that is typically concrete). Conceptual metaphors occur with the inferences between the knowledge from two different domains or concepts." That is, the knowledge about a domain is mapped onto another concept, resulting in conceptual metaphors. These metaphors have two components known as the target domain and the source domain (Lakoff & Johnson, 1980). The target domain is the concept that is mapped onto, while

the source domain is the domain that is mapped from. In fact, the source domain offers the inference patterns to explain the target domain (Lakoff & Johnson, 2003).

To clarify, the source domain is a simple and easily accessible concept such as attributes, processes, relationships that are semantically associated, and stored in the mind together. The target domain, however, is a much more abstract concept that cannot be directly experienced and needs help—such as conceptual metaphors—to mirror the source domain's features. “In this sense, the "logic" of a language is based on the coherences between the spatialized form of the language and the conceptual system, especially the metaphorical aspects of the conceptual system” (Lakoff & Johnson, 2003).



Figure 4. An Example of a Conceptual Metaphor: Time is Money (Lakoff & Johnson, 2003).

Figure 4 helps explain this concept with the conceptual metaphor *Time is Money*. In this case, the source domain is *Money* which is more concrete and easily understood. *Time* is the target domain that is more abstract and difficult to grasp. In this case, we already understand the concept of money. This concept is then mapped into the concept of time and communicates the idea that time is as valuable as money. Consequently, we understand and experience the concept of time as something that can be spent, wasted or saved (Lakoff & Johnson, 2003).

Lakoff & Johnson (2003) provided the following examples:

- a. You're wasting my time.
- b. This gadget will save you hours.
- c. He's living on borrowed time.
- d. You don't use your time profitably.

Phrasal verb particles may carry different meanings, making them crucial in mastering phrasal verb constructions. Most of the common particles, including *up*, *down*, *back*, *out*, and *off* have both literal and figurative meanings. The literal meaning is the basic and core sense in terms of the spatial orientation, and the figurative meaning is accepted as the metaphorical connotation. However, it does not make much sense to say that particles have meanings; rather they carry semantic information which is contributed to the phrasal verbs they are a part of (Rundell, 2005).

According to Lakoff and Johnson (1980), conceptual metaphor helps explain the underlying link between the position-in-space meanings of the above-mentioned particles and their figurative uses. For example, the ideas of being *up* or *down* are often related metaphorically with high and low quantities, with status and power and with a person's mood (happy or sad). If an amount goes *up*, it becomes larger. If the amount goes *down*, it becomes smaller. Likewise, people in positions of power are perceived as being *high up* while the weak and powerless are *down at the bottom*. As Lakoff and Johnson (1980) indicate, the metaphorical development of literal spatial concepts is coherently "rooted in [our] physical and cultural experience" (Lakoff & Johnson, 1980). For example, the link between being *up* and *having power* comes from our experience of the world. If two people fight and fall to the floor and one ends up physically on top of the other, the one top usually has the power (Rundell, 2005).

This is a systematic process in which basic spatial particles develop new, abstract meanings. When the particles combine with verbs to form phrasal verbs, our understanding of these particles helps us to comprehend the whole verb. This way, when someone quits a powerful position, we say that they *step down*. If a dictator is removed

from office, we say that they were *brought down*. In both cases, the choice of particle is not arbitrary. The meaning of *down* as a loss of power better explains the meaning of the associated phrasal verbs (Rundell, 2005).

In a pedagogical experiment, Liao (2019) used the theory of conceptual metaphor to teach phrasal verbs containing the particle *out* to Taiwanese ELLs of pre-intermediate English proficiency. He wanted to see whether concentrating on the sense extension of this particle could enhance the learning of phrasal verbs using *out* in these learners. He found that, when instruction involved the explanation of the underlying conceptual metaphors for the meanings of *out* and *out* phrasal verbs of corresponding meanings, the learners achieved significantly better learning outcomes than those receiving a traditional approach to teaching phrasal verbs. Moreover, this improved learning outcome was observed not only on taught items but also on untaught items as well.

To teach phrasal verbs using *out*, Liao (2019) prepared instructional materials that involved the identification of *out* meanings, the selection of corresponding phrasal verbs, and the construction of appropriate contexts for each phrasal verb. Six meanings were selected following the classification of Tyler and Evans (2003) and Rudzka-Ostyn (2003), as seen below, along with corresponding conceptual metaphors.

The following is the instructional list of meanings for *out* that Liao (2019) used to teach phrasal verbs to Taiwanese students using the conceptual metaphor theory:

1. *out*-1: entities moving *out* of containers (a previous boundary is a container).
2. *out*-2: entities removed *out* of sets or groups (a set/group is a container).
3. *out*-3: exclusion (exclusion is *out*).
4. *out*-4: voice or breath coming *out* of self-body (self-body is a container).
5. *out*-5: entities becoming visible or accessible (accessibility/visibility/existence is *out*).
6. *out*-6: entities expanding to a maximum boundary (a previous boundary is a container).

Liao (2019) had a third group in his study to whom he taught a lexical item in the learner's first language to illustrate the mechanism of metaphorical extension. However, the use of this lexical item in Mandarin was not found to be as effective as expected in boosting the learning of phrasal verbs using *out*.

In another study, Kalay (2019) reports on the attempt to explicitly teach phrasal verb constructions in the light of conceptual metaphor theory and investigates the relationship between this explicit phrasal verb instruction and the implicit knowledge gains of phrasal verbs. Kalay (2019) found that teaching phrasal verbs explicitly in the light of conceptual metaphors significantly influenced not only the achievement and retention of receptive and productive knowledge of phrasal verbs, but also that the “subconscious lexical recognition and processing as well as semantic priming of phrasal verb knowledge, validates a strong interface position in terms of the lexical aspect of language learning” (Kalay, 2019).

Engagement in Leisure Activities

According to Garnier and Schmitt (2016), frequency in corpus was a predictor of knowledge of phrasal verbs. The more frequent a word, the more likely it is to be known (Schmitt, 2010). Other predictors were time spent reading per week and time spent on social networking per week. Less influential factors on the knowledge of phrasal verbs were the years of BA English study, immersion in the target language environment, or previous English instruction.

The use of additional materials to aid self-learning, such as games and apps, is advisable and contributes to student self-learning. While an ELL should not try to use games and apps alone to learn phrasal verbs, using such tools helps put knowledge into practice in an entertaining way (Bujan Sanchez, 2013).

Gamified Teaching Method

There are several teaching methods used in English learning classes. There is the traditional teaching approach that is teacher-centered, in which the teacher lectures and students are expected to passively receive the knowledge being presented. And there is

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Literature Review 20

the student-centered model where the teacher acts more as a coach or facilitator while students take a more collaborative and active role in their own learning (Lathan, n.d.). Gamified teaching is an example of a student-centered approach. Games in the classroom are supposed to be an enjoyable and fun way for students to practice and use the language learned in the course (Byrne, 1995). Games encourage creative and spontaneous use of language (Chen, 2005) and they provide motivation and lower learners' stress (Grimshaw & Cardoso, 2018). When people approach games, they do so without fear. People usually explore games with great interest while also learning as they go (Houser & Deloach, 1998).

Kijpooonphol and Phumchanin (2018) conducted a study to compare the differences between traditional and gamified teaching methods on the effects of understanding and remembering phrasal verbs, and the student's satisfaction. Both groups, the control group (taught with a traditional teaching method) and the experimental group (taught with a gamified method), were taught with the method for teaching English known as 3Ps or PPP – presentation, practice, and production (Florea, 2011). In addition, the experimental group was taught using a matching game and a search game. The matching game was based on a study by Huyen and Nga (2003) where students, working in groups of five, had to find the correct answers to questions listed in a set of phrasal verb cards. The results supported the findings of the Huyen and Nga (2003) study in which students performed successfully and actively collaborated with one another, even the quiet students. The search game was adapted from a study by Chirandon et al. (2009) and consisted of asking each other questions found in pairs of phrasal verb cards. This game also encouraged communication skills.

In the Kijpooonphol and Phumchanin (2018) study, the students performed relatively well in the search game. This study found that students were more satisfied with the gamified method, which gave students a chance to use their creativity, to interact with their peers and to share their ideas. Students in the experimental group were also able to understand and remember more phrasal verbs after finishing all the lessons.

According to Kijpooonphol and Phumchanin (2018), the matching game was preferable for promoting memorization and communication skills because this game emphasized Flemming's (1995) four modalities of language learning: visual, auditory, reading/writing and kinesthetic learning. The variety of modalities involved in the game could have helped students with different learning styles (Kijpooonphol and Phumchanin, 2018).

Mobile Assisted Language Learning (MALL)

Mobile-Assisted Language Learning (MALL), which provides access to learning without the constraints of place and time, has been the subject of many studies due to its potential benefits. The increased use of mobile technologies to assist in language learning makes learning, testing and reviewing easy (Wu, 2015), has the potential of reducing anxiety (Wang, 2017; Grimshaw and Cardoso, 2018) and has the ability of assisting in vocabulary retention (Chen et al., 2019). Some of the studies that have been conducted to understand the efficacy of MALL methods use mobile games, social media and SMS.

Mobile Game-Based Learning. In a study by Ali Roohani and Maryam Heidari Vinchek (2021), young (around 16 years of age) intermediate level participants received phrasal verb instruction with three different methods: mobile games, social media and classroom-based teaching. The game-based group was taught with a mobile gaming application called Phrasal Nerds: Phrasal Verbs, and the social media participants received instruction via a Telegram channel (explained below under Social Media- and SMS-based Learning). While the study found all methods of instruction to be effective since they all shared some positive and successful features such as interaction, feedback and support, the game-based method was the most influential in learning phrasal verbs (Figure 5).

The learning application of game-based instruction provided a pleasant, non-threatening learning environment which made learning fun. Moreover, the game provided learners with visual aids (pictures) that may have enhanced comprehension. To play the Phrasal Nerd: Phrasal Verbs game, learners could study essential phrasal verbs by going on a space adventure with a character, Alex. The game had 14 stages, each composed of a

study mode (Figure 6), and a quiz mode (Figure 7), and in each class, learners were expected to complete one stage of the game (5 to 12 new phrasal verbs) individually.

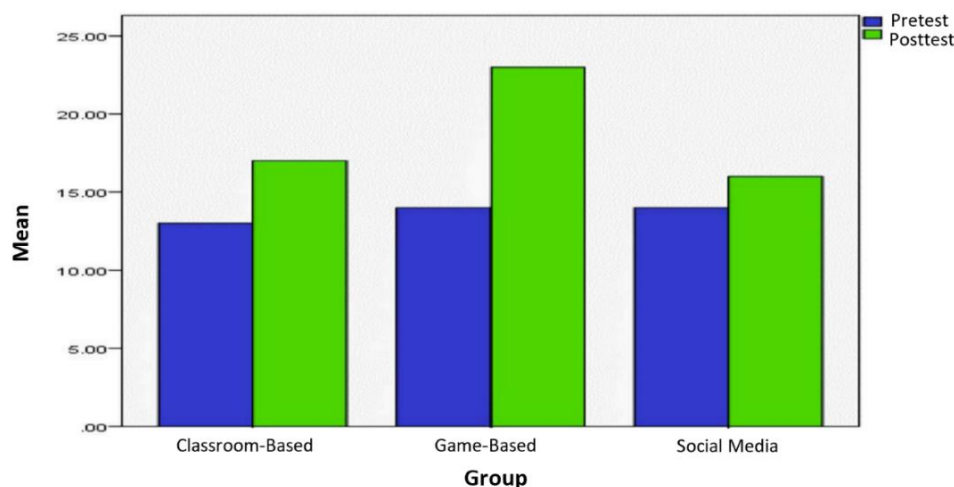


Figure 5. Overall performance of participants in the three instructional groups (Roohani & Vinchek, 2021).

Other studies of game-based instruction have had similar findings. Furio (2015) found that games may have a beneficial effect on language learning by providing motivation and lowering learners' stress. Grimshaw and Cardoso (2018) reported that gameplay could improve oral fluency in language learners while also increasing feelings of comfort with English. Ibrahim (2017) investigated the effect of second language proficiency and gaming experience on the use of the second language by having six Arabic learners play a video game. The data were gathered and evaluated through questionnaires, think-aloud, observations, gaming journals, and interviews. The data analysis revealed that learners' second language proficiency and gaming experience also affected their language learning potential through digital gaming. Dondi and Moretti (2007) found that quiz games fostered factual knowledge, assisted learners in recalling acquired knowledge and, therefore, promoted retention.

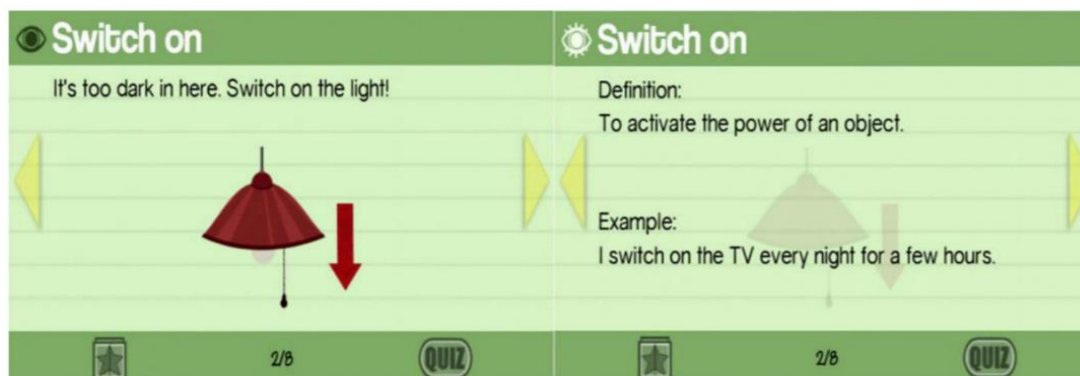


Figure 6. Study mode of Phrasal Nerds: Phrasal Verbs gaming application (Roohani & Vinchek, 2021).



Figure 7. Quiz mode in the Phrasal Nerds: Phrasal Verbs gaming application (Roohani & Vinchek, 2021).

Chih-Ming Chen, Huimei Liu and Hong-Bin Huang (2019) examined the effects of a novel mobile English vocabulary learning app called Phone Words. The game was developed with and without game-related functions in order to examine and compare learner perception and learning performance using both versions of the app. The experiment found that students' acquisition and retention of phrasal verbs were significantly higher in the app using game-related functions, and that this group had

higher feelings of satisfaction and thought the gaming app was more effective for English vocabulary learning.

Based on interview results, the study concluded that the positive effects on learners' vocabulary acquisition were probably due to the competition mechanisms of the app and the gamified assessment features that were perceived as challenging, interesting, interactive, authentic and exciting (Chen et al., 2019). This study also found that the gamified assessment and the ranking of learning peers were very helpful at promoting learners' motivation to learn vocabulary learning. The Phone Word app provided learners with detailed information on each vocabulary term, such as definitions, pronunciations, and example sentences with audio clips. These features can assist learners with correct word pronunciation and spelling and better understanding of the meaning of the words learned (Chen et al., 2019).

The study also found that learners paid attention to several aspects of the application that had game-related functions including interface design, gamified design and content. Learners valued a screen that was used efficiently, with an interface design that led to high interaction and intuitive operation. Well-designed mobile games increase the amount of time learners spend learning vocabulary in their spare time and lead to a strong correlation between learning outcomes and usage time of gamified functions, thus improving vocabulary performance. App participation of learners may also be unintentionally improved by addiction, a feature sometimes associated with gamification. (Chen et al., 2019).

Another study by Grismshaw and Cordoso (2018) investigated the pedagogical use of a mobile game called Spaceteam ESL. The game requires players to communicate orally with clarity and fluency. The study compared low-intermediate students playing this game for 15 minutes as a warm-up activity for six weeks, with a control group who engaged in comparable non-gaming activities. Findings indicated that learners who played Spaceteam ESL outperformed the control group in oral fluency. Spaceteam ESL group participants also had an increased feeling of comfort with English and were able to

practice their pronunciation and receive feedback from peers in a non-threatening manner. Players were not judged for errors and teammates frequently helped one another (Grismshaw & Cordoso, 2018).

Social Media- and SMS-Based Learning. Roohani' and Vinchek' study (2021) (referenced above under Mobile Game-Based Learning), also used the SMS channel, Telegram, to teach phrasal verbs to its participants. Learners were instructed to check the channel outside of the classroom based on a specific timetable throughout a seven-week period. During that time, 101 phrasal verbs, along with their associated definitions and examples (see Figure 8), were delivered to learners. Participants in this group spent the same amount of time and reviewed the same material as the game-based group (referenced above) and the classroom-based group, which was the control group. Roohani' and Vinchek' study (2021) found that the Telegram group underperformed compared to the game-based and the classroom-based groups after the phrasal verb post-test. According to Roohani and Vinchek (2021), the social media group results could have been affected by the lack of structure that would have been provided inside a classroom, by connectivity problems that could have affected learners' performance, or by distractions caused by the phone such as personal chats or calls.

Another study by Pirasteh and Mirzaeian (2015) analyzed the effects of teaching phrasal verbs via SMS to Iranian engineering students. Students received 25 phrasal verbs via SMS and the participants in the control group received the same information in a booklet. The students in the SMS group outperformed the control group participants in the post-test. The students in the control group were expected to read one verb a day with the potential of forgetting to do it, whereas the participants in the SMS group were reminded every day and encouraged to study as they were sent phrasal verbs to their phones every day. In this case, SMS students were provided with conditions for regular study at home every day which in turn lead to more exposure to the target words. This student also found that, through SMS, student learning is flexible in terms of time and

place and that another advantage of SMS learning was that quizzes were marked with immediate feedback.

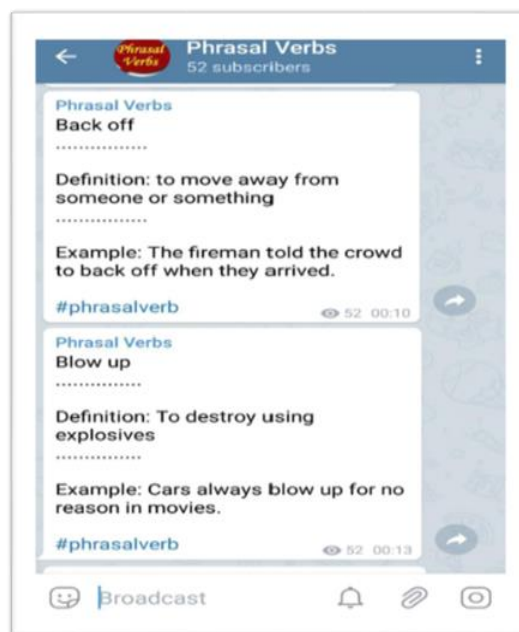


Figure 8. A screenshot of the Telegram channel (Roohani & Vinchek, 2021).

Spaced Repetition in Language Learning

Memorization is probably the most important aspect of learning a foreign language (Pimsleur, 1967). To attain even a minimal proficiency, a student must remember a few thousand words, as well as many processes for adapting and combining them. To help students remember, there might be a certain pattern or schedule of repetitions which is sufficient to raise the student's memory level significantly. To create such a schedule, one must consider several factors such as word length, pronunciation difficulties, and the interaction between this and other words. Thus, the ideal schedule would be personalized to each student, based on the student's progress. According to Pimsleur (1967), his experience and his findings from the field of experimental psychology helped him to develop such a schedule. Pimsleur coined the term "graduated interval recall." He explained that if we were to trace what happens to the knowledge we

just acquired, one could recall, with 100% certainty, a word one second after learning it orally for the first time (noted in graph 1 of Figure 9). However, the probability of remembering this word will decrease rapidly, especially if one continues learning other words. This is shown in graph 2 of figure 9. If we are asked to recall the word at a moment when we still have a good chance (for example, 60%) of remembering it, our knowledge of the word comes back to 100% (shown by another x in graph 3 of Figure 9) because even if we cannot recall the word, we will be reminded of it. At this point, the chances of forgetting the word do not happen as rapidly as before.

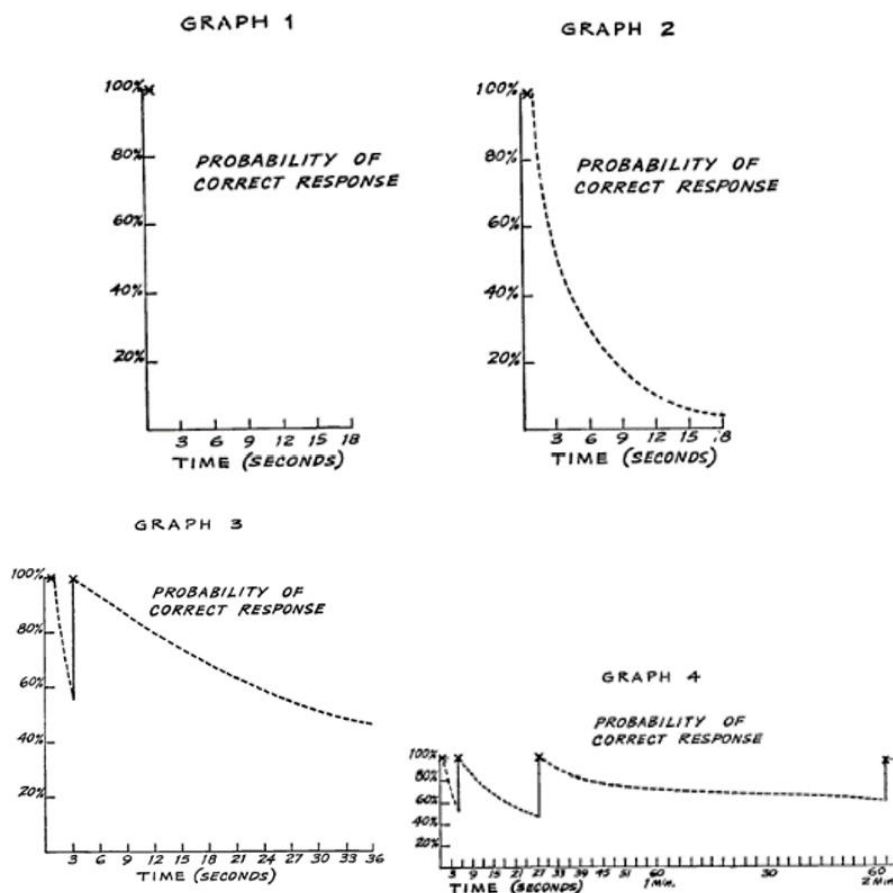


Figure 9. Pimsleur's Graphs of The Probability of Correct Response Recalled Over Time (Pimsleur, 1967).

If we continue to be asked to recall the word when our memory begins to fade, soon the graph will look like graph 4 in figure 9. In graph 4, the x's are getting farther apart. This means that, every time that a word is recalled, one is able remember that word for longer periods of time (Pimsleur, 1967). "This fact –that each time a memory is "boosted" it retains its strength longer than the time before -is the keystone upon which to build foreign language materials" (Pimsleur, 1967).

The length of the interval depends on the difficulty of the word, so all words or structures would have the same schedule. Pimsleur (1967) defined an "ideal" schedule as exponential in form. "That is, if the first interval (between the original presentation and the first recall) is, say, five seconds then next interval may need to come $5^2 = 25$ seconds later, the next one $5^3 = 125$ seconds (2:05) later, the next one $5^4 = 625$ seconds (10:25) after that, and so on" (Pimsleur, 1967). This indicates that students do not need to be frequently reminded of an item after it is first presented, but that the student can concentrate on other activities and recall the item over time with less frequency for each instance. This allows for maximum retention while saving time by eliminating "drumming in" repetition that usually occurs at the beginning of the item introduction (Pimsleur, 1967).

Another study by Cepeda et al. (2008) measured the effect of spacing study sessions on short- and long-term retention and found that "the timing of learning sessions can have powerful effects on retention." (Cepeda et al., 2008). The study revealed that there is not a set study gap that can be recommended for optimal efficiency; instead, it depends on how long one desires to remember something. If a person wishes to retain information for several years, then delaying a review for several months is likely to produce a favorable return on the time invested. On the other hand, a too-short study session gap is likely to produce misleading short-term results of high retention and proficiency that will not survive the passage of considerable periods of time (Cepeda et al., 2008).

Retrieval-based learning, where students are asked to retrieve concepts from memory (e.g., quizzes or brain dumps), as opposed to repeated study sessions, seem to have long lasting effects and promote transfer, inference and knowledge application (Karpicke, 2017). Retrieval practice has been shown to enhance learning of a wide variety of materials for learners of a wide range of ages and ability levels. Roediger and Karpicke (2006) compared retrieval practice to conditions where participants restudied the material and found that retrieval practices enhance retention more than repeated study. To increase retrieval success, learners are provided with more initial retrieval support or with tests shortly after the material has been studied to make retrieval easier. However, evidence suggests initial retrieval success (facilitated by more initial retrieval support) and long-term retention are not the same, and that the level of effort required for retrieval is an essential part of retrieval-based learning. Thus, students who are previously tested with fewer retrieval cues demonstrate substantially greater retention than repeated studying (Carpenter & DeLosh, 2006, Karpicke & Roediger, 2007). In this sense, testing is a powerful instrument to not just assess learning, but to also improve it (Karpicke & Roediger, 2007). These recent studies agree with Plimseur's studies (discussed previously). However, there is still more to learn about how to strike the appropriate balance between retrieval success and retrieval effort. For instance, short answer questions used to be thought to promote better learning outcomes than multiple-choice tests, but other research has questioned such assumptions (Karpicke, 2017). Likewise, expanding schedules of retrieval practice would seem to balance retrieval success and retrieval effort, but the bulk of research has not found expanding retrieval to be a superior form of spaced retrieval, so more research may be needed (Karpicke, 2017).

As discussed in this literature review, ELLs have been able to improve their phrasal verb acquisition using the methods of input enhancement, data-driven learning, picture-elucidation tasks, the theories of event conflation, conceptual metaphor and spaced repetition, gamification and mobile assisted language learning. For this reason, I

will take these learning methods into account while designing the mobile website prototype.

Less Successful Phrasal Verb Learning Methods

Other teaching methods have been judged as less effective and have not been used in creating the prototype for the project. In Liao's study (2019), discussed under the theory of conceptual metaphor, Liao found that using learners' first language to explain the directional verb *chu* (out) before the instruction of *out* senses was not as effective as expected. Sinyashina (2020) analyzed the effectiveness of watching captioned authentic videos for incidental vocabulary learning compared to two other groups: a group learning new vocabulary intentionally during a one-hour classroom session, and a control group used as a reference. The incidental group was asked to watch five hours of the show *Big Bang Theory* at leisure while the intentional group was given three vocabulary tasks involving the target words during the one-hour teaching lesson. This study found that viewing five hours of captioned authentic videos is not as effective as one hour of intentional learning. According to Lin and Siyanova-Chantutia (2014), Chen et al. (2018), and Suarez and Gesa (2019), participants' proficiency level is one of the most crucial factors affecting language and vocabulary learning through watching captioned authentic videos. This type of learning can be too challenging for beginner and intermediate ELLs while being a more appropriate way to learn new vocabulary for learners with higher linguistic competence (Chen et al. 2018). Since this research is aiming to serve a population of ELLs at the intermediate level, it can be established that this approach is not applicable to such a population.

Other methods that are mentioned in existing research are the use of dictionaries and mobile applications. As dictionaries are meant to be informative, and mobile applications are usually very basic, English learners cannot try to learn phrasal verbs just by using either of them. However, dictionaries and mobile applications are useful for clarifying doubts and putting knowledge into practice in an entertaining way, respectively (Bujan Sanchez, 2013). The present literature review is meant to be a preliminary step to

a mobile website design and development, but it is important to keep in mind that while a mobile website is a useful and entertaining way to learn phrasal verbs, learners should not expect to use this method alone to master English phrasal verbs.

In 2019, Ufuk Girgin conducted a study about the effectiveness of using corpus-based activities on Turkish upper-intermediate level teacher candidates' learning of phrasal-prepositional verbs. He wanted to know if six hours of instruction via corpus-based activities were effective at helping the students recognize and understand the forms of the phrasal verbs, their metaphorical meanings, and if the study could help participants construct the correct forms of the phrasal verbs to use them while paraphrasing. This study found that corpus-based activities were effective at teaching learners the structures of phrasal verbs in two dimensions (for example, form and use). However, learners were not able to understand the metaphorical meanings of the phrasal verbs. This study also helped prove that learning the metaphorical meanings of phrasal verbs is incredibly challenging for ELLs. However, it is important to keep in mind that this study only taught students for six hours, which may not be enough time to teach metaphorical meanings (Girgin, 2019).

Selecting Phrasal Verbs to Teach on the Mobile Website

The next major question to be answered before beginning to design the prototype for teaching phrasal verbs is to identify which phrasal verbs should be included. The importance of learning phrasal verbs was previously stated, and it is increasingly more evident that phrasal verbs require more teaching attention. However, there exist thousands of phrasal verbs in English, so the question becomes what phrasal verbs to focus attention upon (Garnier, 2015). Even though there are phrasal verb lists available (Gardner and Davies, 2007; Liu, 2011), they do not account for the highly polysemic nature of phrasal verbs (Garnier, 2015). In response to this need, Garnier (2015) developed the PHrasal VERb Pedagogical List (PHaVE List) with 150 of the most frequent phrasal verbs that provides information on their key meanings. This list covers more than 75% of the occurrences in the Corpus of Contemporary American English

(COCA) (Garnier, 2015). On average, two meanings account for at least 75% of all the occurrences of a single phrasal verb in the COCA. The PHaVE list ranking these 150 phrasal verbs in order of frequency appears in Appendix D.

Previously, under the Theory of Event Conflation section, it was explained that using corpus-based research and such learning theory, Spring (2018) created a comprehensive yet concise list containing 15 phrasal verb particles that explain approximately 95% of common phrasal verb meanings. This list, along with the PHaVE list, is an excellent starting point for selecting the appropriate verbs to teach on the phrasal verb mobile website. Okamoto's findings (2015) validate the use of the aforementioned PHaVE list and the Spring (2018) phrasal verb particle list for selecting verbs to use in the phrasal verb mobile website. It is important that the selected verbs be valuable not only for understanding reading materials but also for verbal communication with native speakers.

Target Population for the Mobile Website

The introduction of phrasal verbs to students takes place in the high-intermediate level since there are relevant grammatical concepts that students do not usually learn until upper-intermediate or advanced levels. It is important, then, to make a distinction between starter, intermediate and advanced learners regarding the specifications of multi-word verbs and the differences between them (Bujan Sanchez, 2013).

Some studies have found that ELLs tend to avoid phrasal verbs, especially those with idiomatic meaning (Liao and Fukuya, 2004; Dagut and Laufer, 1985; Hulstijn and Marchena, 1989). Liao and Fukuya (2004) found that students at the intermediate level tended to avoid phrasal verbs more often than advanced-level students. Additionally, in this study, native speakers (control group), advanced and intermediate level students all favored literal phrasal verbs over figurative verbs regardless of their proficiency level (Liao and Fukuya, 2004). The studies concluded that as proficiency increases, students tend to be more willing to use phrasal verbs.

Some studies show that students in verb-framed languages, such as Japanese, tend to have extreme difficulty acquiring the patterns of a second language of a different type, such as the satellite-framed language of English (Inagaki, 2002; Spring & Horie, 2013). For example, Inagaki (2002) showed that Japanese ELLs frequently confuse motion expressions for location expressions in English.

Given the difficulties and avoidance of phrasal verbs by intermediate level ELL students, the presentation of phrasal verbs should be attractive and entertaining, when possible, to avoid the typical students' unwillingness towards them and make them interesting to learn. Moreover, it is important to introduce a small selection of phrasal verbs at a time, focusing more on the particles than on the lexical verbs. Working with a diverse set of activities and encouraging students to use phrasal verbs every day are two ways to improve learning of phrasal verbs (Bujan Sanchez, 2013).

Conclusion

Phrasal verbs are an inevitable part of everyday English. Being able to use and understand phrasal verbs helps ELLs sound more natural and communicate better in English. It also takes them a step closer to English fluency. There are several techniques that have been proven effective for teaching phrasal verbs to ELLs and that can be used on the mobile website I intend to design for teaching phrasal verbs to ELLs. These include input enhancement, data-driven learning, picture elucidation, event conflation, conceptual metaphor, gamification, and social media.

Input enhancement helps students notice phrasal verbs which in turn aids in the acquisition process. This is particularly important since the first step in acquiring phrasal verbs is being able to notice them. Once students are aware of the phrasal verb they will be learning, other techniques discussed in this review are proven to be effective in helping students understand and become proficient using phrasal verbs.

In picture elucidation tasks, learners use discovery to find common attributes between a group of concrete and abstract images strengthening their association and retention of the verb senses that are less evident. The theory of event conflation helps

explain the polysemy of phrasal verbs and can also help ELLs deduce the meaning of phrasal verbs that follow a pattern and use the same adverbial particle. With the theory of conceptual metaphor, learners can build upon their knowledge of the word and understand the more abstract senses of phrasal verbs.

To help learners remain motivated and take a more active role in their own learning process, gamified teaching can be used as a powerful tool. Games lower learners' stress and encourage students to use their creativity, interact with peers and share their ideas while using the target language. Furthermore, gamified learning promotes memorization aiding the long-term retention of phrasal verbs. Mobile game-based learning has been shown to be especially influential in acquisition and retention of phrasal verbs and increasing the learners' satisfaction. In the study by Chen et al. (2019), learners favored a gamified learning application that made efficient use of the screen, and that was highly interactive and intuitive. A well-designed mobile game increases the amount of time learners spend learning vocabulary in their spare time and leads to a strong connection between the time learners spend using gamified functions and the increased vocabulary performance.

Other methods that have been studied for teaching phrasal verbs, but that have been found to be less effective, are social media- and SMS-based learning, data-driven and corpus-based learning and task-based teaching, direct translation, watching authentic videos, and using dictionaries. These methods have not been incorporated into the mobile website designed for this project—except for the dictionary, which was later requested by test participants (see Chapter 4).

Even mobile applications are to be used with caution. A mobile application, such the one I intend to develop for learning phrasal verbs, is not to be used as the sole resource to learn phrasal verbs. Instead, mobile applications must be used as a tool to practice and enhance comprehension of phrasal verbs. It is important for learners to acquire phrasal verbs from a variety of contexts such as live classes, leisure reading, and culture immersion.

It is also important to keep in mind that in order to improve the learning of phrasal verbs, they must be introduced with a small selection of phrasal verbs at a time, focusing more on the particles than on the lexical verbs. Traditionally, phrasal verbs have been taught by focusing on the verbs rather than the particles.

Learners should also work with a diverse set of activities and should be encouraged to use phrasal verbs every day (Bujan Sanchez, 2013). To help with the ability to remember phrasal verbs long-term, students should be asked to retrieve phrasal verbs over time, each instance of retrieval occurring with less frequency. Thus, quizzes become a valuable tool not only to assess learning, but to increase long-term retention of phrasal verbs.

Finally, Garnier's (2015) word list along with Spring's (2018) list of phrasal verb particles was used as a starting point for the selection of the phrasal verbs in the mobile website application I plan to develop, in order to select verbs that are meaningful to learners so that they can use them in their everyday lives.

Chapter 3: Methods

I implemented interaction design and user research methodologies with intermediate to advanced English language learners (ELLs) to help me answer my research questions (What are the common phrasal verbs that ELLs find most difficult to learn? What do intermediate or advanced ELLs value in a phrasal verb mobile website interface and believe will help them stay engaged in their learning of these verbs?). These processes allowed me to obtain actionable user insights that could be translated into website features aimed at helping ELLs acquire and retain phrasal verbs.

I started the website development process by testing ELLs' knowledge of phrasal verbs with a user survey, then I learned about ELLs' pain points of phrasal verbs through in-depth user interviews. To discover what options were on the market for learning phrasal verbs I did a competitor analysis. With all that information gathered, I created a prototype of the phrasal verb mobile website that I then tested iteratively with ELL participants.

The first step was to survey ELLs to find out which common phrasal verbs were the most likely to be misunderstood. Fifty participants were asked 24 multiple-choice questions to test their knowledge of how to use and understand phrasal verbs successfully (see survey questions in Appendix E).

I then conducted six in-depth interviews with ELLs to talk about their process for learning phrasal verbs and their prior experiences with learning and being exposed to phrasal verbs. These interviews helped me better understand the learning needs of intermediate and advanced-level ELLs. This preliminary user research was followed by a competitor analysis examining other websites and mobile applications designed to teach phrasal verbs, along with a consideration of a few additional game apps for design inspiration (aesthetic and interactional). Thus, inspiration for my website user interface came from features that I liked from other learning and game applications as well as phrasal verb learning tools.

The next step was to design and build a prototype. This occurred in two stages—first, I sketched a complete paper prototype which was reviewed for clarity and flow. Then, I built a higher-fidelity electronic prototype for actual user testing.

The final step was to perform iterative usability testing and refinement using the Rapid Iterative Testing Evaluation (RITE) method (Medlock, et al., 2002) on the electronic prototype with eight participants. The user survey helped me determine what phrasal verbs would be most appropriate for inclusion in the prototype.

Recruiting

Participants for the study came from diverse sources. I contacted several language schools and visited some classrooms hoping to find participants but had little success. It seemed as if English learners were hesitant to participate in a study conducted in English. Not even the incentive I offered or the fact that the interview was conducted remotely seemed to motivate them to participate. I had more success recruiting participants who already knew me from previous studies and through connections I had with the Literacy Council of Frederick County and with old colleagues from my former career as an ESL instructor.

Participant demographics

Fifty participants were recruited for the initial survey. Some of the survey participants were then invited to participate in the discovery interviews and in the prototype testing sessions. There were only two participants in the prototype testing who did not previously participate in the phrasal verb survey.

Table 1 shows the demographics for the 26 survey respondents.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: Methods

38

Table 1

Survey Participant Demographics.

Participant Characteristics	Survey Respondents	
	n	%
<i>Age</i>		
Under 18	0	0
18-24	5	19
25-29	9	35
35-44	9	35
45-54	2	8
55-64	1	4
65+	0	0
<i>Gender</i>		
Female	14	54
Male	12	46
Other	0	0
<i>Education</i>		
Less than high school degree	1	4
High school degree or equivalent (e.g., GED)	4	15
Vocational or Similar	3	12
Some University but no degree	5	19
University - Bachelor's degree	12	46
Graduate or professional degree (MA, MS, MBA, PhD, Law Degree, Medical Degree etc.)	1	4
Prefer not to say	0	0
<i>Language Group</i>		
Arabic, Bengali, Catalan, French, Hebrew, Hindi, Italian, Japanese, Korean, Persian, Portuguese, Punjabi, Romanian, Russian, Spanish, Tagalog, Turkish, Urdu.	20	77
Afrikaans, Chinese, Danish, Dutch, Frisian, German, Greek, Icelandic, Luxembourgish, Norwegian, Scots, Swedish, Vietnamese, Yiddish.	4	15
Other, Hungarian	1	4
Other, Swahili	1	4

User Survey

It was especially important that the phrasal verb mobile website contain verbs that are experienced as challenging, so that the learning experience offered by the mobile website is useful for ESL intermediate or advanced learners. Considering Garnier's (2015) list of most common phrasal verbs that are itemized in order of frequency of use (see Appendix D), I selected 24 verbs from the beginning of the list and conducted a survey with 50 participants to identify the phrasal verbs that are most difficult to learn for ELLs from those highly used phrasal verbs on the list. I asked participants to identify the correct meaning of those 24 phrasal verbs in a multiple-choice question format. The questions included selecting the correct verb particle, selecting the correct meaning, or selecting the picture that most closely resembled the meaning of the phrasal verbs used within a sentence. I also asked participants to voluntarily complete demographic information questions (native language, gender and age range). The estimated time to complete the survey was less than 10 minutes.

My initial goal for the survey was to recruit 50 participants. To reach that number, I advertised the survey in person and online. I advertised in online ESL Facebook communities, I sent direct links to the survey to heads of ESL schools asking them for permission to distribute it to their high intermediate and advanced student population, and I also distributed fliers to personal contacts who were ESL teachers. In addition, I advertised my survey on a UX research Facebook group. Unfortunately, after I had included and paid 50 respondents, my data analysis exposed serious problems with the data. It was clear that some participants had taken the survey more than once, in order to obtain the survey incentive. It was also clear that some participants were either extremely advanced English Language Learners, or, more probably, native speakers of English. After cleaning the data, I was left with 26 valid survey responses.

User Interviews

To better understand intermediate or advanced-level ELLs' needs while learning phrasal verbs, I performed six remote user interviews using Zoom to understand the

perspective of users on their experiences learning phrasal verbs. Part of the interview explored any previous experiences they had had learning phrasal verbs with the help of technology. Participants consisted of adult English learners from the United States, Colombia and Botswana. The findings from my initial literature review and these user interview findings were used to guide the design of the phrasal verb mobile website in terms of user interface and teaching methods.

With the user interviews, I wanted to understand how ELLs learn phrasal verbs in their daily lives, what their goals are with respect to learning phrasal verbs and what were the ELLs pain points in learning phrasal verbs through apps or websites (see Appendix E for the user interview questions).

I recruited six participants for my discovery interview sessions. Participants were adults ranging in ages from 18 to 64 years old. Of the six participants, two were taking conversation classes at the Literacy Council of Frederick, one had recently stopped taking ESL classes in Baltimore county, another was a future Computer Science student from Botswana living in Dallas, and the last two participants were bilingual adults at a high intermediate level currently living in Colombia, South America, who wanted to improve their English because of their constant need to use the language for business meetings with people from the US.

Competitor Analysis

Using an iPhone device, I browsed the Apple store looking for phrasal verb applications on the market. I used the search terms “phrasal verbs” and scanned the results to find the phrasal verbs apps that were intended to teach phrasal verbs to ELLs. To avoid hindering my creativity on designing my phrasal verb website from the information I learned from the user interviews, I made sure to jot down my ideas before exploring the competitors apps. Once I downloaded the competitors’ phrasal verb apps, I studied them in terms of pedagogical methods and user interface (UI) design.

Prototype Creation

To create the phrasal verb mobile website prototype, I started by sketching the screens on paper. Paper prototyping helped me to quickly realize my ideas without the constraints of digital devices and to concentrate on creating content without getting distracted with digital UI design. It was easy to put my ideas quickly on paper. Once I was happy with the contents of the sketches, I created the digital prototypes that I then used during the iterative testing. Figure 10 shows the landing screen of my paper and digital prototypes.



Figure 10. Paper and digital prototype of the phrasal verb website landing screen.

Iterative Prototype Testing

After creating a high-fidelity prototype of my website, I did user testing to understand the viability and ease of use of the prototypes. There were eight remote, moderated sessions of user testing. Following the RITE method, improvements were made to the prototype after each session. Participants of the usability study were selected from the pool of participants who took the phrasal verb survey. Four participants were students from ESL programs in Maryland, along with two English learners living in

Colombia (who had also participated in the discovery interview sessions) and two recent ESL students from Baltimore County.

Analysis

Quantitative

The bulk of the data from this study was qualitative. However, I did perform an item analysis (Thompson, 2017; Ivanova & Voynikova, 2021) of the phrasal verb test in the survey to evaluate the effectiveness of the items or questions in the test. The two principal measures that I used in this item analysis were item difficulty and item discrimination (Thompson, 2017; Ivanova & Voynikova, 2021). The item difficulty in the phrasal verb test was the percentage of participants who answered a phrasal verb question correctly. The item discrimination measured how well a phrasal verb question distinguished between those with more phrasal verb skills from those with less phrasal verb skills. The measure I used for item discrimination was the discrimination index (Thompson, 2017; Ivanova & Voynikova, 2021). I also calculated the Cronbach Alpha coefficient (Yu, 2020) which measures the reliability of a set of survey items.

Qualitative

To analyze the qualitative data gathered during the study, I used an empathy map to capture notes from the discovery interview (Brown, 2018) and a capture grid for information collected during the prototype testing (Dam & Siang, 2022). I then proceeded to synthesize the raw data into actionable insights.

The empathy map (Brown, 2018) helped me organize the information I collected during the discovery interviews. After reviewing the information collected in all interviews, I formed clusters of similar information and looked for patterns. I was able to synthesize the information into ELL needs and goals and use those insights to include certain features during the design of the phrasal verb website. Figure 11 shows the empathy map for Carlos, one of my interview participants.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Methods

43

To analyze the feedback from the prototype testing sessions, I used the feedback capture grid method (Dam & Siang, 2022) to collect the likes, criticisms, questions and ideas the participants shared during the testing session (see Figure 12).

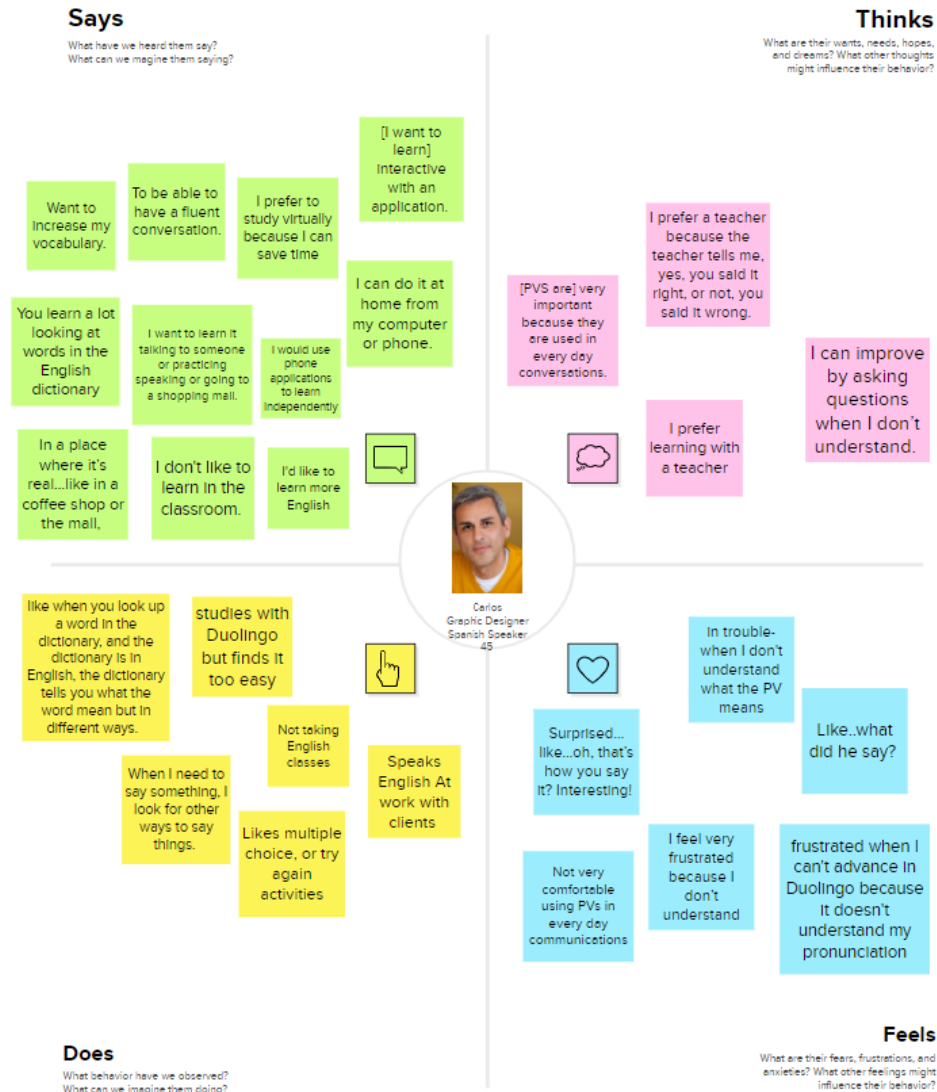


Figure 11. Empathy map from in-depth interview (Empathy Map Template from <https://app.mural.co>).

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: Methods

P1 - Carlos - Age 45-54

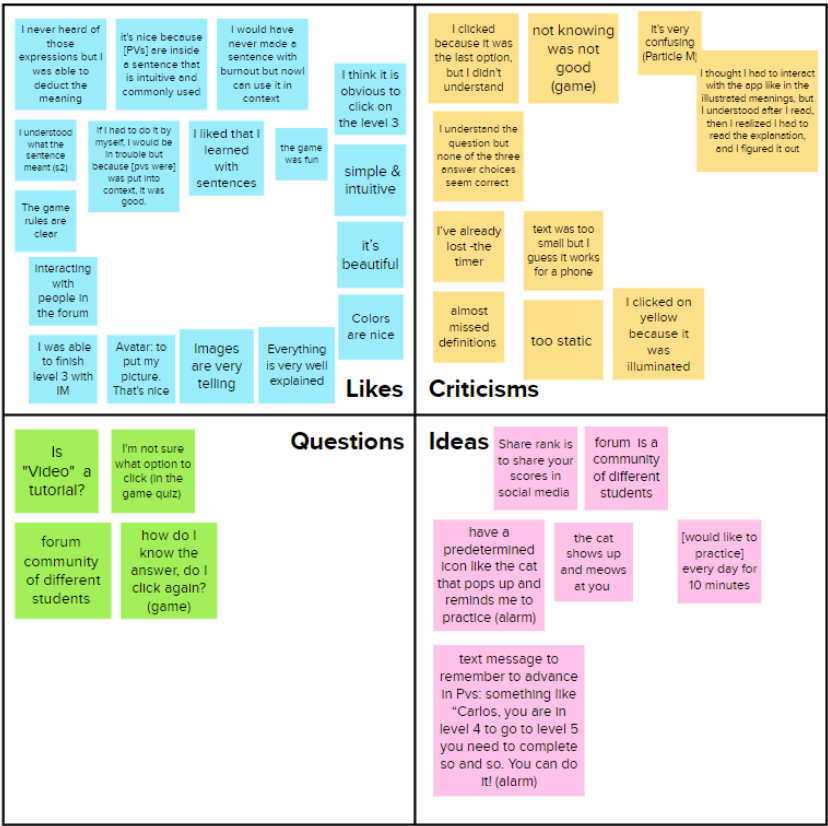


Figure 12. Capture grid from prototype testing (Dam & Siang, 2022).

Chapter 4: Findings

To analyze my study findings, I first discuss the results of the phrasal verb survey. I then go over the discovery interview findings and how they help me define the phrasal verb website user needs. I then look at some of the options for learning phrasal verbs in the market and the mobile apps I used as inspiration to craft my mobile website design. Finally, I discuss my findings from the prototype testing session and how those findings shaped my website design.

Phrasal Verb Survey

The main purpose of the survey was to find out which of the verbs tested were the most challenging for ELLs, in order to maximize the usefulness of the mobile website.

I originally had 24 multiple-choice questions in the surveys where participants chose the most appropriate phrasal verb meaning of a phrasal verb in each sentence. Questions 1 through 10 asked participants complete the sentence with the correct phrasal verb, Questions 11 through 20 asked participants to select the meaning of the phrasal verb in bold type. Questions 21 through 24 asked participants to choose a picture that best described the phrasal verb in bold (see Appendix C).

As mentioned in Chapter Three, analysis of the survey data exposed some problems in the quality of the data. Upon close examination of the participant information, I realized some names were repeated but had different email addresses. Other respondents correctly responded all the answers to the multiple-choice phrasal verb questions, which could indicate three things: their level of English was too high to need phrasal verb teaching, they were native English speakers, or the test questions were too easy for high-intermediate or advanced students. I began to suspect outright participant fraud when I interviewed one participant from the survey pool and found discrepancies in the information he provided during the interview. His English accent also sounded native. Unfortunately, by posting the invitation to take the survey on a public Facebook UX Research group, I obtained an immediate response but also invited fraud by participants who wished to receive the survey incentive (US \$7).

To resolve these data quality issues, I removed all participant names that were repeated and those who claimed English as their first language in the survey screening questions. I was left with 26 participants. However, there is no way of knowing if the remaining responses were legitimate. Given this limitation and the resulting small survey sample size, the results of the survey must be analyzed with caution.

I also decided to exclude one of the survey questions. This question had two pictures that could potentially be selected as the correct answer, and thus it could have caused confusion to participants. I analyzed the remaining 23 questions. Figure 13 shows a histogram with the total incorrect responses from the phrasal verb survey. The graph shows that 100% of participants correctly answered the questions with phrasal verbs *pick up* and *go out* and most missed the questions with *look up* and *take out*. At a first glance, it seemed that the phrasal verb survey was not causing too much difficulty to participants. However, to analyze question difficulty, I found the item difficulty index (Df) (Thompson, 2017; Ivanova & Voynikova, 2021).

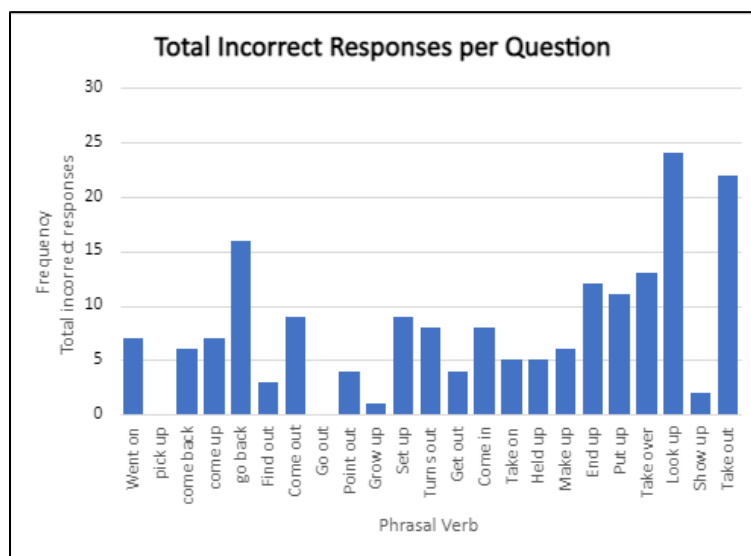


Figure 13. Frequency of phrasal verbs identified incorrectly in the phrasal verb survey.

Were some phrasal verbs easier than others for ELL's?

To answer my survey research question, I started by calculating the difficulty of each question. I did that by finding the percentage of the sample that answered the question correctly. This metric takes a value between 0 and 1. High values indicate the question is easy and low values indicate it is difficult. I used the general guidelines provided by Thomson (2017) for a stereotypical educational or knowledge assessment with four or five multiple choice items. See Table 2 for Thomson's guidelines for item difficulty. Table 3 shows the survey results with color codes indicating the levels of item difficulty based on Thomson's guidelines.

Table 2

Question Difficulty Color Coded and Separated into Levels.

Question Difficulty (Df)	Interpretation & Color Code	Note
0.9 - 1.0	Very easy	These items are mastered by most examinees; they are too easy to provide much info on examinees though and can be detrimental to reliability.
0.7 - 0.9	Moderately Easy	These are the most common range of items on most classically built tests; easy enough that examinees rarely complain.
0.5 - 0.7	Moderately difficulty	These items are common, and a little on the tougher side.
0.3 - 0.5	Very Difficult	Items in this range will challenge even top examinees, and therefore might elicit complaints, but are typically very strong.
0.0 - 0.3	Extremely difficult	Examinees are at chance level or even below, so your item might be miskeyed or have other issues.

Note: From “What is classical item difficulty (P value)?” by N. Thompson, 2017, Assessment Systems. <https://assess.com/classical-item-difficulty-p-value/>. Reprinted with permission.

Table 3 shows the total scores of all participants who took the survey test for each phrasal verb question and the question difficulty with the color code. After observing the

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings 48

color coding of the quiz results per question, I realized that the test was too easy for this sample of participants, since many questions (57%) fell in the very easy or easy category.

Table 3

Survey Quiz Verbs, Scores and Question Difficulty Value.

Phrasal Verb in a Question	Total Correct Responses per question	Total Incorrect Responses per question	Question Difficulty (<i>Df</i>)
Pick up	26	0	1.00
Go out	26	0	1.00
Grow up	25	1	0.96
Show up	24	2	0.92
Find out	23	3	0.88
Point out	22	4	0.85
Get out	22	4	0.85
Take on	21	5	0.81
Held up	21	5	0.81
Come back	20	6	0.77
Make up	20	6	0.77
Went on	19	7	0.73
Come up	19	7	0.73
Turns out	18	8	0.69
Come in	18	8	0.69
Come out	17	9	0.65
Set up	17	9	0.65
Put up	15	11	0.58
End up	14	12	0.54
Take over	13	13	0.50
Go back	10	16	0.38
Take out	4	22	0.15
Look up	2	24	0.08

It is suggested by popular consensus that tests include a mix of difficulty levels. A few that are very difficult, some difficult, some moderately difficult and a few easy (Tobin, n.d.). In that regard, the phrasal verb survey was well balanced with only a few

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings

49

very easy and very difficult questions and a well-proportioned mix of moderately difficult and moderately easy questions.

Next, I calculated the item discrimination to measure how well each phrasal verb survey question distinguished between ELLs with more knowledge of phrasal verbs and those with less knowledge. The maximum total score on the test was 20 correct answers and the lowest score was 10. I calculated the discrimination index by selecting two groups: a high skill group consisted of ELLs who scored in the top 33% (scores between 20 and 17.3 and coded with green color) and a low skill group (scores between 10 and 13.6 and coded with blue color) (See Table 4). There were 13 participants in the high skill category and seven participants in the low skill category.

Table 4

Participant Survey Results Sorted by Skill Level.

Participant	Went on	Pick up	Come back	Come up	Go back	Find out	Come out	Go out	Point out	Grow up	Set up	Turns out	Get out	Come in	Take on	Held up	Make up	End up	Put up	Take over	Look up	Show up	Take out	Total Score	
9	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	0	20	
10	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	0	20	
20	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	20	
21	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	20	
13	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	0	19	
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	0	19	
16	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	19	
19	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	0	18	
5	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	1	0	1	0	18	
7	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	18	
8	1	1	1	1	1	1	0	1	1	1	0	0	1	1	1	1	1	1	1	1	0	1	0	18	
17	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	18	
22	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	18
18	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	1	0	17
12	0	1	1	1	1	0	1	1	1	1	0	0	1	1	1	1	1	0	0	1	1	1	0	16	
4	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	1	1	1	0	0	0	0	1	0	15
25	0	1	1	1	1	0	0	0	1	1	1	1	1	1	0	1	0	1	0	0	1	1	1	15	
11	1	1	0	0	1	0	1	1	1	1	0	1	0	1	1	1	1	0	0	0	0	1	1	14	
23	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	0	0	0	1	0	14
6	1	1	1	0	0	0	0	1	1	1	1	0	1	1	1	1	1	0	0	0	1	0	1	0	13
15	1	1	1	1	0	1	1	1	1	1	1	0	0	0	1	1	1	0	0	0	0	0	1	0	13
24	0	1	0	0	0	0	1	0	1	0	1	1	1	0	1	1	0	1	1	0	1	0	1	0	12
1	0	1	0	0	1	0	0	0	1	0	1	0	1	1	0	1	1	0	1	0	1	0	1	12	
3	0	1	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	10
2	0	1	1	1	1	1	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	1	10
26	0	1	1	0	0	1	0	1	0	1	1	1	1	0	0	0	0	0	0	1	0	1	0	1	10

The discrimination index (d) takes values between -1 and $+1$. Values close to $+1$ indicate that the question does a good job discriminating between high performers and low performers. In this case, the highest d values were for the questions related to the verbs *pick up* ($d = 0.71$), *end up* ($d = 0.70$) and *put up* ($d = 0.78$), which means that those three questions did a good job discriminating between ELLs with more phrasal verb skills and with lower phrasal verb skills. Values near zero indicate that the question does a poor job discriminating between high and low performers. In this case, *go out*, *take on* and

come back had d values of zero. This indicates that these question results were not significantly different among the low and high skilled ELLs.

Values near -1 indicate that items tend to be answered correctly by those who perform worst and incorrectly by those who perform best on the overall test. That was the case for the phrasal verbs *went on* ($d = -0.24$), *go back* ($d = -0.14$) and *look up* ($d = -0.43$). It is typically recommended that the discrimination index be at least 0.15 (Tobin, n.d.), so I can assume that the majority of the questions on the phrasal verb survey were able to discriminate between ELLs who had higher knowledge of phrasal verbs between those who did not. Table 5 show the discrimination index calculated for each phrasal verb survey test question.

The last measure I calculated was the Cronbach's Alpha coefficient which evaluates the internal consistency of the phrasal verb survey test (Nunnally, 1978 & Yu, 2020).. This is a measure of squared correlation between observed scores and true scores. This means that the observed score is equal to the true score plus the measurement error. For example, a learner who only knows 70% of the phrasal verbs obtains a score is 75% because of lucky guessing. Her observed score is 75 but her true score is 70. The additional 5 points are due to measurement error. Therefore, to verify that my test was reliable, I used the Cronbach's Alpha correlation. In general, the higher the Alpha coefficient, the more reliable the test is, and usually 0.7 and above is acceptable (Nunnally, 1978 & Yu, 2020).

To calculate the Cronbach's Alpha coefficient (α) for my phrasal verb survey test, I used Equation 1 (O'Loughlin, 2020) below.

$$\alpha = \left(\frac{k}{k-1} \right) \left(\frac{S_y^2 - \sum S_i^2}{S_y^2} \right) \quad (1)$$

Where k is the number of questions ($k = 23$), S_y^2 is the sample variance or variance of the total test scores ($S_y^2 = 11.36$) and $\sum S_i^2$ is the sum of the individual variances or the sum of the variances for each question on the test ($\sum S_i^2 = 3.73$).

Plugging these values in Equation 1 (see Equation 2), I obtained the Cronbach's Alpha coefficient of $\alpha = 0.7$.

$$\alpha = \left(\frac{23}{23-1} \right) \left(\frac{11.36-3.73}{11.36} \right) \quad (2)$$

Table 5

Phrasal Verb Survey Test Question Discrimination Index (d).

Phrasal Verb in a Question	Discrimination Index (d)
Pick up	0.71
Go out	0
Grow up	0.49
Show up	0.64
Find out	0.18
Point out	0.29
Get out	0.48
Take on	0
Held up	0.57
Come back	0
Make up	0.42
Went on	-0.24
Come up	0.29
Turns out	0.86
Come in	0.29
Come out	0.49
Set up	0.57
Put up	0.70
End up	0.78
Take over	0.19
Go back	-0.14
Take out	0.29
Look up	-0.43

According to this result, I assume that the phrasal verb survey test is a reliable measure of the ELL survey participant' phrasal verb knowledge. However, since

Cronbach's Alpha is subject to the internal relatedness of item responses and the number of items in the scale (Nunnally, 1978 & Yu, 2020), this assumption must take into consideration that the phrasal verb survey test had a low number of questions ($k = 23$) and each verb was only evaluated once in the test.

Overall, it appears that the phrasal verb survey test was a well-balanced test in terms of question difficulty, and it reliably measured ELLs knowledge of phrasal verbs. That means that, even though the test included very common phrasal verbs, it is important to incorporate all those verbs in the mobile website to make sure the website fulfills the needs of all ELL users. This is also an indication of the importance of an adaptive learning experience so that ELLs do not have to go through lessons of phrasal verbs they already know unless they so desire.

In-depth Interviews of English Language Learners

I then conducted six in-depth discovery interviews in order to understand participants' prior experiences with learning phrasal verbs. I recruited ELL participants by reaching out to nearby institutions such as the local literacy council and community college and by getting in touch with some participants from some of my previous user research studies. The interview script can be found in Appendix E. I created an empathy map (Brown, 2018) for each of my six participants (see Appendix F). I then synthesized the qualitative data I collected by grouping information to find patterns in behaviors, thoughts, feelings, and desires (see Figure 14).

I grouped my data into the following eight categories:

- Goals for learning phrasal verbs.
- Challenges communicating in English.
- Reasons for learning phrasal verbs.
- Logistics of learning English.
- Preferred pedagogical methods of learning phrasal verbs.
- Participants' English learning journey.
- Feelings towards being an ELL.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings

53

• Perceptions of the behaviors of others around ELLs.

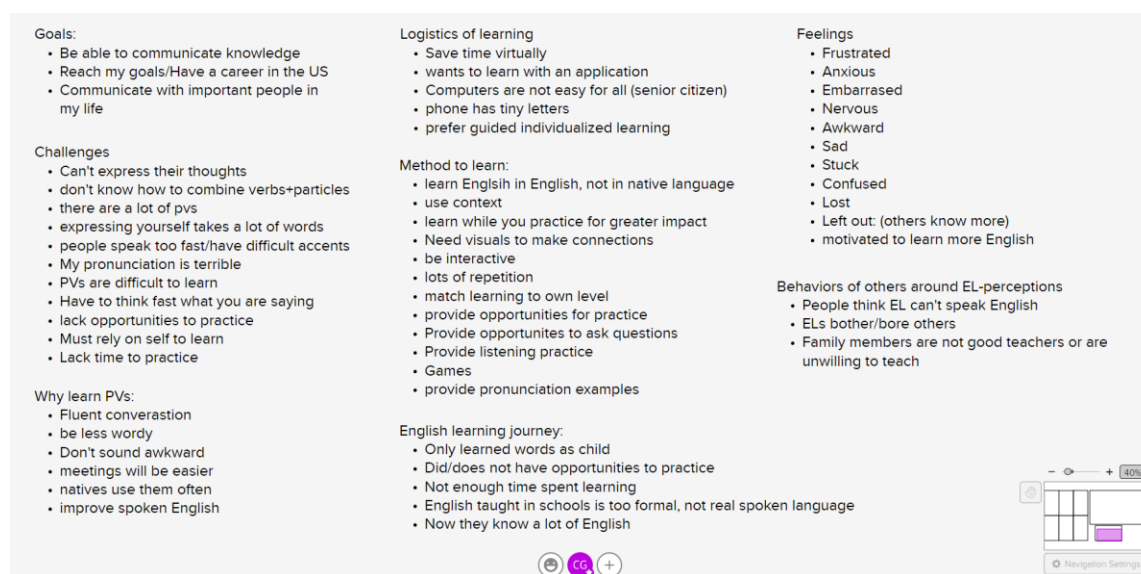


Figure 14. Findings from in-depth interview empathy mapping.

Goals for Learning Phrasal Verbs.

ELLs see their English skills as a barrier to reaching their professional and personal goals. If living in the US, ELLs need to have fluent conversations in English to improve meaningful relationships with others. They also need to be fluent in order to join US schools, get better jobs, or improve their quality of life in the US. When living in other countries, ELLs need to have fluent conversations in English in order to facilitate business transaction with English speakers who come from the US or to improve their traveling experiences to the US or to other English-speaking countries. ELLs who see the need to use the English language to reach their goals are thus very motivated to learn English.

Challenges Communicating in English

Because phrasal verbs are very difficult for ELLs to understand and produce, they instead use circumlocution to express their ideas which can make conversations difficult to understand. ELLs understand that phrasal verbs are often used in conversations, but they do not know how to properly combine these verbs and particles.

Logistics of Learning English

Adult ELLs prefer to have a guided and individualized learning experience, and given their busy lives, they prefer to learn virtually rather than in-person. However, senior ELLs often do not feel very comfortable with technology, and they are concerned about the very tiny letters on phones, so they are likely to be more comfortable using a computer screen. Thus, a website optimized for mobile use but accessible by computer is the best solution.

Preferred Pedagogical Methods of Learning Phrasal Verbs

Given their high intermediate or advanced English ability, ELLs who are ready to learn phrasal verbs prefer to learn English with English instructions and explanations and find that applications that use their native language to teach them English are ineffective and confusing. They prefer to learn through context with every day, mundane life situations. They also want opportunities for practicing their English skills and prefer visuals and interactive learning as a way to make connections that aid retention. ELLs desire lots of listening and speaking practice and examples and ample opportunities to ask questions.

Participants' English Learning Journey

Most ELLs have been exposed to English in grade school. However, classes were often meant to teach vocabulary recognition and some grammar rules. Their teachers mostly spoke the ELLs' native language and the language taught was too formal to feel like the real spoken English they know now. Back in their home countries, they felt like they could not advance their English skills because they had no opportunities to practice the language outside of their classrooms.

Feelings Towards Being an ELL

ELLs feel very frustrated when they are not able to speak their mind in English. They may feel left out when they cannot keep up with group conversations in English. They also may have difficulty bonding with English speakers because they lack enough fluency to have conversations that feel authentic. ELLs feel very motivated to learn

English so that they can stop feeling anxious about their English skills, or embarrassed when people do not understand them or when they must ask people to repeat themselves many times. These situations leave ELLs feeling lost, confused, and embarrassed. They also feel a lot of frustration when they cannot express their thoughts and their knowledge, especially if they are highly educated.

Perceptions of the Behaviors of Others Around ELLs

ELLs often feel misunderstood by English speakers. ELLs feel that people may perceive them as less intelligent because of their lack of fluency. They also feel that others would be annoyed or bored while communicating with them because they cannot express themselves as well as native speakers.

Table 6

Discovery Interview Insights and Features they Inspired to Design the Phrasal Verb Website.

Insight	Feature
✓ Prefers to learn from English to English vs. native language to English	⇒ Design the website in English only.
✓ Needs opportunity to practice	⇒ Provide a way to communicate with others while learning PVs.
✓ Provide opportunity to ask questions	
✓ Lacks time to practice	⇒ Lessons should be short and concise.
✓ Learns better if verbs are in context	⇒ Present verbs inside sentences, videos, and texts.
✓ Needs visuals to make connections	⇒ Provide lots of visuals
✓ Interactive learning helps with retention of PVs.	⇒ Incorporate games, quizzes and active learning.
✓ Needs lots of repetition	⇒ Provide different ways to learn the same PV (reading, watching a video, quizzing, playing, audio, visuals)
✓ Match learning to own level to keep interest	⇒ Do a pretest before starting learning to avoid teaching already mastered content. Still provide opportunities to practice mastered verbs to ensure accuracy of pretest.
✓ Needs to improve listening skills (accents, fast paced conversations, pronunciation)	⇒ Provide videos and audio practice. Feature different accents on videos. Allow control of video speed.
✓ Prefers guided individualized learning	⇒ Personalize learning, provide learning levels with lots of scaffolding.
✓ Has anxiety about learning PVs (they are difficult and there are too many)	

Designing of the Phrasal Verb Mobile Website

The discovery interviews gave me important insights into the learning needs and challenges of ELLs. I used these insights as inspiration to develop features for the website. Table 6 shows insights gathered by the discovery interviews and the website features they inspired.

Armed with the ideas generated from the discovery interviews and with my findings from the literature review, I made an initial plan for the sections the website would include. I regrouped my findings from Figure 14 and came up with the following sections for the website: Play, Learn, Read, Quiz, Video, Score History, Forum and Settings.

I further studied the findings from my literature review to decide how I was going to incorporate the pedagogical methods into the design of the phrasal verb mobile website. Table 7 shows the methods from the literature review (see Chapter 2) that I used in the sections of the website which I prototyped, and that I plan to use in the sections that are still left to explore in future research.

Table 7

Teaching Methods Used or To Be Used in Sections of The Mobile Website.

Method	Mobile site section					
	Play	Learn	Read	Quiz	Video	Forum
Input enhancement	✓	✓	✓	✓		✓
DDL			✓			
Picture-Elucidation Task		✓				
Event Conflation		✓				
Conceptual Metaphor		✓			✓	
Gamification	✓			✓		
Social Media						✓

Competitor Analysis and Website Inspiration

Before designing my phrasal verb mobile website, I studied some mobile applications to see what they offered to ELLs. I wanted to see the pedagogical methods






used in the apps as well as their user interface (UI) designs. I was looking to design something very different to what was currently in the market so, for additional inspiration, I also looked at some of my favorite gaming apps.

Some Phrasal Verb Apps Currently in the Market

I tried to select apps that had high ratings or that caught my attention because of their friendly design or their inclusion of visuals. Table 8 shows five of the phrasal verb apps I reviewed. I then explain the features I observed and the pedagogical methods I noticed.

Table 8

Some Phrasal Verb Apps Currently in the Market.

App Name	Widget	Developer	Rating (0-5)	Size (MB)
English Phrasal Verb Cards		Vladimir Bayatov	4.7 962 ratings	85.6
Phrasal Verbs: Learn and Play		Arsenni Nasikovkyi,	4.5 4 ratings	27.3
English Phrasal Verbs in Use		Loc Nguyen	4.7 735 ratings	29.2
Most Common Phrasal Verbs		Alexaner Martirosyan	5 1 rating	118.7
Phrasal Verbs – Learn English		Aleksey Naumov	4.7 22 ratings	26.8

The Phrasal Verb Cards app worked like a deck of cards with each card in the landing page leading to a set of phrasal verbs (see Figure15, screens a and b). The first set was free and contained 50 cards. The subsequent sets included 100 phrasal verbs each and costed US \$0.99 for each or US \$0.99 for the 10 sets included in the app with a special offer. The UI was simple and static. The app offered each phrasal verb explained

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings

58

with two cards. The first card had the phrasal verb with its definition and an example. The second card showed the same example from the previous card with an accompanying illustration. Then the user would move on to the following phrasal verb.

Audio was offered to listen to the phrasal verb and the example sentence. Each set of verbs used a different voice with mostly American and some British accents. Figure 15 shows the first six screens of the Phrasal verb Cards app.

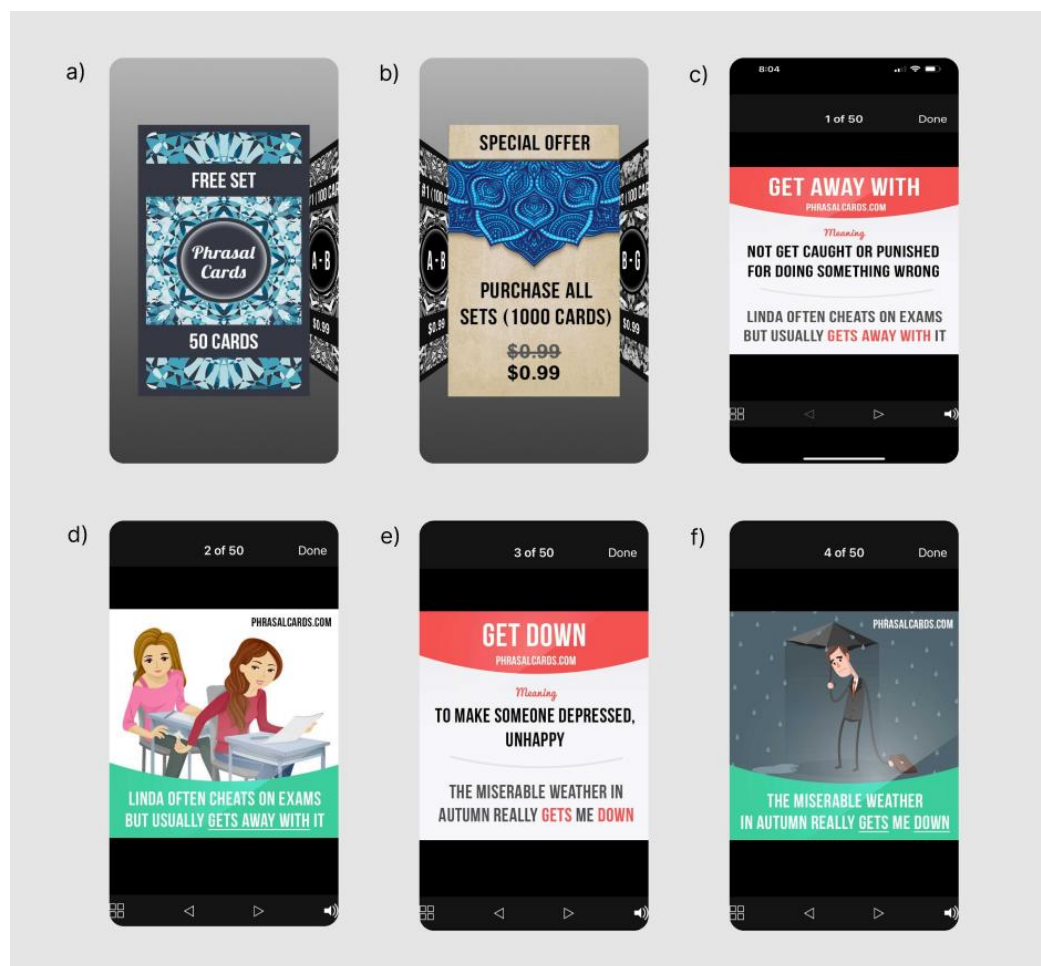


Figure 15. English Phrasal Verb Cards App Sample Screens.

The Phrasal Verbs app has a bottom menu bar with five items. Figure 16 shows the screens for each section linked to the menu. From left to right those screens are

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings

59

Levels (see Figure 16, screen a)), Games (see Figure 16, screen b), Unlocked (see Figure 15, screen c), Favorites (see Figure 16, screen d) and Categories (see Figure 16, screen e).

This app divides the phrasal verbs into categories to teach them in context. The app presents five verbs with a definition, which the app titled Description, and an example (see Figure 16, screens f and g). After the users review the five verbs, they are asked to start learning them.

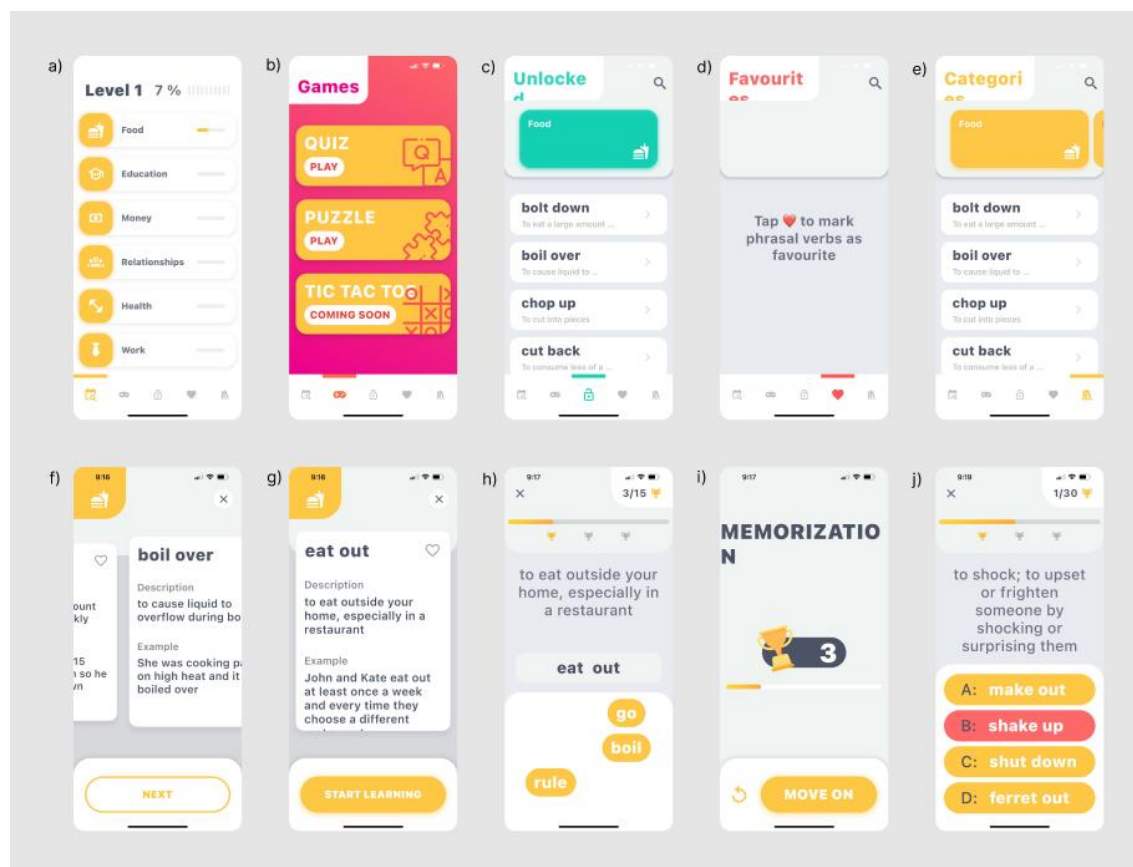


Figure 16. Phrasal Verbs: Learn and Play App Sample Screens.

A definition is then presented, and options of lexical verbs and particles are provided (see Figure 16, screen h). The user should pick the correct phrasal verb to match. After finishing this learning, a screen called Memorization appears showing how many correct verbs the user selected (see Figure 16, screen i). Then there is the option to

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings 60

repeat or move on. By moving on, the user is now presented with a multiple-choice quiz (see Figure 16, screen j).

I liked the intention with the UI design. It seemed simple and straightforward. However, there were multiple text sizing errors (see Figure 16, screens c, d, e and i). The app offered a search function that displayed phrasal verb options even after typing just one letter. In terms of learning, the Games section showed screens similar to Figure 16, screen j, in the Quiz subsection and screens similar to Figure 16, screen h, in the Puzzle subsection.

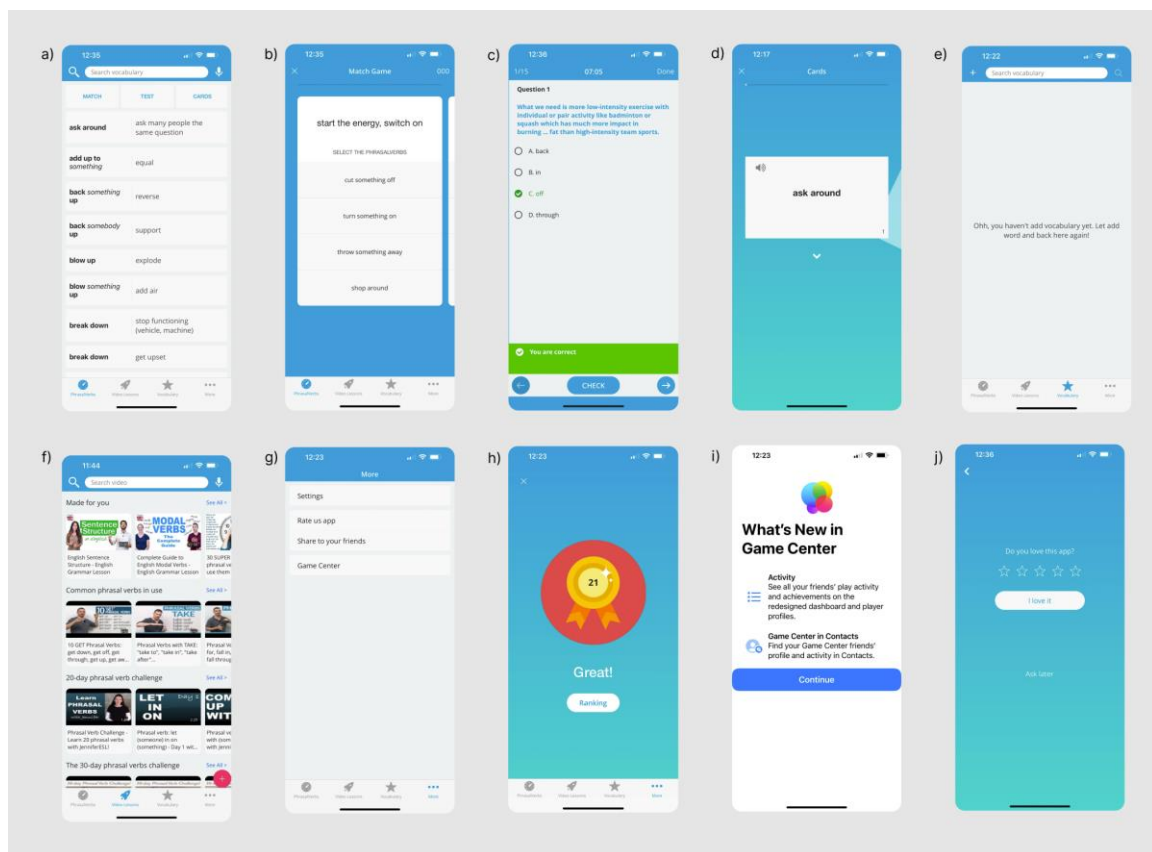


Figure 17. English Phrasal Verbs in Use App Sample Screens.

The content of English Phrasal Verbs in Use was primarily video lessons from YouTube (see Figure 17, screen f). When clicking on a video, the app said that the video was not available, and it took me online to a video on YouTube where a teacher in front

of a board was explaining the meanings of the verb. Then the video proceeded to explain 10 phrasal verbs with the same lexical verb and different particles. The videos were between 5:45 and 12:53 minutes long. I was now browsing the internet on the website youtube.com, and after finishing watching the video, I had to go back from the YouTube website to the English Phrasal Verbs app on my smart phone to continue studying this app. When I thought I had gone back to the English Phrasal Verbs app, I had, instead, mistakenly selected a different phrasal verb app I had downloaded on my phone before, and I got confused thinking I had opened the English Phrasal Verbs app. It took me a couple of minutes to realize that I was looking at different phrasal verb app. This reinforced the fact that taking the user away from the app is not a good idea.

The Phrasal Verbs section of English Phrasal Verbs in Use had a list of phrasal verbs with their short definitions and three ways to study them: Match, Test, and Cards (see Figure 17, screen a through d). There was also a vocabulary section where users add vocabulary. This section also had a search feature (see Figure 17, screen e).

The More menu took me to the options: Settings, Rate us app, Share to Your Friends, and Game Center (see Figure 17, screen g). When I tapped on Game Center, a Ranking button appeared that took me to my mobile phone Game Center (see Figure 17, screens h and i). Once I went to Game Center, I was not able to go back to the app and had to force it closed to start over.

The pedagogical methods used in the app seemed very traditional. Flash cards, multiple choice quizzes and teacher led lessons. I did see many visuals to guide learning. I liked that the app gave the option to connect with friends to compare their learning.

I chose to review The Most Common Phrasal Verbs app even though it only had one rating, albeit it was a five-star one. I liked its use of visuals and humor. The landing page offered three units with a list of 20 phrasal verbs each (see Figure 18, screen a). Only the first 20 verbs were free. At the bottom of the screen there were two links: Examples and Jokes. The jokes were in the form of a paragraph with highlighted phrasal verbs (see Figure 18 screen b). After tapping a verb in the lesson, the verb was then

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings

62

presented with a picture and drop-down examples. There was only one screen per verb (see Figure 18, screens c and d). I also liked that Settings included the option to adjust the text size (see Figure 18, screen e).

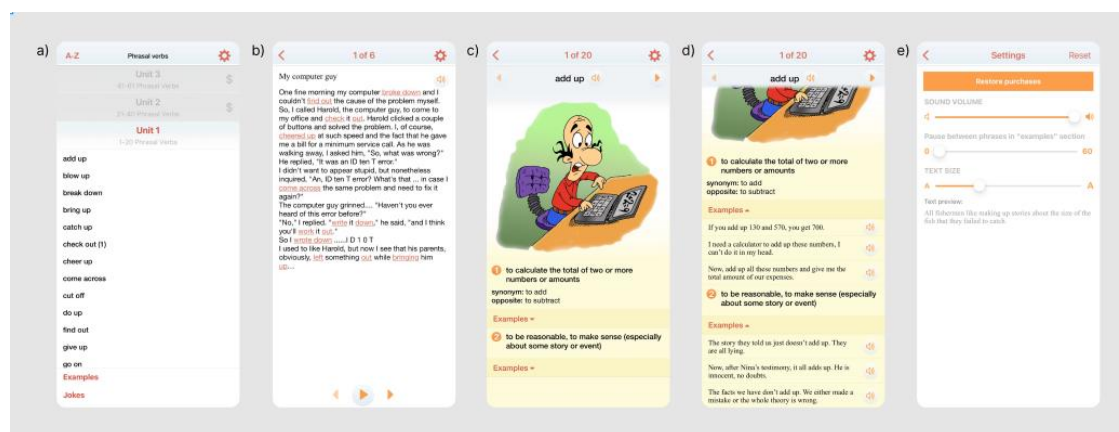


Figure 18. Most Common Phrasal Verbs App Sample Screens.

Finally, the Phrasal Verbs – Learn English app was very focused on repetition to increase retention. The landing screen showed a graph labeled Repetitions per day (See Figure 19, screen a). Below the graph were two levels, Basic, with four verbs, and Advanced, with one verb, for the first lesson. Each verb had a toggle switch. I switched the toggle switch off for the first verb in the list and it disappeared from the list. The app did not provide a way to get that verb back.

Under the Tests section, users could choose to test the particle or the verb that complemented the phrasal verb (see Figure 19, screens e and f). The test consisted of filling-in-the-blank exercises.

There was also a Dictionaries section with Basic, Intermediate and Advanced sub-sections. This section presented the words with hints of the definitions and a toggle switch. When clicking on the word, users could toggle on In Learning (see Figure 19, screen b). When on, the current date was shown under the Next Repeat Date heading. A button under the date read Change. This screen also showed the times the word has been repeated out of seven times, the number of exercises completed and the number of wrong

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings

63

answers. The number of words a user wants to repeat per day can be adjusted by going to the Filter menu on the top right. There was an option to also set the number of stages the user wants to divide their daily repeats in and the repetitions per word and days of learning.

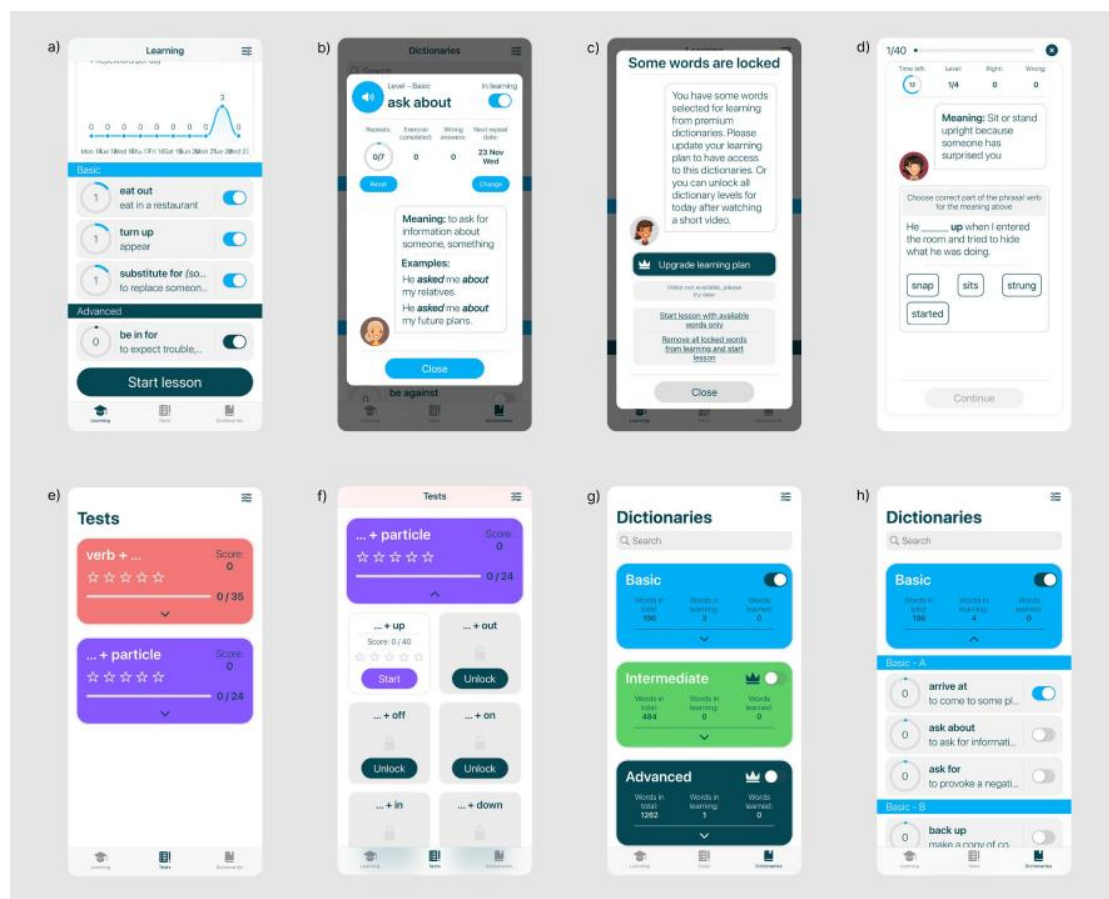


Figure 19. Phrasal Verbs – Learn English App Sample Screens.

I thought this app had good ideas in terms of offering the user the options of spaced repetition and setting reminders for practice, but I felt a little overwhelmed by the constant reminders of how many times I have repeated, how many errors I had made, etc. This app felt visually complex for me with the graphs and progress circles that inundated the interface.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings

64

Pedagogically speaking, this app was not much different to the previous apps. It offered phrasal verbs in sentences and fill-in-the-blank-quizzes.

Website Inspiration

For inspiration, I looked at the apps shown in Figure 20 below. Those apps were, in order of appearance, Phrasal Verbs: Learn and Play (Nasikovskiy, 2020), Mind Games (Mindware Consulting, Inc., 2022), Phone Words (Chen et al, 2019), Block Puzzle – Brain Games (Learnings Co., Limited, 2018) and Wordscapes (People Fun, Inc., 2017).

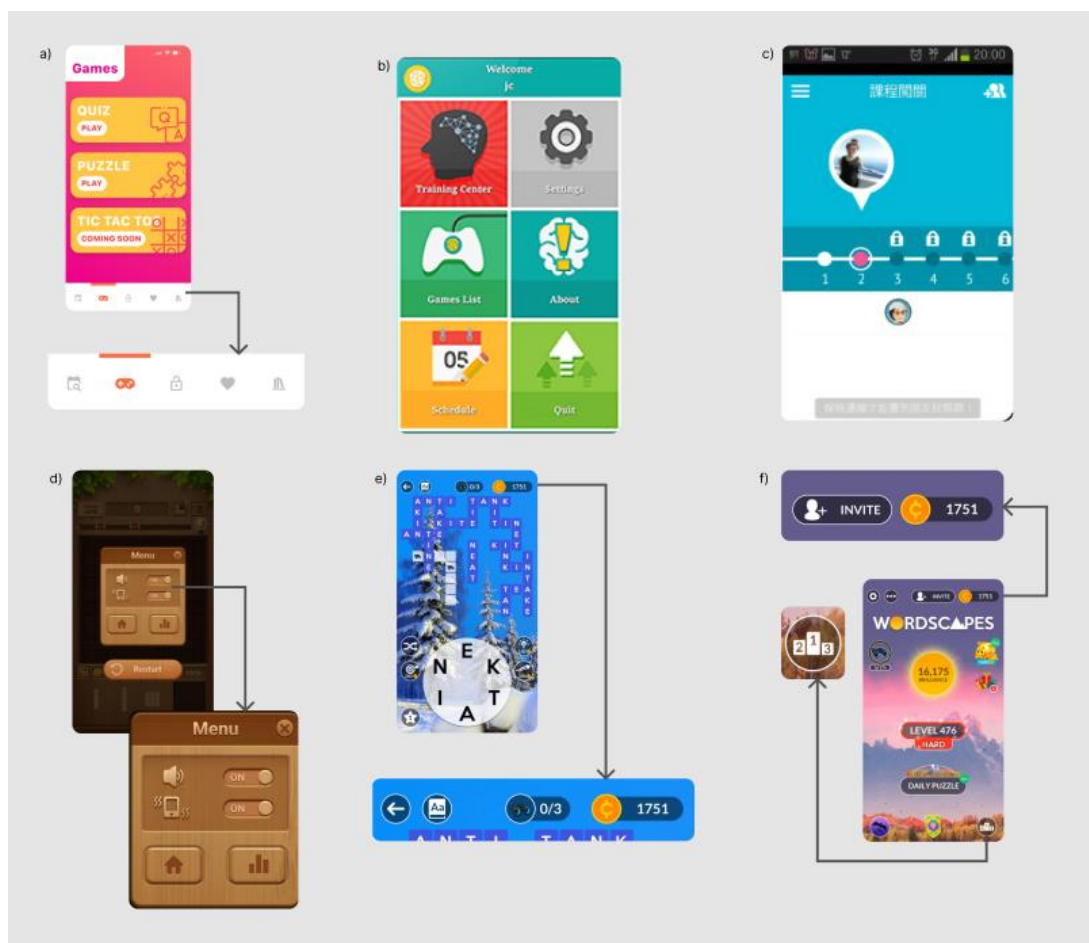


Figure 20. Screens used for inspiration.

I looked at the Phrasal Verbs: Learn and Play menu bar for inspiration. It was simple and it contained five items just the way I wanted my menu bar to be (see Figure 20, a). From the Mind Games app, I wanted to do something similar with the landing

page where I could display different icons to access the different section of the website (see Figure 20, b). While doing my literature review, I found the Phone Words learning path screen (Chen et.al, 2019, p. 174) very intuitive, and I liked how they displayed the pictures of avatars of the user friends. I wanted to do something similar with my app to include the competition factor into the app (see Figure 20, c). The Block Puzzle – Brain Games had a simple menu to toggle volume on and off and a ranking button also which I knew I wanted to incorporate in my app (see Figure 20, d). Finally, the Wordscapes app was an inspiration for the ranking, points and invite sections of the screen (see Figure 20, e and f).

Paper Prototype and Digital Prototype

Armed with the knowledge from my literature review, discovery interviews, competitor analysis and inspiring websites, I drew a paper prototype of my phrasal verb mobile website. I created a digital version of the prototype for remote online testing. I used an iPhone 11 frame in Figma to create the digital prototypes. Figure 21 shows the landing screen of the paper and digital prototype.



Figure 21. Landing screen (paper and digital prototype).

In the Settings section, I wanted to incorporate a volume option to mute all sounds, an Avatar option to personalize the experience, the ability to set reminders, an option to add friends, and a way to share scores and compare the user's learning to their network (see Figure 22).

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings

66

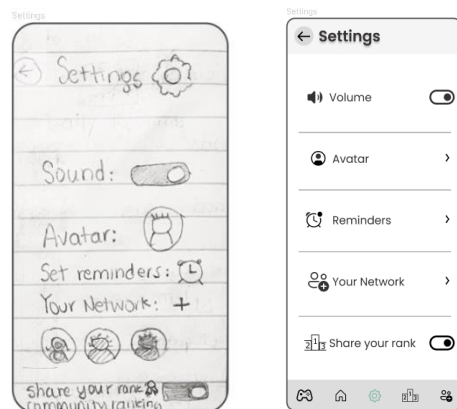


Figure 22. Settings screen (paper and digital prototype).

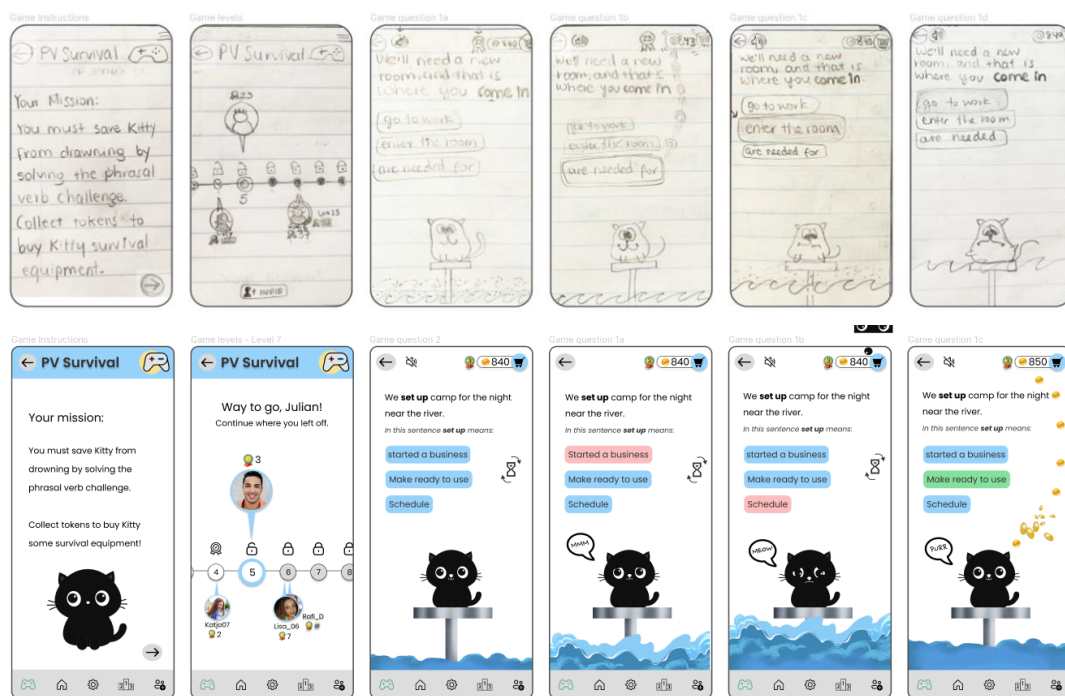


Figure 23. Screens from the Play section of the PV Survival website (paper and digital prototype).

I then designed the Play section. Incorporating a game was important to make learning fun and to provide motivation and lower learners' stress (Grimshaw & Cardoso,

2018). I came up with the idea of saving a cat, called Kitty, from drowning by answering a phrasal verb challenge (see Figure 23). The idea for future development was to have the possibility of accumulating enough points for buying Kitty survival equipment so that users could make more mistakes without sacrificing Kitty's life. The name of the prototype website was derived from this game: Phrasal Verb Survival (PV Survival).

The Learn section included three subsections. Particle Meanings, Illustrated Meanings and Definitions (see Figure 24). Only the first two mentioned subsections were built into the prototype. The Definitions section was meant to hold phrasal verbs and less frequent vocabulary used on the website.



Figure 24. Landing screen of the Learn section of PV Survival (paper and digital prototype).

For the Particle Meanings section, I used the conflation method to explain the meanings of particles. I used Spring's (2018) list of phrasal verb particles (see Appendix A) to explain the meanings of out. Figure 25 shows some screens from the Particle Meanings section. My initial plan, while developing the paper prototype, was to use animations to explain the examples. However, while designing the digital prototype I decided videos would be a better option. I identified appropriate videos; unfortunately, I was not able to incorporate these videos because I was using a free version of Figma to

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings

68

prototype, and this free version did not allow live video. I incorporated the videos as pictures and explained the limitations of the prototype to users.

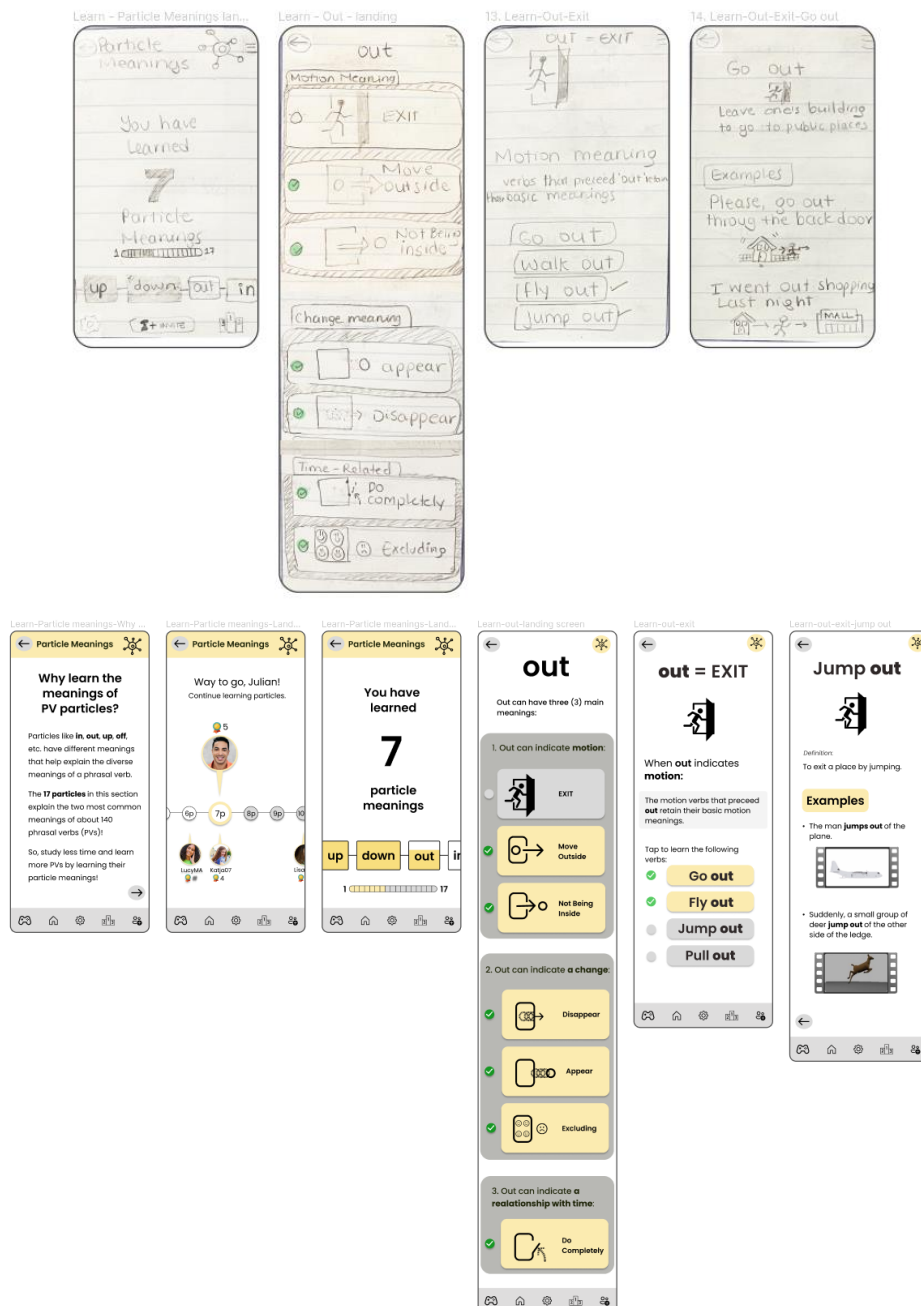


Figure 25. Screens of the Learn with Particle Meanings section (paper and digital prototype).

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings

69

For the Illustrated Meanings section, I used the picture elucidation task and conceptual metaphor methods to explain the meanings of phrasal verbs. I used the phrasal verb “burn out” to design this section of the PV Survival mobile website (see Figure 26).

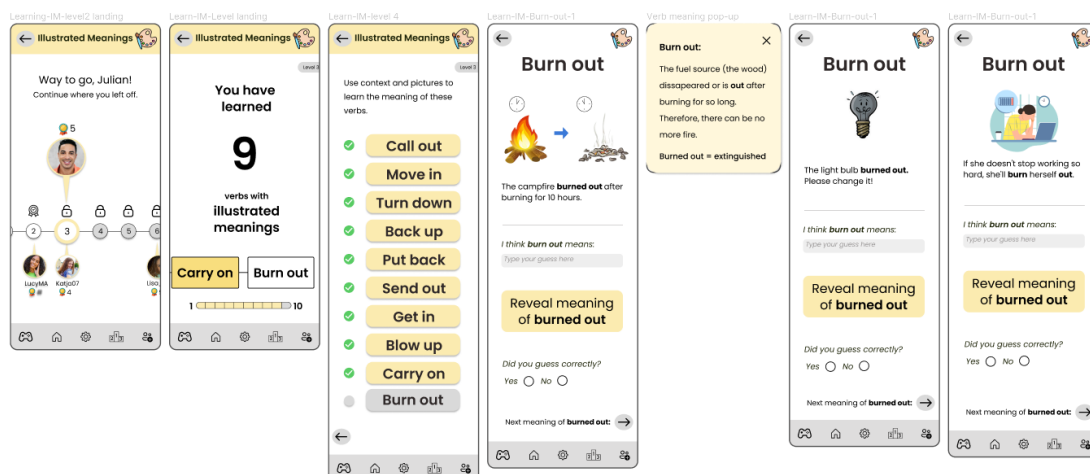
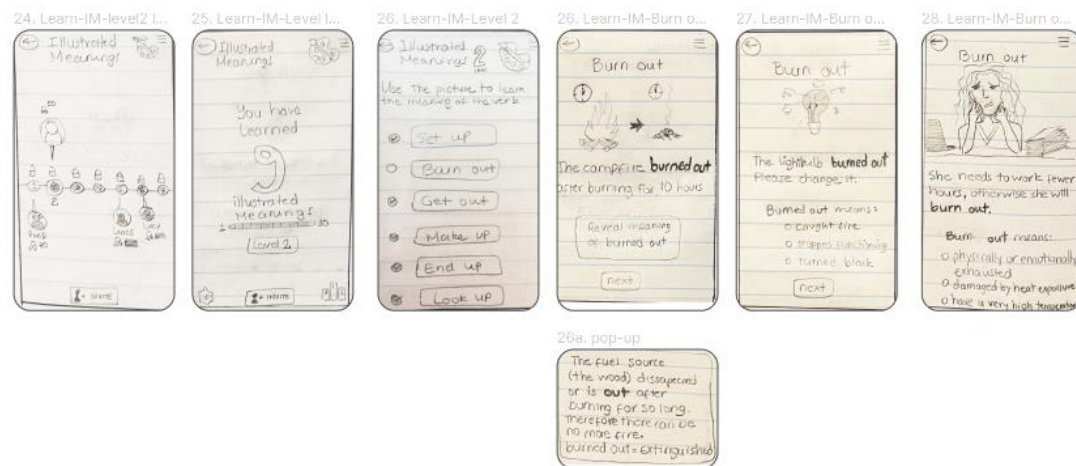


Figure 26. Screens of the Learn with Illustrated Meanings section (paper and digital prototype).

Prototype Testing

After completing the initial digital prototype, I proceeded with the testing sessions. I incorporated changes to the prototype after learning from user pain points and

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings 70

created different versions of the prototype. These are discussed below, after I discuss the major findings in summary form.

Because the intention of this study was to design a mobile website, and not develop it, I was not able to measure the effectiveness of the Phrasal Verb Survival website on learning or retention. I concentrated on designing only some features of the website (Play, Learn PV particles, Learn PVs with pictures, and Forum) to evaluate the qualitative measures such as subjective satisfaction and participant perceptions of the lessons and features they interacted with.

In general, most participants completed all the testing tasks (see Appendix D) with little to no issues. Table 9 shows task completion rates. Participant P7 was not able to get to task T5 because of time running out. The participants who had the most difficulty completing tasks were the older participants who did not feel competent with technology. After analyzing the test session data, trends in pain points, positive experiences, and participant feedback emerged.

Table 9

Prototype Testing Task Completion Rates.

Task	Did Participant Completed the Task Independently?								Rate %
	Participant/Age Range								
	P1 45-54	P2 25-34	P3 25-34	P4 35-44	P5 55-64	P6 55-64	P7 25-34	P8 35-44	
T1: Explore PV mobile website.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100
T2: Finish level 3 of learning PVs with pictures.	Yes	Yes	Yes	Yes	No	Yes	No	No	62.5
T3: Play the Phrasal Verb Survival game.	Yes	Yes	Yes	Yes	No	No	No	Yes	62.5
T4: Find a place where you can set reminders to study every day.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100
T5: Finish learning the meanings of the particle “out.”	Yes	Yes	Yes	Yes	No	No	--	Yes	71.4

Iterative Prototype Modifications

Based on the two initial prototype testing sessions, and after clustering the data from the feedback-capture greed, I created a list of observations from which I obtained some insights that guided some modifications to my prototype (see Table 10).

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings

71

Table 10.

Prototype Testing Observations, Insights, and Improvements They Inspired for Iterations of the PV Survival Website.

Observation	Insight	Feature
② Clicked on all three available options of the game answers to find the correct one. Did not understand why the correct option was right.	✓ It is unclear why a choice is correct if picked randomly because the user does not know the answer.	⇒ After users select the multiple-choice item, explain why the right choice is correct (<i>see Figure 27</i>).
② Did not understand that <i>out</i> had different possible meanings.	✓ Particle meaning section language was confusing.	⇒ Clarify language of this section (<i>see Figure 28</i>).
② One user thought that if she clicked on <i>exit</i> , she will be taken out of the program.	✓ There is still confusion with the language in the Particle Meaning section.	⇒ Make wording clear and simple (<i>see Figure 29</i>).
② Another one said, “ <i>exit</i> is a place where you want to go. [It’s] not motion”.	✓ <i>Exit</i> is being understood as a noun. The chosen picture recreates an image of an exit door in the users’ mind.	⇒ Replace <i>exit</i> with <i>to exit</i> so it is clear the word is a verb. Replace picture with one that is less recognizable as a sign of an exit door (<i>see Figure 29</i>).
② Participants keep missing the <i>Reveal meaning</i> button in the Learn with Illustrated Meanings section.	✓ Users need more specific action-inducing language. <i>Reveal meaning</i> is not understood as a call to action.	⇒ Include a progress bar to let users know where they are and where to go next. Use clear actions words (<i>see Figure 31</i>).
② Users wanted to listen to pronunciation.	✓ There should be audio to help with pronunciation and listening practice.	⇒ Include audio icons next to words to hear pronunciation. There will be several accents and speed every time the user taps an audio icon (<i>see Figure 32</i>).
② Skipped to next exercise when did not understand one word.	✓ New-to-user content words makes it hard to complete an exercise.	⇒ Incorporate a way to link less-common words back to the dictionary (<i>see Figure 33</i>).
② The tone of yellow is too light for a participant.	Contrast needs to be increased for easy viewing.	⇒ Use a deeper shade of yellow (<i>see Figure 34</i>).
② Initial <i>Learn</i> section screens are creating confusion.	✓ There are three screens between the landing and the first exercise in each Learn section. Two of them are for verb selection.	⇒ Reduce the number of screens to only two, the level and the verb selection screens (<i>see Figure 35</i>).
② Clicked on yellow buttons first.	✓ The bright colored buttons make the users want to click.	⇒ Invert colors of call-to-action buttons. Use yellow for buttons that need clicking. Gray for the ones already clicked (<i>see Figure 34</i>).
② A participant wanted to explore learned content instead of advancing as the study scenario instructed.	✓ Users have different learning styles, and some would like to go back and review learned material before advancing.	⇒ Provide a way for users to go back and review learned content by making sure all previous levels are clickable and accessible (<i>not pictured</i>).
② In general, users got confused the first time they explored the website. Other times, they had an easier time exploring around.	✓ Onboarding is needed.	⇒ Design a clear and easy to follow onboarding experience (<i>not pictured</i>).

Table 10 shows most of the observations and modifications that I explain throughout this section. Prototype testing showed that users needed an explanation of why an answer choice was correct while playing the game, they needed clearer language to explain that the particle *out* had different meanings. There was also confusion with the use of the word *exit* as one of the meanings of the particle *out* and it was important to clarify that *exit* was used to indicate motion (as the verb *to exit*) instead of the actual exit door (as the noun *exit*). All participants missed the button to reveal the meaning of the *burn out* phrasal verb in the Illustrated Meanings section making it difficult for users to progress on learning the next meaning of the phrasal verb.

Some users expressed they wanted to be able to listen to the pronunciation of the vocabulary in the mobile website which prompted the incorporation of audio links throughout the website. Similarly, links to words definitions were added when observing that some users skipped content when they could not understand one word in a sentence. Senior participants mentioned not being able to clearly see the yellow color on the website and suggested the use of a deeper shade of yellow.

On the *Learn* section of the website, participants were getting confused after picking a phrasal verb to learn because the website asked them again to pick a verb to learn. In other words, the selection process was redundant, and it needed to be more concise utilizing only one screen for this task. Another observation was that participants got confused with the interactive yellow and gray buttons. For some reason, participants clicked the inactive buttons first. I later realized this was a UI design problem and was an easy fix. Some participants expressed the desire to have previous levels available for reviewing. This was not a modification that needed to be done in the prototype since previous levels were not developed for testing. However, this is an important consideration for the development of the website. Lastly, there was an evident need for a well thought out and researched onboarding process which will be the subject of future studies. Below I explain in detail how I used these findings to modify the prototype for iterative testing.

The prototype went through four different iterations. I explain ahead some of the changes I made to improve the user experience of the prototype. The original version (v1) is usually shown on the left, and the consequent new versions (v2, v3, v4 and v5) are shown to the right.

There were a few major changes after completing the prototype sessions. First, while participants played the game, it became evident that sometimes ELLs will not know the answer to a question and they will guess to find the correct answer, even if they must click all the available options. Participant P2 did just that during the game and did not understand why one of the choices was correct, but the game ended, and he was left clueless. I then decided to incorporate an explanation, as a pop-up window, after players select the right choice (see Figure 27). Further testing conformed that participants benefitted from the pop-up explanation and welcomed the further ratification of their choice; therefore, this modification was made permanent.

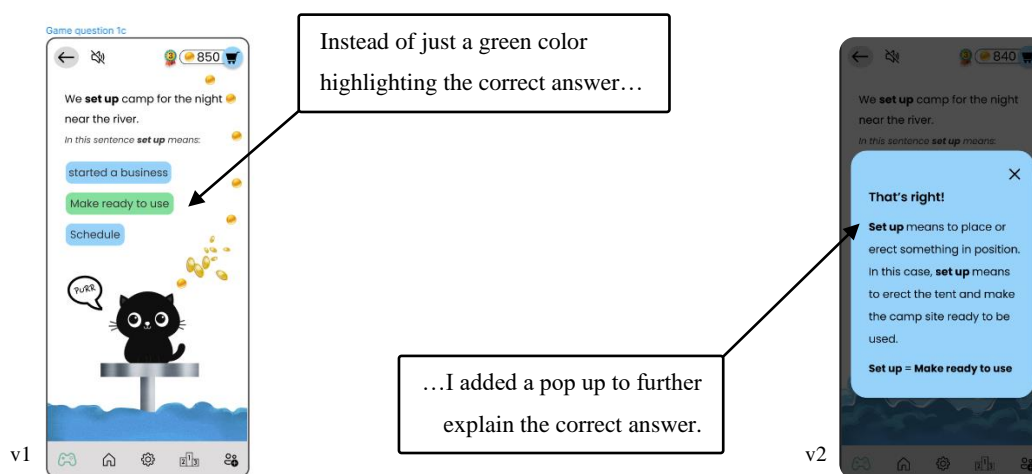


Figure 27. Pop-up further explaining the meaning of the phrasal verb used in the game.

The second main finding during prototype testing was the need for more clarity with the language and with images, in particular, the *exit* image. Participants had difficulty understanding what the different options were in the *out* section. I think they did not anticipate that the particle *out* was going to have so many different meanings.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings

74

Instead, since those meanings were presented as buttons, many participants thought they had to choose which of the options was the correct meaning of the particle *out*.

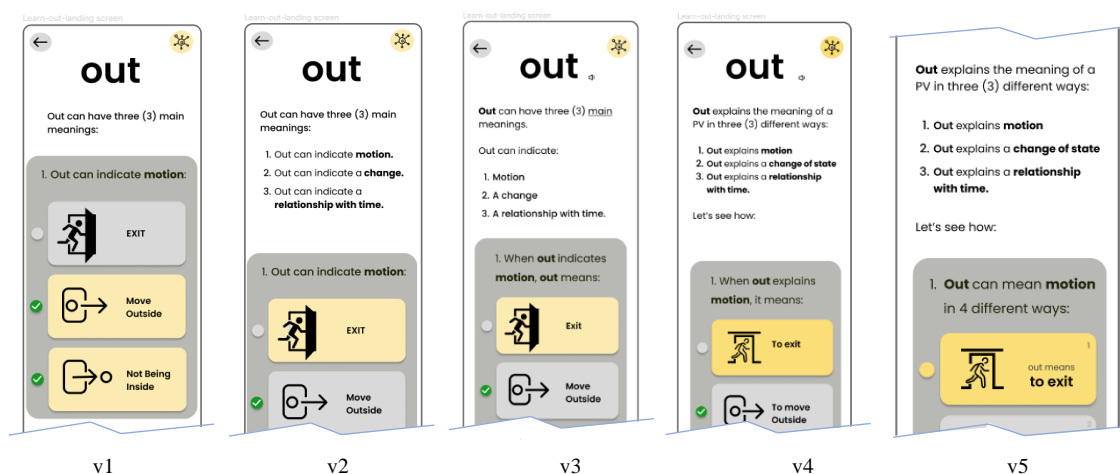


Figure 28. Wording changes throughout prototype iterations of the ‘out’ section.

In my opinion, this difficulty derived in part from the fact that while learning phrasal verbs, it is not the norm to learn the verbs by studying its particle. Many ESL teachers group phrasal verbs by their lexical verb to create their lessons (e.g. come in, come out, come along, etc). Since organizing by particle is a novel way to learn for many ELLs, test participants needed more support to understand what to do. I modified the wording of the *out* meanings presentation a few times, but it was still not understandable, specially for the older students. At the end, the page ended up being too wordy, and I was not happy about that. I feel that a better approach would be to implement a well planned and researched onboarding process and clean out the wording of the page so it is both clear and concise. Figure 28 shows the changes in language through the four iterations.

The other clarity issue I mentioned above was with the image that represented the meaning of *out* as *exit*. I initially thought an image people could identify as meaning *exit* would make a perfect pairing to the actual word. However, that image actually worked so well at representing *exit* that some participants thought that if they clicked the *exit* button, they would be taken out of the current website section. The problem was that

exit was interpreted as a noun, meaning a door to the outside, but the meaning I was trying to convey was the meaning of the verb *to exit* which means the act of going out or leaving a place. When I realized that the image was a problem, then I replaced it for a similar one that was not the standard representation of an *exit*. Figure 29 shows the change in the *exit* image. I also replaced the word *exit* with *to exit* to clarify that the word was a verb and not a noun.

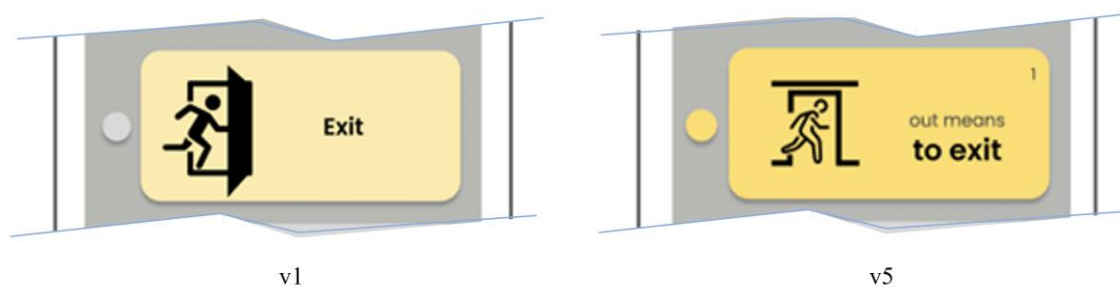


Figure 29. Change in wording and picture when out means exit to distinguish the verb to exit (act of leaving a place) from the noun exit (a way out of a building).

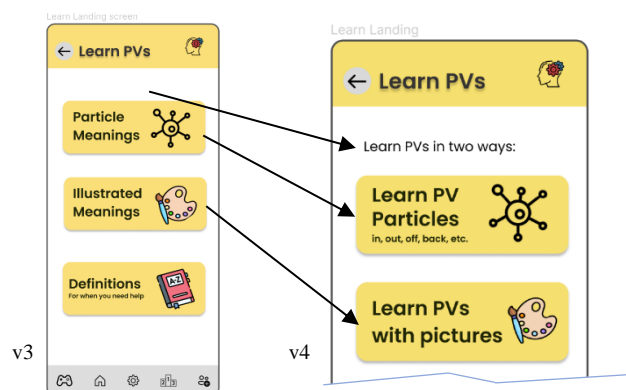


Figure 30. Change in wording for the Learn with Illustrated Meanings and Particle Meanings Buttons.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings

76



Figure 31. Progress bar addition and wording change in Illustrated Meanings section.

Lastly, another change to provide more clarity was to rename the *Learn* sections of the website. I noticed that the titles of the sections were causing confusion, and I

decided to try some more simple terminology. I changed the *Illustrated Meanings* to *Learn with Pictures*. I also changed the *Particle Meanings* title in version 3 to *Learn PV particles* in version 4 (see Figure 30).

The third main finding during the prototype testing session was that users were skipping the *Reveal meaning of burn out* button of the *Learn with Illustrated Meanings* section (see Figure 31, v2). I first thought of incorporating a progress bar and changing the wording to *Tap to reveal meaning of burned out* (see Figure 31, v3). I even added a *tap* icon next to the word *tap*. However, there was not much of a difference because participants kept on skipping this button. I then thought the problem was that the progress bar was not salient enough, so I numbered it and changed its color from gray to yellow (see Figure 31, v4).

Finally, I realized that I needed to gray out and inactivate the steps until the user is ready for them. Only after the user types their guessed meaning of *burned out*, will the reveal meaning button become active. I also changed the word *reveal* to the word *see* to make the call-to-action easier to understand (see Figure 31, v5).

Some participants expressed the desire to listen to the particles and phrasal verbs they were studying to learn their pronunciation, so I incorporated audio for listening practice. The idea would be to have different voices with different accents as users tap on a word multiple times. I incorporated the audio links on the website next to the particles and phrasal verbs as shown in Figure 32

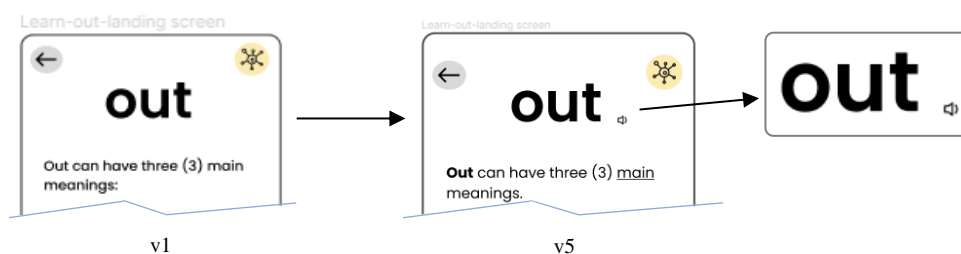


Figure 32. Audio and wording changes on the out section of the prototype.

One more important finding was that participants who did not understand a word in an exercise wanted to skip ahead. It is important that users are supported while learning the phrasal verbs on the website. Not understanding context words should not be a barrier for learning. I already had thought of incorporating a *Dictionary* as part of the *Learn* section. However, because I did not develop that segment of the prototype for this study, it was not available to test participants. As participants had difficulty with vocabulary, it became evident that I needed to come up with a way for users to quickly access the meanings of the words. I made the words into hyperlinks to connect to the dictionary. The idea would be for users to tap on the word to get the meaning, and if they want to know more, they would be taken to the *Dictionary* section. Figure 33 shows the words I linked to the dictionary during the first iteration of the design (version 2).

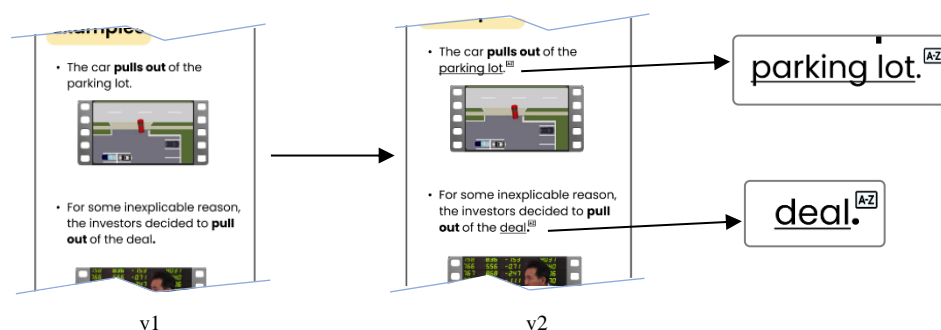


Figure 33. Some vocabulary words linked to the Dictionary section.

Another finding was that the buttons were causing confusion on where to click. Participants wanted to click on the yellow areas of the interface, interpreting them as clickable buttons, but the clickable buttons were white. I then inversed the colors, but when I did, other participants wanted to click on the white interface areas. This was something I struggled with to find the root cause of the problem. After several sessions, I realized that the inactive buttons were not properly grayed out, and my prototype was thus inadvertently confusing participants. Since all the buttons had black font, participants thought all the buttons were active. I properly grayed the buttons on my last iteration. I

feel that this issue was mostly a user interface (UI) design problem that was caused by my lack of experience with UI design. It was a valuable lesson to learn, nonetheless.

What I also realized during testing, specially with the more senior participants, was that they needed more contrast and found the yellow tone of the to be too light. I modified the yellow tone to be reacher and create more contrast. These changes can be seen in Figure 34.

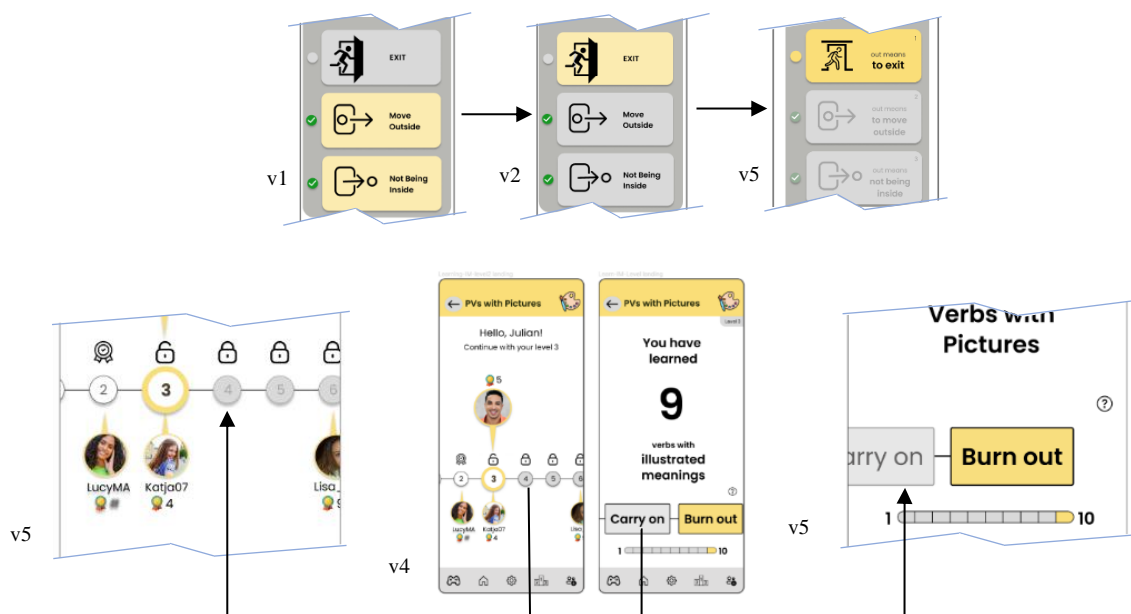


Figure 34. Change in button colors from gray to deep yellow with properly grayed out inactive buttons.

As I advanced with the prototype testing sessions, I had two additional realizations. There was a redundant screen I needed to eliminate (see Figure 35), and the lengthy *Learn PVs with Pictures* introduction needed to be broken down into smaller chunks. There were two screens where participants selected the verbs they wanted to study from the current level. They could learn those verbs in any order. That meant that there were too many steps to get to the content, and that was confusing participants. I eliminated the screen with the verb list since that screen did not have an equivalent screen in the *Learn PV Particles* section. I made this choice to keep the look and feel of the

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings 80

website consistent. Participants did not generally have difficulty with the screen with the slide bar to select the verbs to learn. Figure 35 also shows how I broke down the introduction of the Learn PV with Pictures section. It now consists of four short screens instead of a lengthy one most participants skipped reading. Since v5 was the final version of the prototype, more testing is needed to verify that having multiple short introductory screens would ensure that participants do not skip these important instructions.

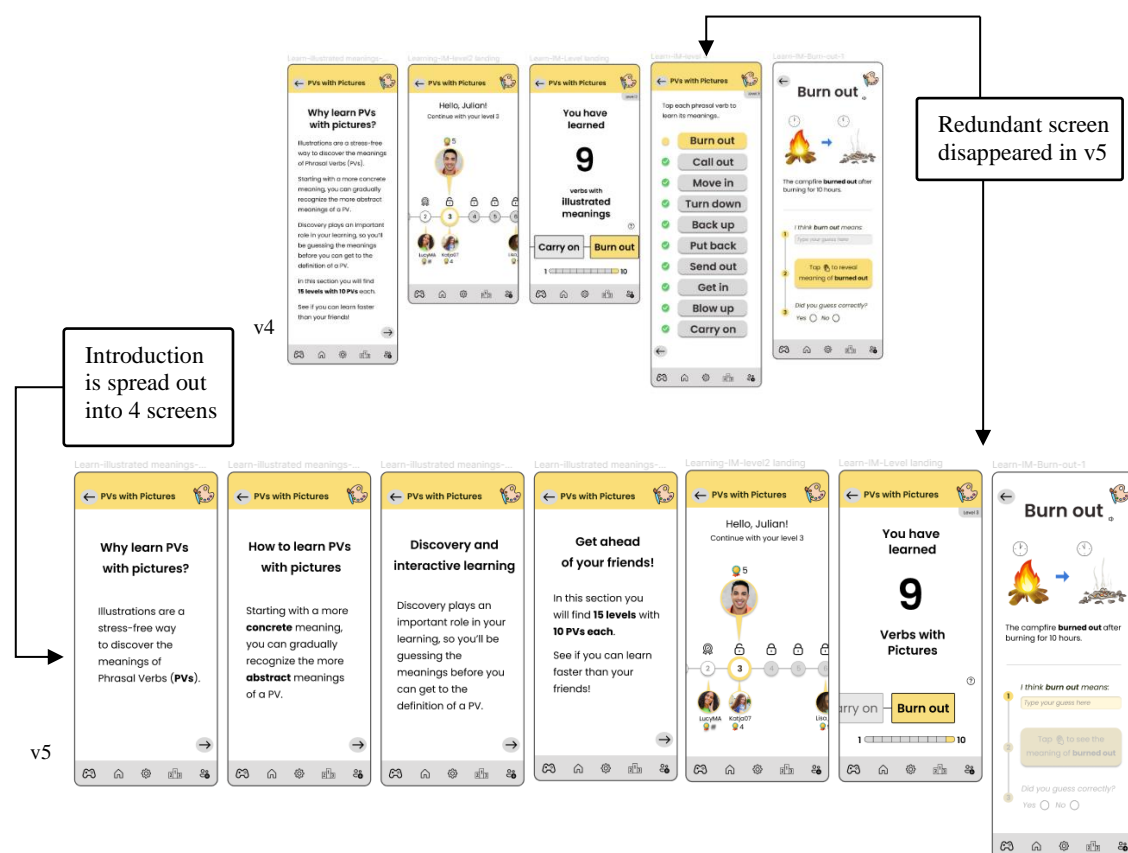


Figure 35. Learn flow became shorter and more straight-forward by omitting one extra screen in the *Learn with Pictures* section, and the introduction text is divided into four screens.

During the prototype testing session, it was very evident that the website would benefit from an improved onboarding process. Users were sometimes confused at first, especially because they were not used to learning phrasal verbs by studying their particles

instead of by guessing the meaning of the entire phrase through context and pictures. A common method of teaching phrasal verbs in the researched apps and from my own experience, is to learn or be told the meaning of the verb, and then, read or write some sentences where the phrasal verb is used in context. An onboarding experience that explains how the phrasal verbs will be approached (organized by participle) would make sure the users understand how to navigate the website without making the webpage unnecessarily wordy. Most users were more comfortable navigating the website once they had already finished one of the sections.

During the prototype testing, I asked participants how they would like the website to remind them to practice. All participants stated they would enjoy practicing with the website daily for 10 to 30 minutes. Below is the feedback I obtained from participants on how they would like to be reminded to practice.

- Participants wanted to get notifications on their phones.
- They wanted the option to switch sounds on or off. Many expressed they did not want sounds or an alarm to go off.
- Participants would have liked an option for a free trial without signing up. Then signing up would be mandatory after level one or two. They assumed, signing up would be necessary to get notifications.

While participating in the prototype testing, all participants expressed excitement about the website and were eager to start using it. Below is a summary of the positive feedback I heard from participants. Thus, these are features of the prototype that should be retained:

- They liked learning with sentences.
- Illustrations reinforced concepts and ideas and made PV learning quite easy.
- They liked interactive tasks because they made learning easier.
- They liked that all example sentences were easy to understand and depicted common life situations.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Findings

82

- Participants thought the interface was attractive.
- They liked the thought of interacting with people in the forum.
- The game was adequately enjoyable.
- They liked the idea of a video to further explain particles and verbs.
- The simplicity of the page made it easy to explore.
- The ranking and the competitive aspect of the website excited them.
- They liked that there was a Quiz section. They want to be tested on their progress.

The testing sessions also shed light on features participants expected to have:

- Lots of animations, especially in the Play section.
- Pronunciation help with different accents and speech speeds.
- An easy-to-follow onboarding experience.

Iterative prototype testing was very useful to understand how the users interacted with the prototype and what the major flaws of the prototype design were for the ELL population. Many of the problems were due to the nature of the prototype being developed in a free version of the Figma application, and the fact that the prototype was just that, a prototype. Most users expected the prototype to function with high fidelity to the finished website but building a high-fidelity prototype was not cost effective or efficient for prototype testing. Nonetheless, many lessons were learned throughout this process. From the inclusion of pronunciation examples, vocabulary definitions and well-designed UI elements following standard practices, to the more complex understanding of how to communicate concepts so that ELLs would understand them. This needed to be done with a careful selection of language and with the inclusion of well-guided explanations that do not make any assumptions of users' previous knowledge of phrasal verbs or English vocabulary. But most of all, with any modification there must always be user research to guarantee the usability of the product.

Chapter 5: Conclusion

The purpose of my initial survey of English Language Learners was intended to answer my first research question: what are the common phrasal verbs that ELLs find most difficult to learn? I had many difficulties, specially at trusting the responses of my participants for the reasons mentioned on the Limitations section of my findings in chapter 4. What I did realize was that, although it is important to learn the most common phrasal verbs used by native English speakers in conversation, the fact that those verbs are the most common makes it very possible that high intermediate or advanced students already know them.

Even though more research is needed then to know which phrasal verbs are more difficult for ELLs, this study reinforced the importance of including all 150 phrasal verbs on Garnier and Schmitt's (2015) list given that learners have very diverse gaps in their phrasal verb knowledge. In addition, it is also imperative to present users with a quiz, perhaps at the beginning of each lesson, so that participants have the option of skipping verbs they already know. It is, in fact, an extremely tedious task to have to go through many lessons on a topic one has already mastered in order to advance on a language-learning program. In the long run, it would be best for the mobile website to be adaptive, responding to the learner's activity.

After the mobile website is launched, analytics will also provide guidance on which phrasal verbs would benefit from expanded or otherwise improved content in the *Learn* section.

The answer to my second research question: what do intermediate or advanced ELLs value in a phrasal verb mobile website interface to help them stay engaged in their learning of these verbs? I gathered all the information from the discovery interviews and the prototype testing. I realized that adult ELLs usually have remarkably busy lives, so they value conciseness and efficiency in their learning endeavors. More importantly, they want to be entertained since they do not want learning to feel like a chore. The Play and Forum sections of the Phrasal Verb Survival website were well received, and so was the

competitive aspect provided by the rankings section. Many of my participants identified themselves as being competitive and were motivated by the thought of advancing faster than their friends or classmates.

Another important realization was that participants valued the ease of learning that images provide and thought that having strategically placed visuals was a useful way to absorb the extraordinarily complex concept of phrasal verbs. Moreover, ELLs were very appreciative of the inclusion of everyday situations to provide context for the verbs. Having mundane situations supported with graphics was well received.

Overall, ELLs were eager to start using the Phrasal Verb Survival website. They stressed that learning those verbs was imperative for fluent communication, and that they really struggled when they found phrasal verbs in everyday situations. For them, learning phrasal verbs was a necessity to improve their quality of life in the United States and to improve interactions in English when living in other countries where English was not widely spoken.

Limitations of the Study

There were some limitations to this study. One of the main limitations was possible participant fraud on the survey due to the participation incentive (US \$7). By publishing the invitation to take the survey on a public Facebook UX Research group, I obtained an immediate response. Upon close examination of the participant information, I realized some names were repeated but had different email addresses. Other respondents correctly responded all the answers to the multiple-choice phrasal verb questions which could indicate three things: their level of English was too high to be almost fluent, they were native English speakers, or the test questions were too easy for high-intermediate or advanced students. I increasingly suspected participant fraud when I interviewed one participant from the survey pool and found discrepancies in the information he provided during the interview. His English accent also sounded native. I removed all participant names that were repeated and those who claimed English as their first language in the survey screening questions but there is no way of knowing if the responses were

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: Conclusion 85

legitimate. Given this limitation and the resulting small survey sample size, the results of the survey must be analyzed with caution.

Another limitation was that some users did not understand the concept of testing a prototype. They expected the prototype to function like the real website, and even though the prototype was high fidelity, only the features that were indispensable were developed. Furthermore, the prototype was created on a free version of Figma which limited features like the inclusion of videos or animation. Additionally, some participants had difficulty putting themselves in the scenarios. This happened more with the older participants. As I advanced in the testing sessions, I realized that the scenarios were also causing participant confusion. The scenarios asked participants to finish learning a level on a section of the website. However, some participants thought they were starting a level and had trouble putting themselves in the scenario. For future research rounds, it will be better to create scenarios where the user is seeing the website for the first time.

It is not customary practice for students to learn phrasal verb particles alone. I was never taught the phrasal verbs this way in my years of learning English, and it was not part of the curriculum in my years as an ESL teacher. I think this unfamiliarity with this way of studying phrasal verbs aids in the confusion of the Learn PV Particles section. As I tested the prototype, it was evident that I needed to let the users know why it is a good idea to learn phrasal verbs this way. Even though I did include an introduction to this section, users skipped reading it. Making sure that students read and understand this important message is instrumental for a good user experience in this section of the website so that learning can take place.

In addition, because I tested a prototype of my design, both observation and confirmation bias were possible. Finally, because users knew that they were being observed while using the prototype, they were susceptible to the Hawthorne effect, which states that users change their behaviors during observation. This seemed especially true for my more senior participants who were less tech savvy. They seemed afraid to click and explore the prototype at their own will and constantly asked for feedback to see if

they were doing well. Additionally, participants were aware that I had designed the prototype which could also influence their behavior during the prototype testing session with me as the moderator of the research.

Further Research

There is still a lot of user research left to do to further develop the Phrasal Verb Survival website. I would like to keep working on further designing the *Play*, *Learn*, *Forum* and *Settings* sections I have already started and later work on the remaining sections of the website. I would like for the *Learn* section to be adaptive so that ELLs can concentrate on learning the verbs that they need to learn instead of having to study verbs they already know to be able to advance. The addition of animation and videos is also very important in the learning process and needs to be incorporated in future prototype testing sessions. Notifications and learning reminders are another addition needed for my website that needs to be well researched to ensure that they are a useful tool instead of a nuisance. Additionally, some study participants revealed they wanted an additional section for speaking practice. I thought that was an idea worth exploring.

During the study, participants who were over 60 years old expressed anxiety with technology but were willing to try learning phrasal verbs with the mobile website. Both participants felt more comfortable studying on a computer screen. Since this is a website, it will be important to develop the website to work on a computer screen so that users who are less comfortable with small mobile screens could benefit from it. It is also important to explore the onboarding experience for the website to ensure that the website remains simple, and easy to use without losing first-time users.

After the website is fully developed, it would be essential to measure the effectiveness of the website in teaching phrasal verbs to ELLs. A study is necessary to measure short term and long-term retention of phrasal verbs with the Phrasal verb Survival website as compared with other more traditional learning methods such as flash cards or learning with definitions and example sentences.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: Conclusion 87

Phrasal verb awareness and understanding is essential for everyday communication; however, they are one of the most difficult English grammar concepts to grasp for nonnative speakers. To make matters more difficult, phrasal verbs are commonly used in informal conversations by English speakers but are often not included in more formal English ESL curriculums. ELLs are then left with the task of learning most phrasal verbs on their own.

Learning to use and being able to understand phrasal verbs help ELLs live more productive and stress-free lives in the United States, and therefore, having a website where ELLs can learn phrasal verbs independently is of great value for this population. In fact, there are currently several websites and applications that teach phrasal verbs, but few are effective at engaging ELLs and explaining the reasoning behind the meaning of the phrasal verbs. Many of those tools rely on memorization as a learning method.

During prototype testing, participants reiterated the importance of learning these verbs for use in their daily lives as not knowing them created big barriers to their communication with native English speakers. It is my intention to help minimize such barriers with the creation of the well-researched and -designed Phrasal Verb Survival website.

References

- Ameka, F. K, and J. Essegbey. Serialising Languages: Satellite-framed, Verb-framed Or Neither. *Ghana Journal of Linguistics*, 2013, 20.
- Archer, A. L., and Hughes, C. A. (2011). Explicit instruction: Effective and efficient teaching. New York: The Guilford Press.
- Armstrong, K. (2004). Sexing up the dossier: A semantic analysis of phrasal verbs for language teachers. *Language Awareness*, 13(4), 213-224
- Batstone, R. (1995). Product and process: Grammar in the second language classroom. In M. Bygate, A. Tonkyn, & E. William (Eds.), *Grammar and the language teacher*. 224-236. London: Prentice Hall
- Bayatov, V. (2018). *English Phrasal Verbs Cards* (1.18) [Mobile app]. App Store.
<https://www.apple.com/app-store/>
- Behzadian, K. (2016). The Effect of Input Enhancement and Concordance-Based Activities on Iranian EFL Learners' Acquisition and Retention of Phrasal Verbs." *Michigan Academician* 44, no. 1: 29–51.
- Bindel, A. (n.d) Phrasal Nerds: Phrasal Verbs Review for Teachers. *Common Sense Education*, Common Sense Education, 22 Apr. 2020,
<https://www.common sense.org/education/app/phrasal-nerds-phrasal-verbs#:~:text=Phrasal%20Nerds%3A%20Phrasal%20Verbs%20is,he%20needs%20help%20understanding%20them.>
- Bronshteyn, K. C. and Gustafson, T. (2015) The Acquisition of Phrasal Verbs in L2 English: A Literature Review. *Linguistic Portfolios*: Vol. 4, Article 8.
Available at: https://repository.stcloudstate.edu/stcloud_ling/vol4/iss1/8
- Brown, J. L. (2018) *Empathy mapping: A guide to getting inside a user's head: UX booth*. Retrieved January 18, 2023, from
<https://www.uxbooth.com/articles/empathy-mapping-a-guide-to-getting-inside-a-users-head/>

- Buján Sánchez, L. M. (2013). *Teaching and Learning Phrasal Verbs: How they are presented in teaching books, dictionaries and mobile applications, and a proposal of possible alternatives*. Universidad De La Coruna.
- Byrne, D. (1995). Games. Teaching Oral English. Harlow: Longman Group UK. pp 101-103.
- Cambridge Dictionary. (2022). Cambridge Dictionary | English Dictionary, Translations & Thesaurus. Retrieved April 15, 2022, from Cambridge.org website:
<https://dictionary.cambridge.org>
- Carpente, S.K., DeLosh, E.L. (2006) Impoverished Cue Support Enhances Subsequent Retention: Support for the Elaborate Retrieval Explanation of the Testing Effect. *Mem. Cogn.* 34 (2), 268-276.
- Carter, R., O’Keeffe, A., Mark, G., & McCarthy, M. (2016). *Phrasal verbs and multi-word verbs*. Cambridge Grammar. Retrieved May 19, 2022, from
<https://dictionary.cambridge.org/us/grammar/british-grammar/phrasal-verbs-and-multi-word-verbs>
- Cepeda, N.J. *et al.* (2008). Spacing effects in learning. *Psychological Science*, 19(11), pp. 1095–1102. Available at: <https://doi.org/10.1111/j.1467-9280.2008.02209.x>.
- Chen, C.M., Liu, H. & Huang, H.B. (2019). Effects of a mobile game-based English vocabulary learning app on learners’ perceptions and learning performance: A case study of Taiwanese EFL learners. *ReCALL* 31(2): 170–188, doi:10.1017/S0958344018000228
- Chen, I. J. (2005). Using games to promote communicative skills in language learning. *The Internet TESL Journal*, 11(2). Retrieved March 30, 2022, from
<http://iteslj.org/Techniques/Chen-Games.html>
- Chen, Y. R., Liu, Y. T. and Todd, A. G. (2018). Transient but effective? captioning and adolescent EFL learners’ spoken vocabulary acquisition. *English Teaching & Learning*. 42(1): 25–56. doi:10.1007/s42321-018-0002-8

- Chirandon, A., Laohawiriyanon, C., & Rakthong, A. (2009). The Effects of Teaching English through Games. M.A. Dissertation, Department of Language and Linguistics, *Prince of Songkhla University*.
- Dagut, M., & Laufer, B. (1985). Avoidance of phrasal verbs—A case for contrastive analysis. *Studies in Second Language Acquisition*, 7(01), 73-79.
- Dam, R., & Siang, T. (2022, May). *Test your prototypes: How to gather feedback and maximize learning*. Retrieved January 18, 2023, from <https://www.interaction-design.org/literature/article/test-your-prototypes-how-to-gather-feedback-and-maximise-learning>
- Domke, D. (1991). *Creative activities for teaching English as a foreign language*. ERIC Digest (ED333713). Office on Languages and Linguistics, Washington D.C.
- Dondi, C. & Moretti, M. (2007). A methodological proposal for learning games selection and quality assessment. *British Journal of Educational Technology*, 38(3): 502–512. <https://doi.org/10.1111/j.1467-8535.2007.00713.x>
- Ellis, N. (2008). Usage-based and form-focused language acquisition. In P. Robinson and N. C. Ellis (Eds.), *Handbook of Cognitive Linguistics and Second Language Acquisition*. New York: Routledge, 372-405
- Ellis, R. (2005). Measuring implicit and explicit knowledge of a second language: A psychometric Study. *Studies in Second Language Acquisition*, 27, 141-172.
- Farsani, H. M., Moinszadeh, A. and Tavakoli. M. (2012). Mnemonic Effectiveness of CL-Motivated Picture-Elucidation Tasks in Foreign Learners' Acquisition of English Phrasal Verbs. *Theory and Practice in Language Studies* 2, no. 3: 498–509. <https://doi.org/10.4304/tpls.2.3.498-509>.
- Flemming, N.D; (1995). I'm different; not dumb. Modes of presentation (VARK) in the tertiary classroom, in Zelmer,A., (ed.) *Research and Development in Higher Education*, Proceedings of the 1995 Annual Conference of the Higher Education and Research Development Society of Australasia (HERDSA), HERDSA, Volume 18, pp. 308 – 313

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: References 91

- Florea, P. J. (2011). Using Improvisational Exercises for Increasing Speaking and listening Skills. *The Asian EFL Journal*. May 2011, pp. 46-58. Retrieved on April, 2022 Vol.52 from <http://www.asian-efl-journal.com/PTA/May-2011-Florea.pdf>
- Furió, D., Juan, M. C., Seguí, I., & Vivó, R. (2015). Mobile learning vs. traditional classroom lessons: A comparative study. *Journal of Computer Assisted Learning*, 31(3), 189–201. doi:10.1111/jcal.12071
- Gardner, D., & Davies, M. (2007). Pointing out frequent phrasal verbs: A corpus-based analysis. *TESOL Quarterly*, 41, 339–359
- Garnier, M. and Schmitt, N. (2015). The PHaVE list: A pedagogical list of phrasal verbs and their most frequent meaning senses. *Language Teaching Research* 19 (6): 645-666.
- Girgin, U. (2019). The Effectiveness of Using Corpus-Based Activities on the Learning of Some Phrasal-Prepositional Verbs. *TOJET: The Turkish Online Journal of Educational Technology*. 18, no. 1:118–25.
- Goudarzi, Z. & Moini, R. (2012). The effect of input enhancement of collocations in reading on collocation learning and retention of EFL learners. *International Education Studies* 5 (3): 247-258.
- Grimshaw, J., & Cardoso, W. (2018). Activate space rats! Fluency development in a mobile game-assisted environment. *Language Learning & Technology*, 22(3), 159-175.
- Heiman, G. W. (2001). Understanding research methods and statistics: An integrated introduction for psychology. *Houghton, Mifflin and Company*.
- Hornby, A. S. (2000). Oxford Advanced Learner's Dictionary. Oxford: Oxford University Press <https://www.thesaurus.com/e/grammar/what-are-lexicalverbs/>
- Houser, R., and Scott D. (1998) Learning from games: seven principles of effective design. *Technical Communication*, vol. 45, no. 3, pp. 319+. Gale Academic OneFile, link.gale.com/apps/doc/A21148250/AONE?u=cfsc&sid=bookmark-AONE&xid=d5e3a733. Accessed 5 Sept. 2022.

- Hulstijn, J. (2005). Theoretical and empirical issues in the study of implicit and explicit second-language learning. *Studies in Second Language Acquisition*, 27 (2), 129-140. doi:10.1017/S0272263105050084.
- Hulstijn, J. H., & Marchena, E. (1989). Avoidance. *Studies in Second Language Acquisition*, 11(03), 241-255.
- Huyen, N. T. T. & Nga, K. T. T. (2003). Learning vocabulary through games: The Effectiveness of learning vocabulary through games. *The Asian EFL Journal*. December 2003, Vol.5 (4). Retrieved on April, 2018 from http://asian-efl-journal.com/dec_03_vn.pdf
- Ibrahim, K. (2017). The Impact of Ecological Factors on Game-Based L2 Practice and Learning. *Foreign Language Annals*, 50: 533-546. <https://doi.org/10.1111/flan.12278>
- Inagaki, S. (2002). Japanese learners' acquisition of English manner-of-motion verbs with locational/directional PPs. *Second Language Research*, 18(1), 3-27.
- Ivanova, V. and Voynikova, D. (2021) Statistical analysis to evaluate the quality of an online practice test, *Thermophysical Basis Of Energy Technologies (Tbet 2020) [Preprint]*. Available at: <https://doi.org/10.1063/5.0041897>.
- Johns, F. T. (1994). From printout to handout: Grammar and vocabulary teaching in the context of data-driven learning. In *Perspectives on Pedagogical Grammar*, edited by. T. Odlin. New York: Cambridge University Press.
- Kalay, D. (2019). *Implicit phrasal verb knowledge gains through conceptual metaphor theory: A case of university prep school students* (Order No. 28633018). Available from ProQuest Dissertations & Theses Global. (2561900743). Retrieved from <http://search.proquest.com.proxy-ub.researchport.umd.edu/dissertations-theses/implicit-phrasal-verb-knowledge-gains-through/docview/2561900743/se-2?accountid=28969>
- Karpicke, J. (2017). *Retrieval-Based Learning: A Decade of Progress*. ERIC. Retrieved April 11, 2022, from <https://eric.ed.gov/>

- Karpicke, J.D. & Roediger, H.L. (2007) Repeated Retrieval During Learning is The Key to long-term retention. *J. Mem. Lang.* 57 (2), 151-162.
<http://dx.doi.org/10.1016/j.jml.2006.09.004>
- Karpicke, J. D. (2017) Retrieval-Based Learning: A Decade of Progress. In *Learning and Memory: A Comprehensive Reference*, 487–514.
Elsevier.<https://doi.org/10.1016/B978-0-12-809324-5.21055-9>.
- Kijpooonphol, W., and Phumchanin, W. (2018). A Comparison between Traditional and Gamified Teaching Methods for Phrasal Verb: A Case of Grade 10 Students. 13, no. 3: 10.
- Kövecses, Z. (2017). *Conceptual Metaphor Theory*. Routledge Handbook of Metaphor.
- Lakoff, G., and Johnson, M. (1980). *Metaphors we live by*. Chicago, IL: The University of Chicago Press.
- Lakoff, G., and Johnson, M. (2003). *Metaphors we live by*. London: The University of Chicago
- Lathan, J. (n.d.). *Complete Guide to Teacher-Centered vs. Student-Centered Learning*. University of San Diego Online. Retrieved from
<https://onlinedegrees.sandiego.edu/teacher-centered-vs-student-centered-learning/#:~:text=In%20teacher%2Dcentered%20learning%20%E2%80%94%20the%20knowledge%20being%20presented>.
- Learnings Co., Limited. (201). *Block Puzzle – Brain games* (2.8.10) [Mobile app]. App Store. <https://www.apple.com/app-store/>
- Liao, F.-H. (2019). Making Sense of *Out* Phrasal Verbs: The Instruction of *Out* Senses. *RELC Journal* 51, no. 3: 364–80. <https://doi.org/10.1177/0033688219828199>.
- Liao, Y., & Fukuya, Y. J. (2004). Avoidance of phrasal verbs: The case of Chinese learners of English. *Language Learning*, 54(2), 193-226.
- Lin, P. and Siyanova-Chanturia, A. (2014). Internet television for L2 vocabulary learning. *Language learning beyond the classroom*. Eds. *David Nunan and Jack C. Richards*. London: Routledge. 149-158.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: References 94

- Liu, D. (2011). The most frequently used English phrasal verbs in American and British English: A multicorpus examination. *TESOL Quarterly*, 45, 661–688
- Martirosyan, A. (2021). *Most Common Phrasal Verbs App* (1.5) [Mobile app]. App Store. <https://www.apple.com/app-store/>
- Medlock, M. C., Wixon, D., Terrano, M., Romero, R., & Fulton, B. (2002). Using the RITE method to improve products: A definition and a case study. *Usability Professionals Association*, 51, 1963813932-1562338474.
- Merriam-Webster. (n.d.). Adverb. In *Merriam-Webster.com dictionary*. Retrieved May 9, 2022, from <https://www.merriam-webster.com/dictionary/adverb>
- Merriam-Webster. (n.d.). Intransitive. In *Merriam-Webster.com dictionary*. Retrieved May 9, 2022, from <https://www.merriam-webster.com/dictionary/intransitive>
- Merriam-Webster. (n.d.). Transitive. In *Merriam-Webster.com dictionary*. Retrieved May 12, 2022, from <https://www.merriam-webster.com/dictionary/transitive>
- Meyer, C. F. (2004). English corpus linguistics: An introduction. *Cambridge University Press*.
- Mindware Consulting, Inc. (2022). *Mind Games – Brain Training* (3.1.6) [Mobile app]. App Store. <https://www.apple.com/app-store/>
- Nasikovskiy, A. (2020). *Phrasal Verbs: Learn and Play* [Mobile app]. App Store. <https://www.apple.com/app-store/>
- Naumov, A. (2021). *Phrasal Verbs - Learn English* (1.4.4) [Mobile app]. App Store. <https://www.apple.com/app-store/>
- Nguyen, L. (2018). *English Phrasal Verbs in Use* (1.2.2) [Mobile app]. App Store. <https://www.apple.com/app-store/>
- Nordquist, R., (2019). Interlanguage Definition and Examples. ThoughtCo. <https://www.thoughtco.com/what-is-interlanguage-1691074>
- Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.
- O’Keeffe, A., McCarthy, M., and Carter, R. (2007). *From corpus to classroom*. Cambridge: Cambridge University Press.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: References 95

- Okamoto, M. (2015) Is corpus word frequency a good yardstick for selecting words to teach? Threshold levels for vocabulary selection. *System* 51: 1-10
- O'Loughlin, E. (2020). How to... calculate Cronbach's alpha in Excel. YouTube. Retrieved January 6, 2023, from https://www.youtube.com/watch?v=Hgf22LMcOHc&ab_channel=EugeneO%27Loughlin
- Oxford English Dictionary. (n.d.). Retrieved April 15, 2022, from oed.com website: <https://oed.com>
- Oxford Languages. (n.d.). Direct Object. The Oxford Pocket Dictionary of Current English. Retrieved May 9, 2022, from Encyclopedia.com: <https://www.encyclopedia.com/humanities/dictionaries-thesauruses-pictures-and-press-releases/direct-object>
- People Fun, Inc. (2017). *Wordscapes* (1.24.2) [Mobile app]. App Store. <https://www.apple.com/app-store/>
- Pimsleur, P. (1967). *A Memory Schedule*. JSTOR. Retrieved November 28, 2022, from <https://www.jstor.org/stable/321812>
- Pirasteh, P., and Mirzaeian, V. R. (2015). The Effect of Short Message Service (SMS) on Learning Phrasal Verbs by Iranian EFL Learners. *Language in India* 15, no. 1: 144–61.
- Quirk, R., Greenbaum, S., Leech, G. and Svartvik, J. (1985) *A Comprehensive Grammar Of The English Language*. London: Longman.
- Roediger & Karpicke (2006) Test-enhanced learning: taking memory tests improves long-term retention. *Psychology Science*, 17 (3), 249-255. <https://doi.org/10.1111/j.1467-9280.2006.01693.x>
- Roohani, A. & Vincheh, M. H. (2021). Effect of Game-Based, Social Media, and Classroom-Based Instruction on the Learning of Phrasal Verbs. *Computer Assisted Language Learning* 0, no. 0: 1–25. <https://doi.org/10.1080/09588221.2021.1929325>.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: References 96

- Rott, S. (1999). The effect of exposure frequency on intermediate language learners' incidental vocabulary acquisition and retention through reading. *Studies in Second Language Acquisition* 21: 589-619.
- Rudzka-Ostyn B. (2003). *Word Power: Phrasal Verbs and Compounds*, New York: Mouton de Gruyter.
- Rudzka-Ostyn, B. (2008) *Word Power: Phrasal Verbs and Compounds: A Cognitive Approach*, Berlin, New York: De Gruyter Mouton, 2008.
<https://doi.org/10.1515/9783110197235>
- Rundell, M. (2005). Why are phrasal verbs so difficult? *Humanizing Language Teaching*, 7 (3). Retrieved from <http://old.hltmag.co.uk/may05/idea.htm>, in March, 2022.
- Ryan, J. (2009). Phrasal Verbs? They're Easy! 1: In a New Series, John Ryan Takes up the Challenge of Putting across Phrasal Verbs. *English Teaching Professional*, no. 62 (May 1, 2009): 20–22.
- Ryan, J. (2009). Phrasal Verbs? They're Easy! 3: John Ryan Takes up the Challenge of Verbs That Take Up. *English Teaching Professional*, no. 64 (September 1, 2009): 20–21.
- Ryan, J. (2009). Phrasal Verbs? They're Easy! 4: John Ryan Ties up His Exploration of Verbs That Take Up. *English Teaching Professional*, no. 65 (November 1, 2009): 21–22.
- Ryan, J. (2009). Phrasal Verbs? They're Easy! John Ryan Takes on Verbs That Take On. *English Teaching Professional*, no. 63 (July 1, 2009): 21–22.
- Schmidt, R. (1994). Implicit learning and the cognitive unconscious: Of artificial grammars and SLA. In *Implicit and explicit learning of languages*, edited by N.C. Ellis, 165-210. London: Academic Press.
- Schmitt, N. (2010). *Researching vocabulary: A vocabulary research manual*. Basingstoke, UK: Palgrave Macmillan.
- Segalowicz, N. (2003). Automaticity and second languages. In C. Doughty and M. Lon (Eds.), *Handbook of Second Language Acquisition*. Oxford: Blackwell, 382-408.

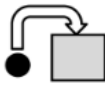
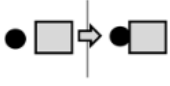

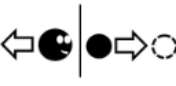


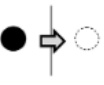


- Selinker, L. (1972). Interlanguage. *Product Information International Review of Applied Linguistics in Language Teaching*, 10, 209-241.
<http://dx.doi.org/10.1515/iral.1972.10.1-4.209>
- Sharwood Smith, M. (1993). Input enhancement in instructed SLA: Theoretical bases. *Studies in Second Language Acquisition* 15: 165-179.
- Shook, J. D. (1994). FL / L2 reading, grammatical information, and the input-to-intake phenomenon. *Applied Language Learning* 5: 57-93.
- Sinyashina, E. (2019). The effect of repetition on incidental legal vocabulary learning through long-term exposure to authentic videos. *ESP Today* 7(1): 44-67.
[doi:10.18485/esptoday.2019.7.1.3](https://doi.org/10.18485/esptoday.2019.7.1.3)
- Sinyashina, E. (2020). Watching Captioned Authentic Videos for Incidental Vocabulary Learning: Is It Effective?. *Nordic Journal of English Studies* 19(1):28-64
- Skehan, P. (1998). A cognitive approach to language learning. *Oxford; Oxford University Press*.
- Spring, R. & Horie, K. (2013). How cognitive typology affects second language acquisition: A study of Japanese and Chinese learners of English. *Cognitive Linguistics*, 24 (4), 689-710. <https://doi.org/10.1515/cog-2013-0024>
- Spring, R. (2018) Teaching Phrasal Verbs More Efficiently: Using Corpus Studies and Cognitive Linguistics to Create a Particle List. *Advances in Language and Literary Studies* 9 (5): 121. <https://doi.org/10.7575/aiac.all.v.9n.5p.121>.
- Straus, J. (2022). *Object of a preposition examples*. The Blue Book of Grammar and Punctuation. Retrieved November 28, 2022, from <https://www.grammarbook.com/blog/prepositions/object-of-a-preposition/>
- Suárez, M. & Gesa, F. (2019). Learning vocabulary with the support of sustained exposure to captioned video: Do proficiency and aptitude make a difference? *The Language Learning Journal*. 1-21. [doi:10.1080/09571736.2019.1617768](https://doi.org/10.1080/09571736.2019.1617768)
- Talmy, L. (1985). Lexicalization patterns: semantic structure in lexical forms. In *Timothy Shopen (ed.) Language Typology and Syntactic Description*, vol. III. Cambridge: Cambridge University Press, 57-149.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: References 98

- Talmy, L. (2000). *Toward a cognitive semantics, vol. 2: Typology and process in concept structuring*. Cambridge, Mass.: MIT Press.
- Talmy, L. (2008). Aspects of attention in language. In N. Ellis and P. Robinson (Eds.), *Handbook of Cognitive Linguistics and Second Language Acquisition*. New York, NY: Routledge, 37-54.
- Thesaurus. (2017). What Are 5 Types of Lexical Verbs? In *Thesaurus.com*. Retrieved April 25, 2022, from <https://www.thesaurus.com/e/grammar/what-are-lexical-verbs/>
- Thompson, N. (2017). What is classical item difficulty (P value)? Assessment Systems. Retrieved December 7, 2022, from <https://assess.com/classical-item-difficulty-p-value/>
- Tobin, M. A. (n.d.). Guide to item analysis - pennsylvania State University. PennState. Retrieved January 6, 2023, from <https://www.schreyerinstitute.psu.edu/pdf/GuideToItemAnalysis.pdf>
- Tyler A, and Evans, V. (2003). *The Semantics of English Prepositions*. Cambridge: Cambridge University Press.
- Walden University Writing Center. (n.d.). *Grammar: Prepositions*. Academic Guides. Retrieved November 28, 2022, from <https://academicguides.waldenu.edu/writingcenter/grammar/prepositions>
- Wang, B. T. (2017). Designing mobile apps for English vocabulary learning. *International Journal of Information and Education Technology*, 7(4): 279–283. <https://doi.org/10.18178/ijiet.2017.7.4.88>
- Wu, Q. (2015). *Designing a smartphone app to teach English (L2) vocabulary*. Computers & Education, 85, pp. 170-179
- Yu, C. H. (2020). Using SAS for Item Analysis and Test Construction. Cronbach Alpha: Educational Assessment Course by dr. Chong Ho Yu. Retrieved January 6, 2023, from <https://www.creative-wisdom.com/teaching/assessment/alpha.html>
- Zareva, A. (2019). First, we'll go over some definitions I came across and then I'll talk about the theories they're based on': Multi-word verbs in ESL students' lexical use. *The Description, Measurement and Pedagogy of Words*. 173-194.

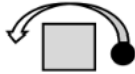
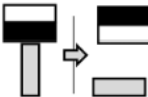

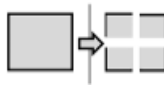
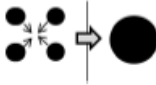
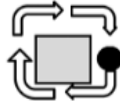

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Spring's (2018) List of Phrasal Verb Particles

100

Word	Motion Meaning	Change Meaning	Aspect Meaning
on	<p>Moving from not touching place to touching (usually higher)**</p>  <p>The circle moves on the square. <i>jump on, land on, fall on</i></p>	<p>Become touching / attached**</p>  <p>He stuck the circle on the square. <i>put on, clip on, stick on</i></p>	<p>Continue</p> <p><i>walk on, keep on, hold on</i></p>
off		<p>Become not-touching / unattached** (*of something)</p> 	
back	<p>(1) Moving backward (2) Return to original position</p>  <p>The circle moves back. <i>step back, go back, run back</i></p>	<p>Return to original state</p>  <p>His arm healed back. <i>get back, put back, steal back</i></p>	
away	<p>Moving farther (*from something)</p>  <p>The circle moves away (from the square). <i>run away, go away, fly away</i></p>	<p>Disappear</p>  <p>The circle went away. <i>go away, blow away, wish away</i></p>	
after	<p>Following something</p>  <p>The circle moves after the square. <i>run after, go after, swim after</i></p>		
under (below)	<p>Moving to lower than something else **</p>  <p>The circle moves under the square. <i>go under, fly under, walk under</i></p>		

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Spring's (2018) List of Phrasal Verb Particles

101

Word	Motion Meaning	Change Meaning	Aspect Meaning
over (above)	Moving to higher than something else **  The circle moves over the square. <i>fly over, jump over, go over</i>	(1) Reverse 180°vertically (2) Off of the base  The rectangle turned over. <i>turn over, flip over, fall over</i>	
across	Moving from one side of something to the other side		
along	Moving on the path of something		Do something at the same time (* with something/ someone else)
apart		Become many pieces**  The square came apart. <i>fall apart, come apart, pull apart</i>	
together		Become one unit**  The circles were pushed together. <i>put together, come together, tie together</i>	
around (about)	Moving in a circle, or to various places  The circle moves around the square. <i>walk around, look around, go around</i>		
through	Moving in and then out of something  The circle moves through the square. <i>go through, pass through, drive through</i>		

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: Usability Scale Results 102

Appendix B: Garnier and Schmitt 's (2015) List of Phrasal Verbs

Phrasal Verb	Phrasal Verb	Phrasal Verb
1. Go on	27. Show up	53. Catch up
2. Pick up	28. Take off	54. Go in
3. Come back	29. Work out	55. Break down
4. Come up	30. Stand up	56. Get off
5. Go back	31. Come down	57. Keep up
6. Find out	32. Go ahead	58. Put down
7. Come out	33. Go up	59. Reach out
8. Go out	34. Look back	60. Go off
9. Point out	35. Wake up	61. Cut off
10. Grow up	36. Carry out	62. Turn back
11. Set up	37. Take over	63. Pull up
12. Turn out	38. Hold up	64. Set out
13. Get out	39. Pull out	65. Clean up
14. Come in	40. Turn around	66. Shut down
15. Take on	41. Take up	67. Turn over
16. Give up	42. Look down	68. Slow down
17. Make up	43. Put up	69. Wind up
18. End up	44. Bring back	70. Turn up
19. Get back	45. Bring up	71. Line up
20. Look up	46. Look out	72. Take back
21. Figure out	47. Bring in	73. Lay out
22. Sit down	48. Open up	74. Go over
23. Get up	49. Check out	75. Hang up
24. Take out	50. Move on	76. Go through
25. Come on	51. Put out	77. Hold on
26. Go down	52. Look around	78. Pay off

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: Usability Scale Results 103

Phrasal Verb	Phrasal Verb	Phrasal Verb
79. Hold out	105. Shut up	131. Move out
80. Break up	106. Turn off	132. Come off
81. Bring out	107. Bring about	133. Pass on
82. Pull back	108. Step back	134. Take in
83. Hang on	109. Lay down	135. Set down
84. Build up	110. Bring down	136. Sort out
85. Throw out	111. Stand out	137. Follow up
86. Hang out	112. Come along	138. Come through
87. Put on	113. Play out	139. Settle down
88. Get down	114. Break out	140. Come around
89. Come over	115. Go around	141. Fill in
90. Move in	116. Walk out	142. Give out
91. Start out	117. Get through	143. Give in
92. Call out	118. Hold back	144. Go along
93. Sit up	119. Write down	145. Break off
94. Turn down	120. Move back	146. Put off
95. Back up	121. Fill out	147. Come about
96. Put back	122. Sit back	148. Close down
97. Send out	123. Rule out	149. Put in
98. Get in	124. Move up	150. Set about
99. Blow up	125. Pick out	
100. Carry on	126. Take down	
101. Set off	127. Get on	
102. Keep on	128. Give back	
103. Run out	129. Hand over	
104. Make out	130. Sum up	

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: Phrasal Verb Survey
Diagnostic Test

104

Appendix C: Phrasal Verb Survey Diagnostic Test

[The following were the phrasal verb diagnostic test questions included in the Phrasal Verb survey after the demographic questions. Demographic questions were not included in this appendix, but they asked participants about their gender, age, educational background and native language.]

In the next session, please select the best option to complete the sentence,

Do not guess the answer, but you can make an educated guess if the answer sounds right to you. If you have no idea, please choose, “I don’t know”.

1. He went _____ speaking for two hours (went on)

- ahead
- off
- on
- into
- I don’t know

2. I need to pick _____ my luggage before leaving. (Pick up)

- after
- up
- at
- off
- I don’t know

3. Oh, that’s right! It’s all coming _____ to me now. (Come back)

- Off
- up
- Along
- back
- I don’t know

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: Phrasal Verb Survey
Diagnostic Test

105

4. I'm going to have to cancel our lunch – something's came _____. (Come up)

- Off
- up
- Along
- back
- I don't know

5. This new toaster will have to go _____-it's faulty. (Go back)

- around
- out
- away
- back
- I don't know

6. The police are determined to find _____ who killed Louise. (Find out)

- Out
- around
- through
- up
- I don't know

7. The movie is coming _____ this summer. (Come out)

- around
- off
- out
- up
- I don't know

8. Last night we went _____ for Italian food. (Go out)

- through
- out
- up
- off
- I don't know

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: Phrasal Verb Survey
Diagnostic Test

106

9. He pointed _____ the importance of daily exercise (Point out)

- back
- out
- in
- off
- I don't know

10. She grew _____ in Boston (Grow up)

- back
- out
- in
- up
- I don't know

Choose the option that best represents the meaning of the underlined word.

Do not guess the answer, but you can make an educated guess if the answer sounds right to you.

If you have no idea, please choose, "I don't know".

(* denotes correct answer)

11. We **set up** camp for the night near the river

Choose the best meaning of **set up**

- started a business
- made ready to use *
- scheduled
- I don't know
-

12. The bakery **turns out** 300 pies a day.

Choose the best meaning of **turns out**

- results, proves to be
- excludes, rejects
- Produces *
- I don't know

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: Phrasal Verb Survey
Diagnostic Test

107

13. We don't **get out** much now that we have a baby.

Choose the best meaning of **get out**

- escape a place
- go places and have an enjoyable time *
- remove something from inside
- I don't know

14. We'll need a new room, and that's where you **come in**.

Choose the best meaning of **come in**

- are needed for *
- go to work
- enter the room
- I don't know

15. I have **taken on** too much work.

Choose the best meaning of **taken on**

- brought home
- competed against someone
- accept some responsibility *
- I don't know

16. Sorry I'm late - I was **held up** at work.

- Supported, stopped from falling
- Delayed *
- Robbed with a gun
- I don't know

17. Women **make up** 56 per cent of the student numbers.

Choose the best meaning of **make up**

- form, account for *
- put on their face
- make peace
- I don't know

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: Phrasal Verb Survey
Diagnostic Test

108

18. I **ended up** doing all the work myself.

What sentences best describes the meaning of **ended up**:

- To find yourself in a place or situation that you did not intend or expect to be in *
- To finish doing something
- To make a final decision about something
- I don't know

19. They surrendered without **putting up** much of a fight.

What sentences best describes the meaning of **putting up**:

- letting someone stay with you
- raising or increasing something
- making an effort to achieve or prevent something *
- I don't know

20. I did not let negative thoughts **take over**.

What sentences best describes the meaning of **take over**:

- become bigger or more important *
- stop from happening
- carry or remove something
- I don't know

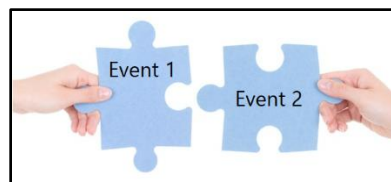
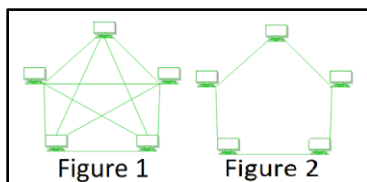
21. She had to **look up** the number of the restaurant.

Choose the picture that best describes the verb **look up**: Option 2



22. We **figured out** the connection between the two events

Choose the picture that best describes the verb **figured out**: option3

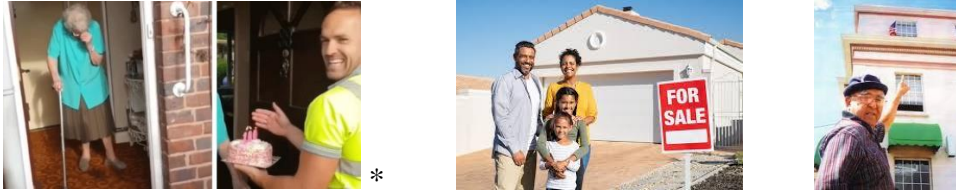


Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: Phrasal Verb Survey
Diagnostic Test

109

23. He just showed up at my house.

Choose the picture that best describes the verb **showed up**: Option 1



24. He **took** me **out** to a restaurant last night (take out)

Choose the picture that best describes the verb **took out**: Option 1



----- End of Survey -----

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Participant Tasks During Prototype Testing

110

Appendix D: Participant Tasks During Prototype Testing

Task	Scenario	Follow Up Questions
T1	Your English teacher just told you about this new mobile website to learn phrasal verbs. Your whole class would be using the website to practice these verbs. You download the widget of the website on your phone and decide to check it out.	<ul style="list-style-type: none"> • What are your first impressions? • What do you notice/gravitate towards/want to interact with first? • Tell me why that interested you?
T2	You started using the Phrasal Verb Survival website every day. Today you want to finish your Level 3 of learning phrasal verbs with illustrated meanings. Show me how you will do that.	<ul style="list-style-type: none"> • What did you like the most about finishing this level? • What did you think about learning phrasal verbs this way? • Is there anything on this section of the website that you think is not needed?
T3	You have a couple of minutes to spare while waiting in line at the grocery store, and you remembered that the Phrasal Verb Survival website has a game. Go to the website and play while you wait.	<ul style="list-style-type: none"> • What was clear, or confusing during the game? • Was there anything you expected to see that you did not see on the game?
T4	You have decided that you like this site, and you have every intention to go to the website and study every day, but your life is very busy, and you keep forgetting. Find a place where you can set reminders to study every day.	<ul style="list-style-type: none"> • Is the location of the reminders where you expected it to be? • How would you like to be reminded to study your phrasal verbs? • How often do you realistically study them and for how long each time?
T5	You keep studying with the Phrasal Verb Survival website and when you received your reminder today, you want to continue learning the meanings of the particle “out.” Go and finish learning the meanings of the particle “out.”	<ul style="list-style-type: none"> • What was clear and what was confusing? • What did you think about learning phrasal verbs this way? • Is there anything on this section of the website that you think is not needed?

Appendix E: In-depth Interviews of English Learners

Interview Goals

- How do intermediate/advanced students learn phrasal verbs in their daily lives?
- What do these students want to achieve in terms of learning phrasal verbs?
- What are the learners' pain points in learning phrasal verbs through apps or websites?

Personal Background

- How old are you? 18-24, 25-34, 35-44, 45-54, 54-64, 65+
- What country are you from?
- What is your native language?
- What city do you live in? Work in?
- What is your educational background?
- What do you like to do in your free time?

Phrasal Verbs knowledge

- How would you classify your level of English:
 - Beginner
 - Low Intermediate
 - High Intermediate
 - Advanced
- Do you know what a phrasal verb is? (If not, explain and give examples)
- How important do you think it is to learn phrasal verbs?
- How do you feel about learning phrasal verbs?
- Where do you speak English?
- How do you feel when people use phrasal verbs in everyday conversations?
- At what age did you start learning English?
- Are you taking English classes right now?

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: In-depth Interviews of English Learners

112

- Where online do you learn English?
- Have you encounter any limitations in your communication with others because of your knowledge of phrasal verbs?
- How comfortable are you using phrasal verbs in your everyday communications?
- Would you like to improve your knowledge of phrasal verbs?
- How do you think that you can improve your knowledge of phrasal verbs?
- What would make learning phrasal verbs more enjoyable for you?

Interactions in English

- Where are those interactions taking place?
- How do you occupy most of your time during the week?
- Do you interact with others in English during those times?
- What are your biggest challenges while communicating with them?
- How do you think you can address those challenges?
- What frustrates you the most when you hear people using phrasal verbs in conversations?

Goals

- What are your goals with learning phrasal verbs?
- Why are those goals important?
- What steps are you taking to achieve these goals?

Challenges

- What are the biggest challenges that prevent you from achieving these goals?
- What have you done in the past to conquer these challenges? Did it work?
- If it didn't, what would you do differently next time?

Tech usage for learning PVs

- What kind of technologies have you used for learning phrasal verbs?
- What have been your biggest challenges with those technologies?

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners
Based on Research on Effective Pedagogical Techniques: In-depth Interviews of
English Learners

113

Objections

- What are your biggest complaints about technology?
- What must happen for you to overcome these complaints?

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Empathy Maps from In-depth Interviews of English Learners

114

Appendix F: Empathy Maps from In-depth Interviews of English Learners

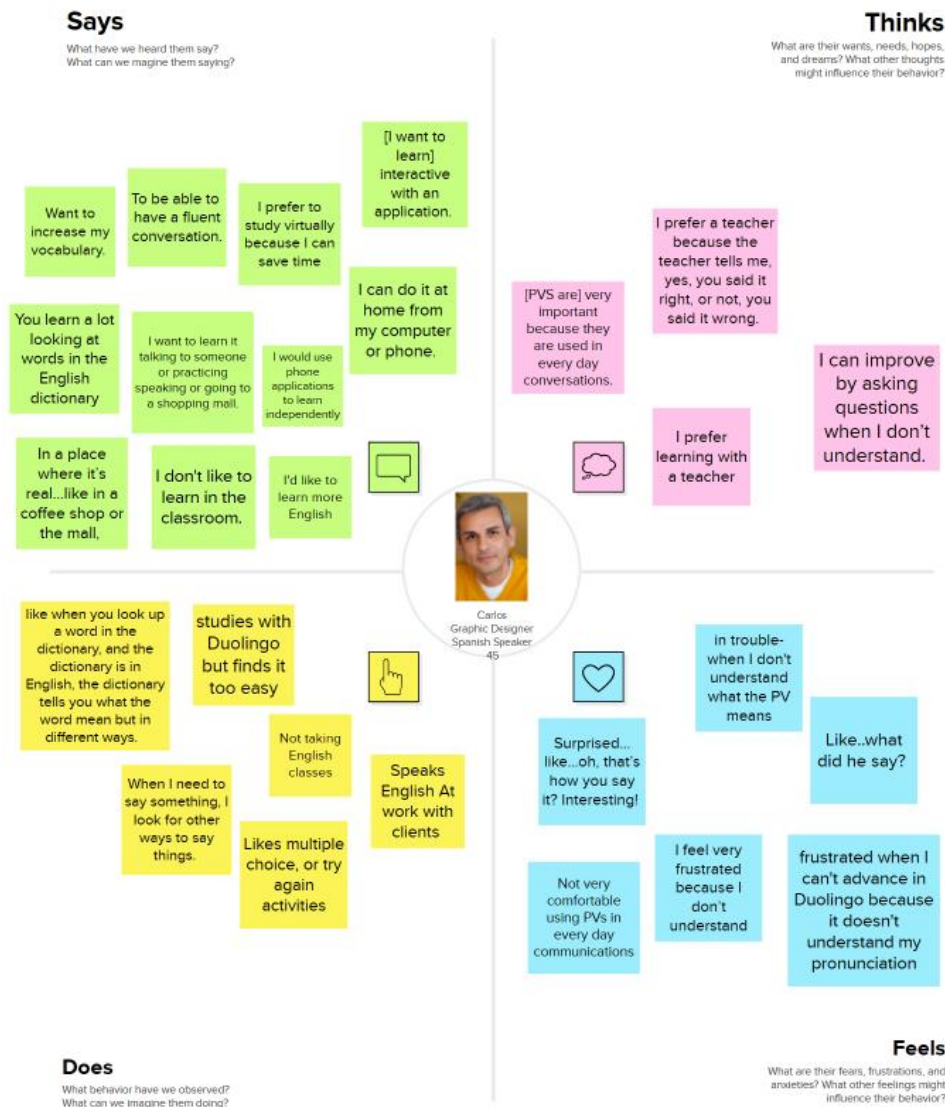


Figure F1. Participant P1 Empathy Map.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Empathy Maps from In-depth Interviews of English Learners

115

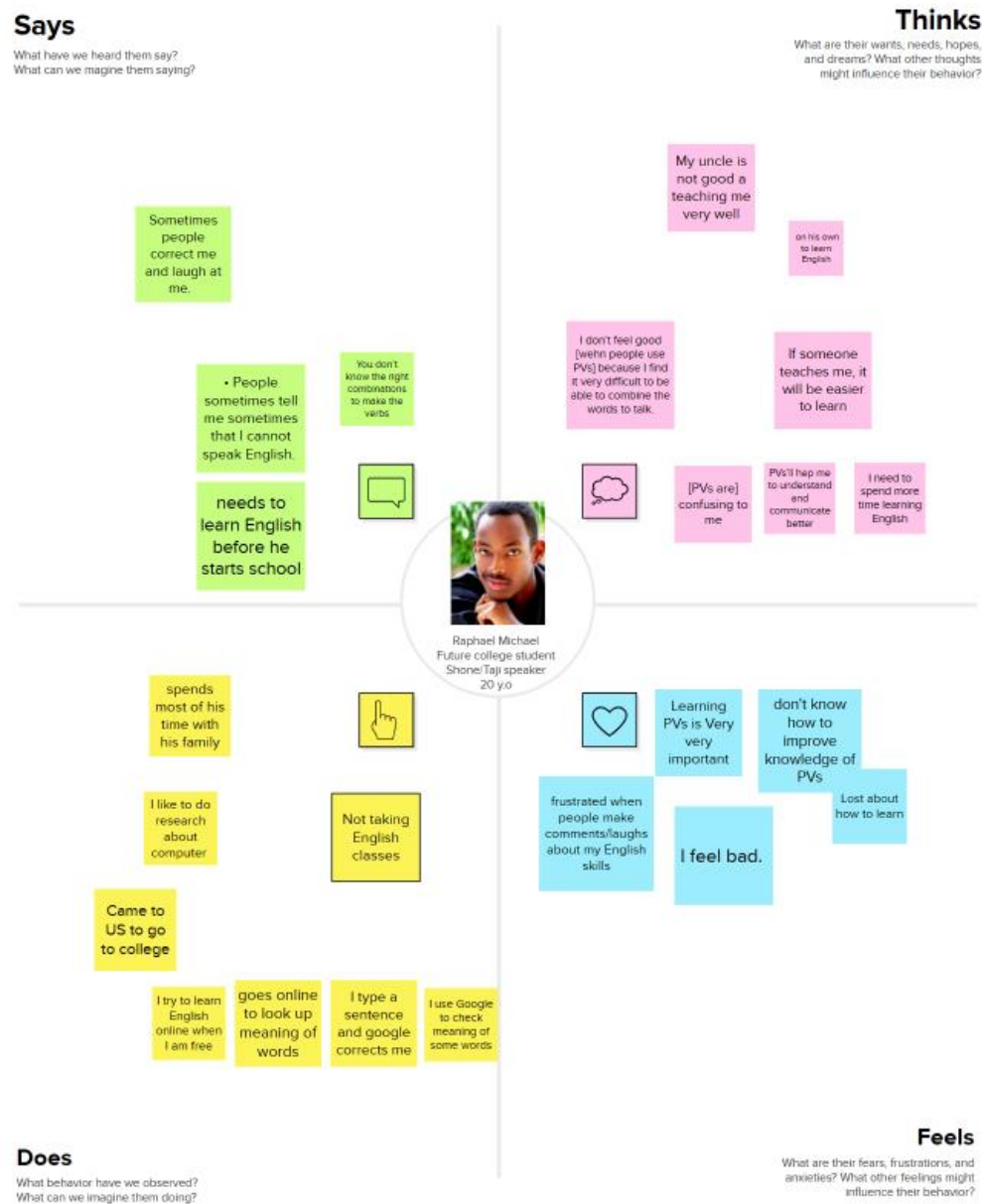


Figure F2. Participant P2 Empathy Map.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Empathy Maps from In-depth Interviews of English Learners

116



Figure F3. Participant P3 Empathy Map.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Empathy Maps from In-depth Interviews of English Learners

117

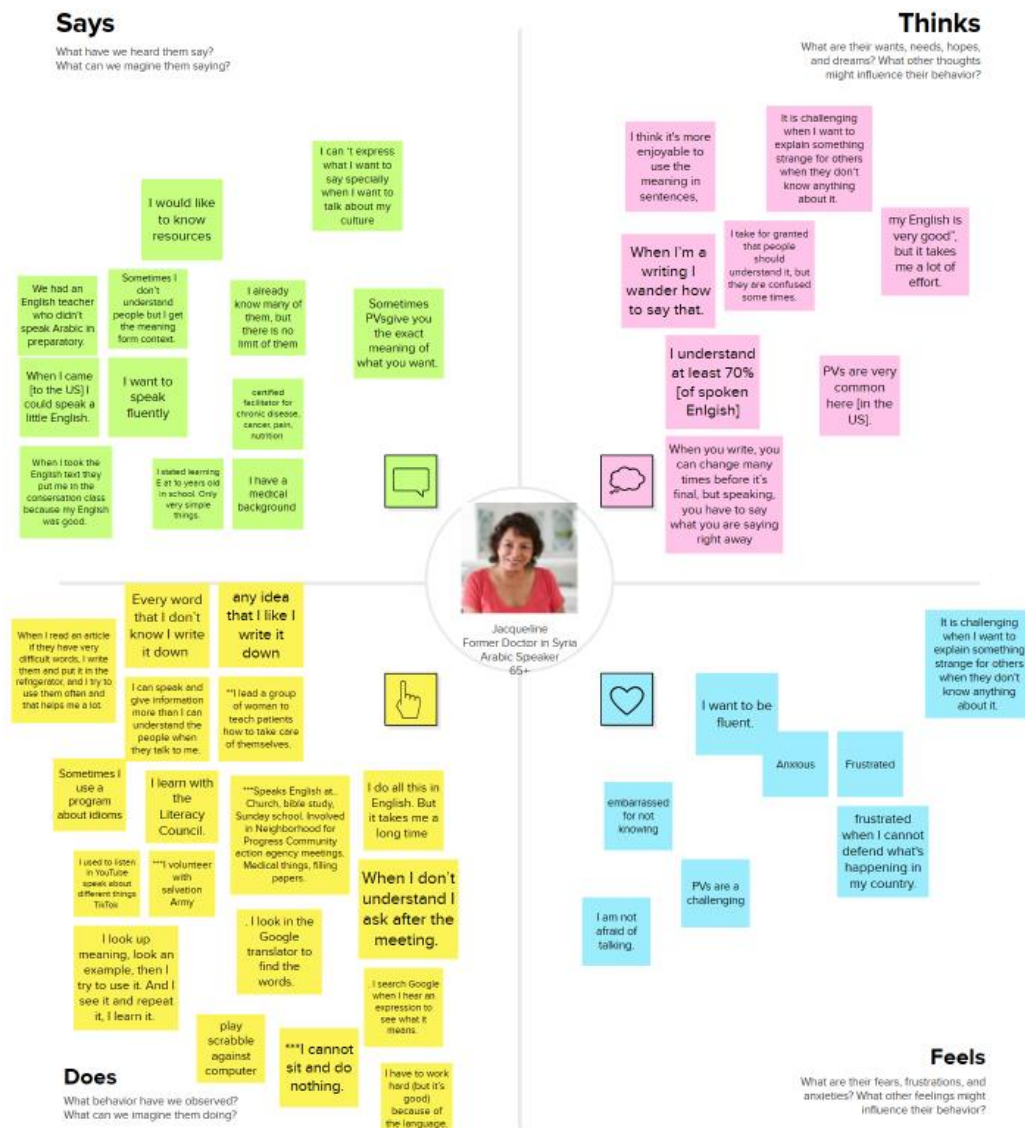


Figure F4. Participant P4 Empathy Map.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Empathy Maps from In-depth Interviews of English Learners

118



Figure F5. Participant P5 Empathy Map.

Designing a Usable Mobile Website for Teaching Phrasal Verbs to English Learners Based on Research on Effective Pedagogical Techniques: Empathy Maps from In-depth Interviews of English Learners

119

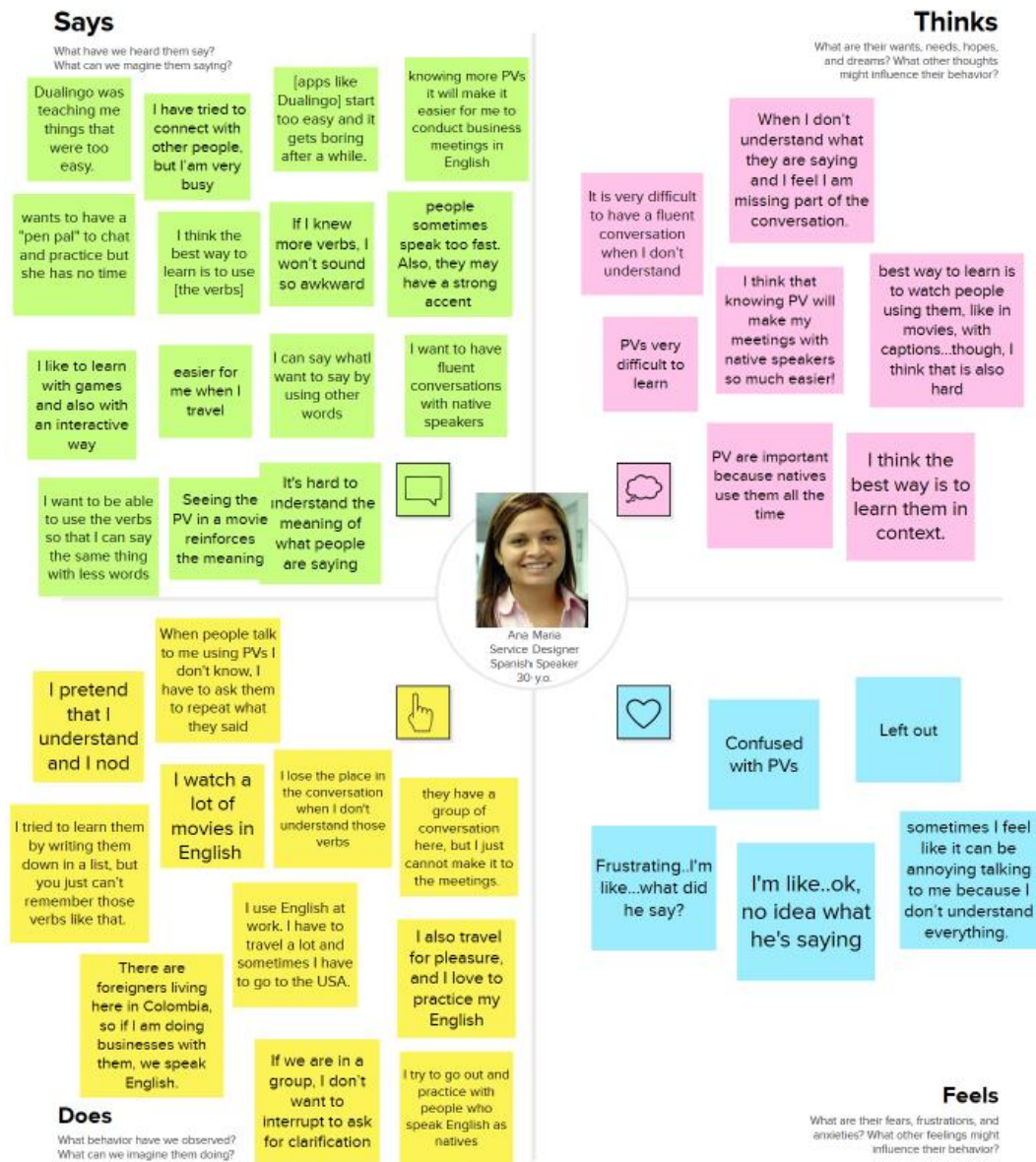


Figure F6. Participant P6 Empathy Map.