

High-Immersion Virtual Reality L2 Learning Apps: Alignment with Second Language Learning

Theories and Principles

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Abstract

High-immersion virtual reality (VR) applications have been widely used for educational purposes, such as utilizing VR headsets as a learning engagement tool, performing simulated surgeries, or taking driving lessons. According to many studies, VR headsets are educationally beneficial as they increase motivation and promote classroom interaction and collaboration. While the studies showing VR educational benefits are numerous, few of them have explored VR benefits for second language (L2) instruction and learning. One particular question in need of scholarly attention is to what extent language-learning VR applications are in keeping with the well-established L2 learning theories and principles. This project compared the existing high-immersion (i.e., headset-operated) VR applications *Immerse* and *ImmerseMe* for their alignment with the L2 theories. Specifically, we developed a rubric to evaluate the extent to which each application adhered to the principles of L2 pedagogy, including focus on meaning, input, focus on form, interaction, and motivation. The findings suggested that the *Immerse* application is more closely aligned with the L2 pedagogical principles, especially as it relates to providing focus on form and opportunities for negotiation of meaning. However, we also discovered that *ImmerseMe* had a few pedagogical advantages related to autonomy, motivation, and classroom use. Based on these findings, we concluded that although *Immerse* has significantly more pedagogical potential than *ImmerseMe*, both applications can be useful for independent L2 learning.

Keywords: Virtual reality, language learning, VR headset, high-immersion VR

Introduction

As a higher education institution, Oakwood university (henceforth, Oakwood) seeks innovation in order to maximize learning outcomes for its students. Virtual reality (VR) is one of the innovative tools that Oakwood could use for this purpose. Considering the growing impact of VR technology on higher education, it is particularly important to investigate if *high-immersion* VR has a facilitative effect on second language (L2) learning. High-immersion VR allows for ample locomotion and interaction with the immediate environment and its objects (Frazier et al., 2021), which can be achieved by means of using a VR headset as opposed to lower-immersion technologies, such as a laptop or smartphone (Makransky & Petersen, 2021). Given that cultural immersion and interaction are key ingredients for successful L2 learning (Lightbown & Spada, 2022), investigating the effects of high-immersion VR on L2 learning could significantly shape the L2 teaching practices at Oakwood, including the teaching of Spanish, French, and/or English as a second language (ESL) classes.

The research into the effectiveness of high-immersion VR applications for L2 learning is scarce and inconclusive. According to some studies (e.g., Lan, 2020), VR may boost motivation for and attitudes toward L2 learning; however, the extent to which this boost facilitates L2 acquisition is yet unknown. Other studies compared the effects of high-immersion VR vs. lower-immersion technologies such as mobile applications on L2 skills development, with mixed findings (e.g., Nicolaidou et al., 2021). Another important aspect of the relationship between VR and language is how high-immersion VR applications align with L2 learning theories and principles. There are several high-immersion-VR-based applications for L2 learning on the market, including but not limited to *ImmerseMe*, *Immerse*, *Mondly*, and *VR Speech*. To the

author's knowledge, their design and its adherence to L2 learning principles have not yet been a subject of scholarly investigation. It is this gap that the present study aims to bridge.

Literature Review

The field of instructed second language acquisition (SLA) has seen many theoretical and empirical studies that explored optimal conditions for L2 learning. Collectively, these studies provide a comprehensive picture of how L2 is learned, but the picture is still inconclusive and remains an unsolved puzzle in many respects. For instance, theoretical views on instructed SLA range from behavioristic, repeat-after-me and learn-the-rules elements to purely communicative, zero-grammar approaches, with many junctures in between (Lightbown & Spada, 2022). Even though we have several theoretical positions that sometimes compete with one another, there is a growing consensus as to which principles and factors are essential for successful L2 learning to take place. Many scholars now agree that the following principles are critically important: (1) focus on meaning, (2) focus on form, (3) comprehensible, authentic, and extensive input, (4) interaction, and (5) motivation. Each of these principles is explained below with a view on its application to the design and evaluation of VR-based L2 learning apps. The numbering does not suggest superiority of one principle over another; rather, it reflects the order in which these principles are discussed below.

Focus on Meaning

According to Ellis (2014), L2 “instruction needs to ensure that learners focus predominantly on meaning” (p. 34). This focus-on-meaning principle prioritizes activities where learners need to understand what is said in the target language (e.g., read a news story and discuss it with a partner) over activities where learners do not (e.g., memorize a dialogue or conjugate a verb). It includes semantic meaning, or the surface meaning of a particular structure, and

pragmatic meaning, or the hidden, context-dependent meaning of the structure. For example, saying “It is cold in here.” to inform someone of the room’s temperature would represent semantic meaning while saying the same sentence to express indignation and suggest someone should shut the door encodes pragmatic meaning. Both aspects are believed to be important for developing L2 proficiency. In the case of CALL environments such as L2 learning VR apps, the focus-on-meaning principle can manifest itself in an abundance of meaning-focused (including pragmatic meaning) activities afforded by a particular VR app.

Input

Maintaining focus on meaning would not be possible without providing learners with L2 input. Input refers to meaningful messages in the target language that learners need to understand. It comes in many forms, such as written and spoken texts, conversations, teacher-student communication, and others. Some scholars say that input is the most important factor for successful L2 learning and, in and of itself, a sufficient condition for L2 acquisition (e.g., Krashen, 1984 as cited in Wright, 2019). Other scholars disagree: While considering it essential, they don’t believe input alone is sufficient for successful L2 learning and argue that L2 instruction should account for factors like interaction and focus on form (see Lightbown & Spada, 2022). Regardless of the position one takes, input is clearly a key player in the process of L2 learning, and therefore, its impact should be maximized where possible.

We can maximize the role of input by ensuring that it is comprehensible, authentic, and extensive (Ellis, 2014; Krashen, 1984; Tomlinson & Masuhara, 2018). First, input must be comprehensible. If input is too hard to understand, it may not be meaningful for learners; however, if it is too easy, it may not be effective. In keeping with Krashen’s ideas, input should be at the level slightly above the current L2 proficiency of the learner (i.e., $i+1$, where i = the

learner's current level) so that to provide reasonable challenge without being overwhelming. Next, input may need to be authentic. As mentioned before, learners benefit from exposure to both semantic and pragmatic meaning in the target language. Perhaps the best way to achieve this exposure is to incorporate input stemming from real-life situations in the target culture. While sometimes modified (e.g., contrived or simplified) input may also be effective, especially for lower-level learners, authentic input can help learners develop a more nuanced understanding of the target language and culture.

Finally, input should be extensive. Ellis (2014) stresses that “language learning ... is a slow and laborious process” (p. 38) that requires exposure to “massive amounts of input.” Transferring this assumption into the realm of L2 learning, we understand that the more input the learner gets, the more he/she learns. Therefore, it is pedagogically beneficial to maximize how much input the learner receives in the classroom (e.g., the use of L2 in class by the teacher) and outside the classroom (e.g., level-appropriate out-of-class reading and listening). As it translates to L2 learning in VR settings, we would expect software to incorporate level-appropriate real-life input along with creating opportunities for users to receive input outside the immediate CALL environment.

Focus on Form

In addition to providing focus on meaning and comprehensible input, effective L2 instruction seeks to incorporate focus on form (Ellis, 2014). The term “focus on form” (FonF) was coined by Long (1991), as cited in Tomlinson & Masuhara (2018), to describe teachers' feedback on linguistic form as a reaction to learners' form-related problems in a communicatively oriented activity. Long believed that this on-demand FonF should not take over the lesson's primary focus on meaning and, therefore, should be brief. Since then, however, the

term has evolved to encompass not only the teacher's reactive attention to form in response to an error arising in a communicative, meaning-focused activity but also a planned instruction of the pre-selected grammatical forms that are expected to cause communication problems during the activity. For instance, a teacher giving feedback on a Past Simple error that arises in the middle of an activity where students describe what they did last summer would be an illustration of FonF in its original sense (reactive). But a pre-teaching of Past Simple before the activity in order to help students avoid communication breakdowns while in the activity illustrates the term's expanded meaning (proactive). Research has demonstrated that both approaches are beneficial to L2 learners (see Ellis, 2014; Lightbown & Spada, 2022).

The concept of FonF partners with the notion of noticing. It is believed that before internalizing a certain language form (e.g., a grammar pattern or word), the learner needs to notice it as it occurs in the input, not necessarily as it occurs in the grammatical rule (Schmidt, 2001, as cited in Li, 2017). To increase the chances of noticing, teachers can employ typographical enhancements (e.g., bolding or underlining), input modifications (i.e., visual support or L2-to-L1 translation), or input flood (e.g., input intentionally seeded with a certain grammar point). These measures direct learners' attention to the target form. To build on this attention-grabbing momentum, teachers can employ an inductive approach to form-focused instruction by having learners infer what the target feature is, what it means, and how it is used in the input. As a follow-up, the teacher can provide clarification, explicit explanation, and/or elaboration deductively. Alternatively, the presented approaches can be combined in a different way depending on the context.

It should be noted that form-focused instruction is a strong suit of modern CALL, including VR environments. Computers can provide feedback and explanations on form in an

increasingly efficient and reliable manner, in addition to their ability to use input enhancement and modification to increase noticing (e.g., multimedia, visuals, video, graphics). These capabilities enable computers to provide balanced FonF where conscious noticing, inductive instruction, deductive explanations, and corrective feedback are neatly integrated in a communicative activity without compromising its primary focus on communication and meaning.

Interaction

Interaction is another key factor for successful L2 development. In the field of SLA, the concept of interaction has two angles. The first angle aligns with the cognitivist theory of language learning and Long's (1991) interaction hypothesis, which posits that negotiation of meaning is a crucial component of successful L2 learning. While talking with another person, the L2 learner is forced to produce output and clarify the meaning amidst a communication problem by asking questions, repeating his or her utterance, or giving confirmation checks or clarification requests. This process develops the learner's fluency due to its focus on information exchange and meaning-making in the real time. The information exchange may also force a more proficient interlocutor to modify their speech to make it more comprehensible to his or her conversation partner (e.g., slowing down, simplifying, using body language). These modifications ensure that the receiver of the message gets comprehensible input, which, as discussed above, is critical for L2 development. Interaction also fosters accuracy as it helps the learner to notice his/her L2 gaps as they arise incidentally in the form of grammatical, lexical, or phonological errors, which, in turn, trigger clarification and negotiation. In this respect, interaction is a tool that forces the learner to notice the limitations of their L2 ability and pay more attention to form. Given these benefits, it seems crucial for VR-based language learning

environments to afford ample opportunity for L2 learners to interact with other learners or native speakers.

The second perspective on interaction is grounded in the socio-cultural theory of learning and Vygotsky's (1978) work (see Li, 2017). This perspective treats interaction as a social, context-dependent activity, with minimal attention to its cognitive and psychological processes. According to Vygotsky, knowledge is created through interaction and collaboration with another, usually more skillful, learner. Such a collaboration promotes an ecosystem, often referred to as a zone of proximal development (ZPD), where the less skillful learner can reach his or her language learning potential with the support and assistance from the more skillful learner (i.e., a more proficient speaker or a native speaker). When applied to L2 learning, this theory promotes collaborative activities aimed at co-constructing knowledge, such as a lower-level learner working with a higher-level partner to create a movie script, the teacher looking at a draft of the script to provide feedback on content and/or grammatical accuracy, or the teacher explaining a script-relevant grammatical rule to the students and designing meaningful practice of the said rule. Thus, the socio-cultural perspective views interaction as a space where learners can develop their L2 ability in collaboration and by participating in social practices (e.g., working on a project together, collaborative problem-solving or exploration, socializing, creating a community). In contrast, the cognitivist perspective views interaction primarily as a pedagogical tool for L2 use and practice (e.g., receiving modified input, noticing the gap, generating comprehensible output). For the former, a CALL environment would seek to facilitate social participation and collaboration among L2 learners by providing opportunities for do-it-together tasks, scaffolding and feedback from the computer or a knowledgeable person, and promoting empathy and cultural awareness.

Motivation

Motivation is hard to define because it is a multi-faceted construct that has been influenced by numerous theories and hypotheses. It is colloquially referred to as a desire to learn an L2 and is often described in terms of the following contrasts: intrinsic vs. extrinsic and instrumental vs. integrative. As discussed in Brown (2014), intrinsic motivation builds on internally rewarding feelings such as aspiration and self-determination to achieve L2 competence (e.g., personal interest in the target culture or in the learning process) while extrinsic motivation is an external, reward-driven factor (e.g., learning an L2 for a grade or to avoid punishment). The other, instrumental-vs-integrative, classification was inspired by the work of Gardner and Lambert (1972), as cited in Brown (2014). Instrumental motivation relates to the practical value of learning an L2, which may include growing one's career (e.g., increasing the chances of getting a promotion) or achieving a personal goal (e.g., watching a movie in the original language). In contrast to this practical orientation, integratively inclined L2 learners are interested in partaking in the target culture and connecting with L2 communities. It is important to note that both the intrinsic-extrinsic and instrumental-integrative classifications are continuums rather than dichotomies and may overlap. In everyday life, L2 learners normally source their motivation from a mixture of factors, and these factors may belong to different orientations at the same time.

Despite these challenges, both classifications can help VR app developers maximize the motivational power of their products. A well-developed VR-based L2 learning app would promote learners' motivation in a variety of ways – intrinsically, extrinsically, instrumentally, and integratively. For example, an app that can develop a deeper understanding of the target culture alongside the target language would cater to integratively motivated learners. On the other hand, an app offering incentives (e.g., digital coins or stars) for learners to complete L2 learning tasks and get promoted to the next level would foster extrinsic and perhaps instrumental motivation. In

addition to promoting more than one type of motivation, it is important to avoid common-sense motivation-threatening elements of app design such as a counterintuitive or glitchy interface.

Research Questions

The current study aims to (1) identify existing high-immersion VR applications designed specifically for L2 learning, (2) analyze each application for its purpose and claims about its effectiveness and expected L2 learning outcomes, (3) explore the extent to which the design of each application aligns with the key L2 learning principles discussed above, and (4) provide a recommendation as to which applications are likely to be more effective in terms of L2 pedagogy. These aims will be achieved by answering the following research question: *How closely does the design of chosen VR language learning applications align with the key principles of L2 pedagogy, namely focus on meaning, input, focus on form, and interaction?*

Methods

To achieve our goals, we employed a descriptive, judgmental, phenomenological, non-empirical evaluation of the identified apps (Leaky, 2011). We first selected the apps that met the following criteria: (i) a VR-based application with high-immersion (headset) capabilities, (ii) designed specifically for L2 learning, (iii) does not require a classroom-based formal environment, and (iv) is available in the *Meta Quest* store. We then analyzed the publicly available information about the chosen apps, including their descriptions in the *Meta Quest* store and official webpages. We chose to research observing the apps Immerse and Immerseme.

Then, we developed a rubric that included the key L2 learning principles discussed in the literature review. We borrowed ideas from Leakey's framework (2011, p. 249), which was developed for evaluating CALL and can be applied to the CALL platform, program, and/or pedagogy. It contains 12 evaluation criteria, many of which overlap with the L2 learning principles identified in the literature review. While we borrowed some evaluative questions from

the framework, we decided to group them by the four key pedagogical principles we discussed earlier and leave out questions that relate to more technical CALL aspects like learner fit, teacher fit, practicality, and class delivery modes. The resulting rubric is presented in Table 1.

Table 1

The Rubric

Criterion	Questions:	To what extent? (0-3)
	<i>Do the app-based activities ?</i>	0 = not at all 1 = minimally 2 = somewhat 3 = fully
Focus on Meaning	<ul style="list-style-type: none"> allow learners to comprehend and produce meaningful L2 spoken messages? comprehend and produce meaningful L2 written messages? provide meaningful and relevant context? simulate real-life scenarios? 	
Input	<ul style="list-style-type: none"> provide oral input? provide written input? provide level-appropriate input? provide authentic input? provide/promote extensive input? 	
Focus on Form	<ul style="list-style-type: none"> provide feedback on language form? provide explicit instruction of language forms? promote conscious noticing of form through typographical enhancements, glossing, and/or input flood? 	
Interaction	<ul style="list-style-type: none"> provide opportunities to negotiate meaning with same-level L2 learners? provide opportunities to negotiate meaning with a more knowledgeable other, such as a higher-level L2 learner, native speaker, or the computer? provide opportunities to engage in collaboration and cooperative learning? provide scaffolding or support for learners to engage in more challenging activities? 	
Motivation	<ul style="list-style-type: none"> use immersive, realistic, intuitive, and glitch-free VR environments? promote autonomy by allowing learners to choose and control learning experiences, set personalized goals, track their progress, and reflect on it? offer incentives/rewards for learners to complete tasks or achieve milestones in their learning journey? encourage learners to develop a deeper understanding of the target culture? promote a sense of community among learners? allow for creativity and self-expression? 	
	* other motivational factors are accounted for in the questions above (i.e., interaction with native speakers, level-appropriate activities, authentic materials)	

Results

Each question was evaluated on a scale from 3 to 0. A score of 3 constitutes the highest score possible, meaning that the VR application showed consisting evidence of adopting practices that aligned with a specific pedagogical principle. A score of 0 constitutes that the application does not show any evidence of incorporating practices that align with the specific pedagogical principle. After observing the lessons included in each app and applying the rubric, we averaged the scores of each question within each criterion, as shown in Table 2 below. Table 3 contains individual scores for *Immerse* on a beginner-level 40-min Spanish lesson “In the Restaurant.” Table 4 shows individual scores for *ImmerseMe* on an intermediate-level Spanish lesson “Buying a Sandwich.”

Table 2

Average Scores per Pedagogical Principle

Pedagogical Principle	<i>Immerse</i>	<i>ImmerseMe</i>
Focus on Meaning	2.75	2.50
Input	2.10	1.80
Focus on Form	2.50	0.33
Interaction	2.88	0.00
Motivation	2.33	1.29
Total	2.51	1.18

Table 3

Scores and Commentary for Immerse

Criterion	Questions:	Score	Commentary
<i>Do the app-based activities ?</i>			
Focus on Meaning	allow learners to comprehend and produce meaningful L2 spoken messages?	3	The messages mimic real-life exchanges in order to create a product.
	comprehend and produce meaningful L2 written messages?	2	No writing but reading phrases and vocabulary on the board.
	provide meaningful and relevant context?	3	Meaningful exchanges between learners to produce a real product: making food.
	simulate real-life scenarios?	3	VR restaurant looked like a videogame. Learners collaborate in real-life scenarios.
Input	provide oral input?	3	The teacher demonstrated the new vocab and phrases in context.
	provide written input?	3	The teacher wrote the phrases and vocabulary that was needed to perform the task.
	provide level-appropriate input?	3	Phrases provided: "Quiero pedir un perro caliente". Teacher speaks mostly Spanish.
	provide authentic input?	3	We had basic phrases such and we explored other ways to order food that were normal for Spanish Speakers.
	provide/promote extensive input?	0	No outside sources were available during the lesson.
Focus on Form	provide feedback on language form?	3	Correction by repeating request correctly.
	provide explicit instruction of language forms?	3	Explanations provided by teacher as to mistakes in grammar.
	promote conscious noticing of form through typographical enhancements, glossing, and/or input flood?	3	The teacher helped students notice mistakes. However, there was no typographical enhancement.
Interaction	provide opportunities to negotiate meaning with same-level L2 learners?	2	Yes, learners had to negotiate meaning when ordering food and preparing meal to complete the task.
	provide opportunities to negotiate meaning with a more knowledgeable other, such as a higher-level L2 learner, native speaker, or the computer?	3	The teacher spoke Spanish as her L2. Provided explanations and clarification of word meaning and intonation.

	provide opportunities to engage in collaboration and cooperative learning?	3	The students had to complete tasks in Spanish.
	provide scaffolding or support for learners to engage in more challenging activities?	3	The students provided support for technology challenges. The teacher provided support to students' language challenges.
Motivation	use immersive, realistic, intuitive, and glitch-free VR environments?	3	The class took place in a fast-food restaurant, we moved throughout the room, touched things, cooked, sat on chairs. Users can choose which classes to take, and when. Learners can personalize avatars.
	promote autonomy by allowing learners to choose and control learning experiences, set personalized goals, track their progress, and reflect on it?	2	I have not seen how you can track your progress, but each class has a reflection section at the end. There was opportunity to ask questions about culture, customs, and even sayings, or different dialects. Learners collaborate with other users and with the teacher in the class to complete tasks in the VR environment. Learners can also join other conversation groups outside of the class time to converse and put in practice what they learn.
	offer incentives/rewards for learners to complete tasks or achieve milestones in their learning journey?	1	
	encourage learners to develop a deeper understanding of the target culture?	2	
	promote a sense of community among learners?	3	
	allow for creativity and self-expression?	3	You are welcomed to collaborate and share your own knowledge with the class.
* other motivational factors are accounted for in the questions above (i.e., interaction with native speakers, level-appropriate activities, authentic materials)			

Table 4

Scores and Commentary for ImmerseMe

Criterion	Questions:	Score	Commentary
<i>Do the app-based activities ?</i>			
Focus on Meaning	allow learners to comprehend and produce meaningful L2 spoken messages?	3	Learners comprehend and produce meaningful L2 spoken messages that are evaluated if accurate by the computer.
	comprehend and produce meaningful L2 written messages?	1	Learners read a scripted phrase in Pronunciation, However, there is no written exchange of information.
	provide meaningful and relevant context?	1	The context is very relevant, and the input is formulaic, but meaningful.
	simulate real-life scenarios?	3	The environment is authentic, the person recorded is a real native speaker who works at a cafe.
Input	provide oral input?	3	Learners listen to recordings of native speakers,
	provide written input?	3	Learners read 2-3 options per answer in the interaction, you can read and type the question you read.
	provide level-appropriate input?	3	Input is comprehensible for an Intermediate learner.
	provide authentic input?	2	Input reflects a dialect from Spain. However, learners cannot go "off" the script as the app will mark it as wrong or will not perceive it as accurate.
	provide/promote extensive input?	0	No extensive sources were available during the lesson.
Focus on Form	provide feedback on language form?	1	If learners spell/conjugate the verb well, they get points and "kudos".
	provide explicit instruction of language forms?	0	No explicit instruction of language form.
	promote conscious noticing of form through typographical enhancements, glossing, and/or input flood?	0	No typographical enhancements observed.
Interaction	provide opportunities to negotiate meaning with same-level L2 learners?	0	No opportunity to negotiate meaning. Either the person says or types the requested sentence correctly or it is inaccurate. The computer will not allow for the avatar to ask clarification questions or explanation questions.

	provide opportunities to negotiate meaning with a more knowledgeable other, such as a higher-level L2 learner, native speaker, or the computer?	0	Same as above.
	provide opportunities to engage in collaboration and cooperative learning?	0	No opportunity to engage in collaboration and cooperation.
	provide scaffolding or support for learners to engage in more challenging activities?	0	No opportunity to provide scaffolding or support from any live person or avatar.
Motivation	use immersive, realistic, intuitive, and glitch-free VR environments?	2	Learners have a 365 degree view of the entire real life surrounding. You can hear the background noises. It is intuitive. Learners keep track of progress by getting "kudos" and points when doing well on activities.
	promote autonomy by allowing learners to choose and control learning experiences, set personalized goals, track their progress, and reflect on it?	3	Learners get "kudos" and points for completion and accuracy. Somewhat. You can observe environments and dialects, but there are no perspectives offered. No community. No interaction with real people.
	offer incentives/rewards for learners to complete tasks or achieve milestones in their learning journey?	3	
	encourage learners to develop a deeper understanding of the target culture?	2	
	promote a sense of community among learners?	0	
	allow for creativity and self-expression?	1	Learners are given options for questions or answers. No creative use of the language.
	* other motivational factors are accounted for in the questions above (i.e., interaction with native speakers, level-appropriate activities, authentic materials)		

Discussion

After observing each application's functions and limitations and comparing the average scores for each section we can observe that *Immerse* receives a consistently higher score in each category with a total average of 2.51. *ImmerseMe* received a lower average score in each category with a total average of 1.18. We can conclude that *Immerse* offers L2 learners with an VR language learning application that better incorporates the theories and principles of language acquisition than *ImmerseMe*.

The most significant differences between the two applications were in the categories "Focus on Form" and "Interaction." For both categories *ImmerseMe* scored exceptionally low while *Immerse* scored remarkably high. With regards to Focus on Form, *Immerse* scored higher (2.50) because it allowed for learners to receive feedback on grammar and vocabulary use from the teacher and/or classmates. Also, learners received the teacher's explicit explanation, guidance, and/or correction, which afforded learners the opportunity to notice their mistakes. In contrast, *ImmerseMe* scored very low (0.33) because there was no explicit explanation for or correction of learners' grammar. The other category that showed a wide discrepancy between *Immerse* and *ImmerseMe* is Interaction. *Immerse* scored significantly higher (2.88) because it allows for creating community with scaffolding opportunities including a "waiting room" before class time, collaborative real- life do-it-together tasks, and feedback from the teacher and students in aspects of the target culture. In contrast, in *ImmerseMe* (0.00), learners do not engage in any collaboration with others, and the interaction does not allow for negotiation of meaning or creative use of the language.

It is important to note that neither app received a perfect score, suggesting that both apps have deficiencies in adopting practices that align with the principles of second language

acquisition. *Immerse* is more theory-informed, particularly regarding interaction and collaboration opportunities and focus on form. However, *ImmerseMe* may promote more autonomy and rewards-based motivation. Both apps show limitations in their offer of extensive input, such as listening to a story or reading a book, or written output, such as constructing a sentence or a paragraph.

Pedagogical Recommendations

The results of this study suggest that both applications have pedagogical value for learning a second language. *Immerse* could work particularly well for independent L2 learning such as adults who cannot attend a class in a traditional classroom environment. It offers a classroom feel featuring a real-life scenario in which learners come together to learn and collaborate under the guidance of a real person who provides level-appropriate input and grammatical explanations in an inquiry-based lesson. On the other hand, *ImmerseMe* can be beneficial as a source of authentic input and rewards-based motivation. It offers more autonomy than *Immerse*. It takes the learner from a “Pronunciation” lesson, to a “Typing” lesson, to a “Spelling” lesson, to a “Translation” lesson, to an “Immersion” lesson. It is motivating to feel that one can track their progress through points and “kudos”. This approach may be motivating to teenagers that like to receive immediate feedback. Unlike in *Immerse*, *ImmerseMe* users can also choose when and where to work on their L2 language learning journey without the constraints of schedules and time limits.

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