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Toward understanding the impact of mobile apps on learner progress in attaining foreign language skills

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Part A

Abstract

This paper presents a review of the existing literature on the effectiveness of language learning apps and the factors that may influence linguistic gains. It also highlights some of the underpinning pedagogical approaches apps utilise. The subsequent mixed methods parallel design case study proposal aims to investigate how learning outcomes compare to the official Spanish DELE exam at level A1.1, and the contextual factors that may influence outcomes. The conceptual framework presents a research design that emerged from the relevant theories identified during the literature review, the content presented in the post-graduate modules, and the researcher's positionality. The resulting findings may support the development of more effective language learning and teaching techniques.

Chapter 1 – Introduction

Over the past decade, mobile technologies have revolutionised how we learn by making education more accessible, flexible and personalised. Mobile-assisted language learning (MALL) is 'an extension of both mobile learning and computer-assisted language learning' (Stockwell and Hubbard, 2013, cited in Chen *et al.*, 2020, p.1770). MALL is not a new phenomenon; it has evolved from the listen-and-repeat cassette tapes of the 1990s to something more engaging, exciting and inspiring. Ubiquitous access to the internet, smartphones and the widely accessible software applications they enable, have paved the way to a new era of language learning - an era that does not only allow for the learner mobility across various locations but also allows learners to 'learn across different social contexts' and move between formal and informal settings (Sharples, 2016). MALL is utilised in a range of settings to enrich and broaden learning opportunities; it can supplement traditional classroom teaching, enable field-based inquiry learning and collaboration (Adams *et al.*, 2010), can be incorporated into professional development plans, and can be used for language learning, including location-based learning. An exploration of how mobile technology could support learning and motivation was conducted by researchers working on

the MASELTOV project, which used Spanish-speaking English language learners' contextual information (in this, case, their location) to offer mobile app-enabled learning opportunities (The Open University, no date - a).

Context is not only geographical location, however. It also encompasses social activity, learning goals (Gaved *et al.*, 2014), task structures (Brown *et al.*, 2010), activity timing, resources, and mobile network availability. Mobility across these contexts is just as important as the mobility of the learner, as they enable seamless transition between learning environments, flexibility, and personalisation, thus providing an adaptive learning experience. Personalisation and support of situated learning are just two of UNESCO's 13 mobile learning recommendations in support of advancing progress towards 'Education for All' (West and Vosloo, 2013).

According to Goodwin (2023), 23% of U.S. adults have used a language-learning app, and by 2026, the language-learning software market will expand by almost \$30 billion. The BBC also reports significant growth in user numbers, particularly since the pandemic (BBC News, 2021). One of the most popular mobile language learning apps is Duolingo, which reports having 124.5 million learners across the top five languages (Spanish, French, Japanese, Korean, German) (Duolingo, no date - a). It is not, however, immediately evident whether and how the popularity of these apps corresponds to their effectiveness, how they compare to and can complement other tools and methods (including classroom-based instruction), and what fuels their increasing popularity. Challenges around the integration of apps into formal education, despite their potential benefits, are also evident. Viberg, Andersson and Wiklund (2021) note that this is partly due to the lack of a universal definition of formal and informal learning, as well as the absence of evidence about MALL's efficacy (due to questions around its sustainability, generalisability of results, and how mobile devices are actually used by learners for this purpose).

Given the extent and upward trend of MALL use, research in this field is still limited. Existing studies cover a wide range from software reviews to learning outcomes, with only a small proportion referenced and featured in publications where researchers look (Kukulska-Hulme, 2021, pp.15-16). Mihaylova *et al.*, (2022) highlight that research on the efficacy of mobile-

assisted language learning is lacking entirely, whilst Burston (2015, p.4) claims that 'statistically reliable measures of learning outcomes' are scarce.

In addition to the paucity of research about apps' ability to support learner progress, little is available about the underpinning pedagogies, and how users' experiences and motivations affect learning outcomes. Exploring these issues may enable an improved understanding of the role and impact of apps, benefit educators who want to incorporate them into the formal curriculum, and provide valuable insight into learners' contexts, thus supporting further app development that facilitates enduring learner engagement and enhanced learning outcomes.

Chapter 2 – Literature Review

2.1 The Effectiveness of Language Learning Applications

It is easy to presume that the efficacy of technologies correlates with their ubiquity, i.e. that the most effective technologies are the most pervasive ones. However, such an assumption does not invariably hold true. Research cited by The Open University (no date – b) shows that online educators have an astounding range of technologies and tools at their disposal - 5 million different apps between Apple and Android users as of 2017. Meanwhile, educational platforms, such as Google Classroom, Canvas and Duolingo were in the top 100 tools for learning in 2023 (Centre for Learning and Performance Technologies, 2023). Does this also mean that they are among the most effective technologies in terms of supporting the achievement of quantitatively measurable educational gains, use the most appropriate features and pedagogies to achieve the best outcomes (e.g. self-perceived progress, increased motivation, heightened cultural interest), or do they simply attract the most users?

Three meta-analyses by Mihaylova *et al.* (2022), Chen *et al.* (2020) and Peng, Jager and Lowie (2021) that examined the existing literature published between 2007 and 2019 provide valuable insight into the effectiveness of mobile language learning apps and MALL in general.

In their research article titled 'A Meta-Analysis on Mobile-Assisted Language Learning Applications: Benefits and Risks', Mihaylova *et al.* (2022) undertook a quantitative synthesis

of the literature published between 2007-2019 to determine the effect of mobile language learning apps on second language proficiency. Although this paper's aim was not to examine the features and pedagogical approaches used by MALL apps, which could provide insight into how the potency of apps could be increased, it does draw attention to some aspects that appeal to MALL users, such as instant access to learning material, portability, and personalised content based on learner ability and interest.

Mihaylova *et al.* analysed results from control groups using traditional language learning methods and compared these to the results of groups using mobile apps. They report that the 23 studies analysed show a moderate-to-strong correlation between learner achievement and MALL, and that MALL is an effective way to boost language learning. They emphasise that experimentally validated (i.e. with proven effectiveness in achieving learning outcomes) MALL applications that are specifically designed for learning might be more effective than general MALL. This study is relevant for highlighting differences in learning outcomes between traditional and MALL learning methods, thus it helps to evaluate the impact and effectiveness of apps. The authors' selected publication timeframe broadly corresponds with my chosen dates, with the difference that my enquiry proposes the start date of 2008 - the launch year of Babbel (Business of Apps, 2023), one of the largest and most popular language learning apps - and the end date of 2024 (to capture the most current data and thinking in this rapidly evolving field).

The study of Mihaylova *et al.* is a systemic review, rather than a narrative critical review, therefore it should be more rigorous due to the rule-driven literature search and explicit inclusion criteria, resulting in less selection or publication bias (Jesson and Lacey, 2006, p.146). Mihaylova *et al.* took steps to detect publication bias and determined that no significant amounts were present in their sample. Publication bias can compromise the validity of meta-analysis and lead to the inclusion of unreliable sources (Dwan *et al.*, 2013, p.1), thus compromising the study outcome. As Stanley, Doucouliagos and Ioannidis (2017, p.1580) point out, no tests and corrections are perfect and 'should only be used in a minority of meta-analyses where pre-requisites for their application are satisfied'.

A more comprehensive meta-analysis of MALL efficacy was conducted by Chen *et al.* (2020) who synthesised 84 studies. Like Mihaylova *et al.*, they also found a medium-to-high effect size of mobile devices on achievement, confirming their positive impact on language learning. Based on this, Chen *et al.* (2020, p.1785) call for further examination of MALL's pedagogical capacity. The study identified the following instructional approaches: self-directed learning, flipped learning, collaborative learning, situated learning, game-based learning, teacher-led instruction, assessment, and mixed approach. Like Mihaylova *et al.*, Chen *et al.* also found slightly larger effect sizes for educational apps, as opposed to general-purpose apps. Collaborative learning had a large effect size, whilst game-based learning had a medium effect size. A self-directed approach was found to have a medium-to-high effect size, possibly indicating the significant impact that learner motivation can have on outcomes.

The size of Chen *et al.*'s analysis can increase its scalability and reliability, although it would be misleading to claim that large samples prove reliability (Cohen, Manion and Morrison, 2017, p.138). Furthermore, the terms reliability and validity are questioned in the context of qualitative research. Instead of these, Lincoln and Guba (1985), cited in Schwandt, Lincoln and Guba (2007), suggest the criteria of credibility, transferability, dependability and confirmability to test rigour.

The above findings inform my enquiry by providing contextual information, enrichment, and grounds for comparison. Chen *et al.* (2020, p.1786) state that meta-analyses can only investigate the outcomes of quantitative research designs, Timulak and Creaner (2023, p.4) however claim that qualitative meta-analysis can provide a 'comprehensive picture of a field of enquiry' and 'a clear, rigorous, and replicable method for producing such a comprehensive picture'. Sung, Chang and Yang (2015, p.71) highlight that assessing the effectiveness of MALL using qualitative approaches is difficult, which could be the reason for most current qualitative research focusing on descriptions of how MALL is used to support learning and barriers encountered, rather than efficacy. These conflicting views underpin my belief that the combination of statistical evidence and subjective learner experience provide a richer, more insightful analysis, particularly in the field of linguistics which is influenced by both objectivism and positivism (Chatwin, 2024a).

Loewen, Isbell and Sporn (2020) use a mixed design to quantitatively measure gains made by Babbel users; findings are then validated and further explained using qualitative information about factors that influence learning gains and users' perceptions. Using a pre-test before the intervention and a post-test afterwards, statistical findings show that oral proficiency, grammar and vocabulary scores increased and learners maintained interest (although this dropped slightly over time, both in the app and the language). Grammar and vocabulary gains correlated to the time spent using the app. A common expectation is that more study time equates to better outcomes - an idea supported by several studies, including Loewen *et al.* (2019) and Kessler, Loewen and Gönülal (2023). The intervention period in the literature reviewed varied, e.g.: Kessler, Loewen and Gönülal (2023) – 8 weeks; Loewen *et al.* (2019) – 12 weeks; Loewen, Isbell and Sporn (2020) – 12 weeks; Mihaylova *et al.* (2022) 4 months. Improved outcomes are not necessarily due to the increased breadth of study material covered but due to an extended window of opportunity to practice and post-testing happening closer to the end of the intervention. It is, therefore, possible that 'the effects of MALL-application interventions diminish over the time' (Sung *et al.*, 2019, cited in Mihaylova *et al.*, 2022, p.266). Further exploration of this assumption could enhance understanding of how long-term gains can be made. It raises another issue that can affect second language (L2) learning - the issue of spacing, i.e. the practice of 'studying items separated by an interval of time or other items' (Kim and Webb, 2022, pp.269-270). For example, one may study the vocabulary for describing the weather in their target language, and instead of repeating the same cycle of words again, they move on to studying the concept of tenses, before returning to the weather-related terms.

Loewen, Isbell and Sporn (2020) found that learner interest in the target language was shown to have a small-to-moderate positive effect on linguistic outcomes. This finding was also replicated by Loewen *et al.* (2019) who cited limited interest and subsequently decreasing motivation, negatively affecting post-intervention test results. Berns *et al.* (2016) state: 'Fun learning is motivated learning—and often leads to better outcomes.' In their study of 104 German language students at a Spanish university, Berns *et al.* (2016) hypothesised that hybrid game-based apps (i.e. apps that combine individual and collaborative learning activities) would increase perceived usefulness and value. Analysis of qualitative interviews showed that gamified learning that incorporates multimedia, sets time challenges, has

different play levels, and allows progress tracking was found to be motivating by learners. Quantitative data from pre- and post-tests confirmed similar findings to those of Loewen, Isbell and Sporn (2020), i.e. that using an app will have a positive impact on learning outcomes. It must be noted that Loewen *et al.*'s research was funded by Lesson Nine GmbH, the company behind Babbel, therefore sponsorship bias cannot be excluded (e.g. in terms of study design, data selection/representation, 'choice of the scientific concepts used to interpret the results') (Reutlinger, 2020, p.2).

These findings underline the need for utilising interpretive research tools and methods and considering a range of factors, including learner context, motivation and experiences. If learner interest is linked to progress, further questions to be asked are: (1) How can interest be maintained or increased to improve outcomes? (2) How do pedagogical approaches and app features support the achievement of the intended goals?

Some insight is provided by Peng, Jager and Lowie (2021) whose meta-analysis of 17 studies confirmed that learners using MALL significantly outperformed students receiving other interventions such as traditional classroom-based teaching. In contrast to the other papers mentioned, Peng, Jager and Lowie studied MALL in general, including various mobile devices, social networking sites and digital storytelling applications. Although these are not directly comparable to linguistic apps, they do provide valuable insight, particularly the exploration of the type of activities (synchronous vs asynchronous) and whether the activities were individualised or collaborative. Asynchronous, individualised activities showed the largest effect sizes. This highlights the importance of learners' ability to customise their learning activities and points towards the value of personalisation. Kukulska-Hulme (2016) argues that to achieve the best mobile learning outcomes, it is key to align the physical and social environment with appropriate pedagogical approaches. Learners' individuality must also be considered.

In contrast to the findings presented above, Loewen *et al.*'s (2019) brief overview of the literature and subsequent study presents mixed results. They seem to support the idea that with the use of appropriate instructional methods, MALL has been shown to provide learning advantages. However, they note that the degree of effectiveness of commercial online

language learning programs is unclear, and it is mainly research that is commissioned by app creators that claims that apps are more effective than face-to-face courses. It is important to note that since 2019, research in this rapidly expanding field has increased and the features and methods the apps use have evolved. Despite being 5 years old, this study, and app research in general, are still relevant as their core features and premise are unchanged (i.e. the interactive exercises, vocabulary drills, gamification elements, multimedia content, progress tracking, and community features). Loewen *et al.*'s study of 9 university students explored the effectiveness of Duolingo in learning Turkish and the experiences of learners using the app. All participants were *ab initio* (i.e. had no prior experience of the target language). Most of the literature focuses on English and Spanish as the target language; exploring a broader variety of languages would elevate the overall generalisability of claims. However, it can also be argued that app effectiveness is influenced by the language of choice on the apps, as not all courses have the same features (e.g. the Turkish course for English speakers does not offer the 'Duolingo Stories' reading and listening exercises, whilst the Spanish for English speakers course does (Duolingo, no date - b).

The study found that participants who had agreed to use Duolingo for a minimum of 1 hour per week for 12 weeks - but were encouraged to reach 34 hours in total - increased their Turkish skills. At the end of the intervention, participants undertook a proficiency exam. Results showed moderate-to-strong correlations between the time spent on Duolingo and the scores on the proficiency test, particularly in the listening and speaking areas, suggesting that Duolingo activities significantly supported language learning. However, despite this, most participants, except for one, did not meet the 70% mastery criterion set by a university proficiency exam. The researchers noted possible reasons for this: (1) the hours of intervention were less than half of that of the university course over the same period, (2) participants had no prior experience of the target language, (3) participants were not motivated by the choice of language, (4) some sections of the proficiency test required implicit knowledge, whilst Duolingo helped participants to improve their explicit knowledge, (5) participants were also simultaneously researchers in the study. The latter could have influenced the results due to their 'familiarity with the process of L2 learning in general' (Loewen *et al.*, 2019, p.308), any pre-existing (sub)conscious biases, or conflict of interest. For example, participants were anonymised in the published study but given the fact that they

were also the researchers and worked together on the study, it is plausible that a participant-researcher may have wished to 'enhance' their results and 'show off' their language learning skills by using disallowed aids such as a dictionary.

According to Loewen *et al.* (2019), many studies commissioned by app creators found positive outcomes for learners, however the credibility and reliability of these findings may be compromised due to the risk of bias. A year after the Turkish Duolingo inquiry, Loewen himself was one of the researchers on the Babbel study funded by its creators, as mentioned above. It could be argued that this raises potential conflicts of interest and issues with transparency. Although the Babbel study acknowledges the funding source, the Duolingo study states that there were no conflicts of interest, and the studies were undertaken on products of competing businesses, research transparency could be questioned. Further steps to mitigate bias or perception of bias, such as declaring Loewen's role in the research process, could have increased credibility and reliability. On the other hand, both studies were peer-reviewed which is an indicator of increased trustworthiness as peer reviews 'provide a critique of the validity, significance, rigour, and originality of the research to be published' (Cambridge University Press, 2020).

Both Loewen *et al.*'s (2019) Duolingo study and Loewen, Isbell and Sporn's (2020) Babbel study acknowledge the effectiveness of using apps in improving L2 knowledge and some positive effects on initial learner motivation. Overall, the Babbel study seems more favourable; it also calls for consideration of the benefits of integrating the app into classroom curricula. Some pedagogical shortcomings are identified, such as the 'learner-input-heavy' approach, limited opportunities for producing the language, and no interaction with other learners. There seems to be more emphasis on the pedagogical limitations in the Duolingo study (derived from a qualitative analysis), which relate to repetitive activities, no human interaction that allows practising the learnt skills, and decontextualised exercises.

The aim of this review and proposal is not to undertake a direct comparison of apps, nevertheless, comparisons could yield valuable insights into the characteristics of effective application design. A study comparing Babbel's and Duolingo's effectiveness when used by ab initio learners to learn Turkish supports the impression that Babbel may be more effective.

Kessler, Loewen and Gönülal (2023) found that Babbel's post-test scores were higher, although not statistically significantly. The apps seem to build skills in different areas, for example, Babbel users achieved higher results in translation, and listening and typing, whilst Duolingo users scored better in speaking and listening. This indicates that a combination of apps may lead to better overall outcomes for autodidactic L2 learners in terms of how effectively they can use the target language in a real-life setting, which normally includes being able to speak, listen and write. The study's summative findings reflect the previously presented findings, namely that apps can improve L2 skills. The researchers also note that gains seem to be linked to individual goals and perspectives, e.g. the gamification in Duolingo seems to increase motivation however this may not suit everyone's preferences. Topics and associated vocabulary presented can also impact motivation and in turn, outcomes. Although this study was not commissioned or funded by either of the app owners, Babbel did provide vouchers exchangeable for one year of app use to all participants. The company from which the vouchers were gifted was only known to the researchers, therefore participant bias was mitigated however it may have impacted researcher bias.

2.2 Gamification

A common feature of apps referred to by the literature is gamification. It is an approach used in most MALL tools to some extent, making it a dominant way to deliver content in self-regulatory digital learning environments (Shortt *et al.*, 2023). Definitions of gamification vary depending on factors such as the context in which it is applied, the specific game design elements used, the balance between gamefulness and playfulness, and the non-game contexts in which these elements are implemented. Commonly used gamified features are experience points, leaderboards, and time-based challenges. Its goal is to enhance user experience, increase engagement and motivation, support learning and problem-solving, and facilitate user value creation in non-game services and products (e.g. educational apps whose main objective is to teach, rather than play) (Deterding *et al.*, 2011; Kapp, 2012, cited in Shortt *et al.*, 2023, p.518). Deterding *et al.* (2011, p.9) propose the following definition for gamification: 'the use of game design elements in non-game contexts'.

Extending initial motivation towards learning is key to achieving meaningful and lasting gains. While gamification can assist in achieving this goal, it does not guarantee it. As suggested by

the experiences of the three ab initio researcher-participants in Isbell *et al.*'s study (2017), the introduction of game elements into learning environments does not necessarily guarantee the desired educational outcomes or sustained learner motivation. Although all participants persevered for the 12-week duration of the study, their interest in the Duolingo app waned over time and they achieved low scores on the post-test. Reasons for this may be comparable to the reasons cited by Loewen *et al.*'s 2019 study (see paragraph 2 on page 11 above). This indicates that gamification alone may not be sufficient to overcome the challenges of language learning and calls for the exploration of other pedagogic approaches that may be utilised to enhance engagement and outcomes. Even though gamification elements increased engagement, this seems to have happened to the detriment of the primary goal – learning. Participants reported increased engagement due to competition-based elements, rather than due to interest in the language; their goals changed from wanting to learn the language to wanting to collect points. This indicates that there is a need to find the balance and synergy between gamification and the appropriate pedagogy to best support the achievement of the desired outcomes. At the end of the intervention period, one participant cited 'a lack of connection to meaningful use' (Isbell *et al.*, 2017, p.10) as a reason to discontinue using the app.

2.3 Emotions

In addition to a meaningful purpose and applicability in real life, the feelings elicited by the learning experience can also impact motivation. In her autoethnographic study recording her own experiences using a range of language apps, Alm (2021) noted how activities that elicited positive emotions made the learning experiences more engaging and personally rewarding, resulting in increased motivation. Some of the positive aspects of the apps trialled were reported to be: competitive elements that led Alm to discover her 'competitive nature'; a functionality enabling users to provide feedback on their language skills, giving 'the impression of being attended to'; the 'non-punitive approach' that made her 'feel good about learning Spanish' and about herself (Alm, 2021, pp.214-215). Alm's analysis of the apps also identifies challenges (e.g. long units, difficulty levels progressing too fast, non-intuitive structure) and areas that are particularly helpful in one app but may be missing from others such as the grammar explanations in Busuu. To aid progress, outside tools were used (e.g.

translation tools, verb forms app and Google) seemingly supporting the idea that a combination of apps may lead to better overall outcomes.

2.4 Research Question Development

Enabled by a rapidly evolving technological landscape and necessitated by globalisation, the demand for accessible, context-fluid, anytime-anywhere language learning has increased. Yet, student drop-out rates for language learning programmes are high. About *Icelandic Online*, a guided Massive Open Online Course (MOOC) offering Icelandic as a foreign language, Friðriksdóttir and Arnbjörnsdóttir (2015) reported the lowest retention rate among self-directed students learning outside of formal education. Similarly, app-based language learning is characterised by high dropout rates, along with limited knowledge about their effectiveness (Chamani, Razi and Xodabande, 2023). So, what is the correlation between student retention and emotional states? How is progress influenced by learner context (e.g. session spacing, physical environment, app personalisation options), experiences and motivations? How do these factors relate to self-perceived and measurable gains? And finally, how do app features and pedagogical approaches impact outcomes and motivation? These are the themes that the final research questions have arisen from (stated in Chapter 4).

The questions have evolved since the beginning of E822. The first question now focuses on app-based, rather than mobile-assisted language learning in general. The latter is a larger, more diverse topic and exploring it in sufficient detail would be challenging within the constraints of the dissertation. Having had the opportunity to undertake further research, I have also found that investigations of educational apps are more limited than those of general mobile learning, hence this could be of more benefit. Question 2 had various iterations as the literature I encountered shaped my thinking about the topic. The importance of learner context became evident, along with employing appropriate pedagogical approaches, however the latter issue cannot be fully addressed within the constraints of this research proposal. Exploring these topics could lead to a better understanding of their impact on learning outcomes and can aid the development of more effective apps, and teaching and learning methods.

2.5 Literature Search

An electronic search of books, journal articles, reviews, dissertations and conference proceedings was undertaken to ascertain what is already known about the topic. The databases used were: The Open University Library, JSTOR, ProQuest, Google Scholar, Sage Publications and ResearchGate. The parameters set bound the search to the most relevant results. The search terms were identified through the research questions (e.g. MALL effectiveness, mobile-assisted language learning, the effectiveness of mobile apps in language learning).

Much of the literature focuses on mobile learning in general instead of learning using mobile applications. These sources are useful in providing contextual information but data about tools other than apps will be excluded as the proposed study focuses on these specifically, while mobile learning includes learning via personal digital assistants, games consoles, smartwatches, etc. (Garzón, Lampropoulos and Burgos, 2023).

Further relevant topics and terms were identified from the abstracts and skimming the literature and were used to inform subsequent searches. The initial search was restricted to items from 2019 onwards to provide the most current publications as suggested by Dale Bloomberg and Volpe (2008). Later, this was amended to 2008 to find less recent but still relevant sources. The relevance of the results was evaluated through the PROMPT framework (The Open University, 2021a). Only well-presented, peer-reviewed material with previous citations was selected. As the proposed enquiry will use mixed method research (MMR), papers utilising both qualitative and quantitative methods were included. Further relevant literature was also identified from bibliographies and reference lists.

Chapter 3 – The Conceptual Framework

A theoretical framework is a structured summary of concepts and theories developed from a synthesis of existing knowledge in field-relevant subjects that can help determine the guiding principles of data analysis and interpretation, and steer the conclusions drawn; existing theories probably relate to different issues than what is being proposed, hence will need modification (Kivunja, 2018). The purpose of a theoretical framework is to provide a 'scholarly foundation' to the proposed research, help to ascertain 'what to look for in the data' (Neumann, 1997, cited in Kivunja, 2018, p.47), how it fits together, and how to discuss the findings, considering existing theories. Kivunja suggests that a solid theoretical framework emerges *from* the literature review, while Grant and Osanloo (2014) assert that it must be selected and clarified at conception of the topic, although some types are developed during the study. Pope (2017) claims that the term *conceptual framework* is an alternate name for *theoretical framework*, whilst Kivunja (2018, p.47) defines it as an 'umbrella term' that is a 'logical master plan for [the] entire research project' and includes the researchers' concepts, ideas and goals of what they want to research, why and how. Complete consensus is lacking around these frameworks.

3.1 Ontology and Epistemology

Paradigms are theoretical perspectives that direct research, hypothesis formulation, and the identification of the most appropriate research questions (Corbetta, 2003). They describe two aspects of knowledge: (1) ontological aspects that aim to discover what counts as knowledge, how we see the world and what exists in reality; does the world exist independently from human interpretation? (2) epistemological aspects that query what the nature of knowledge is and what we can know (The Open University, 2021b).

Ontologically, this proposal acknowledges both subjective perspectives and objective realities, therefore it aligns with both realist and relativist views. Realism asserts that 'the world exists independently of our awareness of it' whilst relativists believe that 'an absolute reality does not exist' but there are multiple realities (Corbetta, 2003, pp.17, 25). These views are situated on the opposite end of the continuum of positivism and constructivism/interpretivism.

In positivism, reality exists independently of the individual and is objectively understandable. Interpretivism views reality by considering perceived individual perspectives, such as motivations and values. I argue that reality can be both static and changing, and truth can be both singular and diverse. Multiple realities are based on the individual's setting, experiences and perception of the world, therefore 'no one ultimate truth' exists (Bunnis and Kelly, 2010, cited in The Open University, 2024a).

Epistemologically, there are multiple ways of knowing and knowledge can be both objective and subjective, depending on the context. The varying realities of individuals (e.g. a person's enjoyment of an app) are not objectively measurable using positivist deductive methods that seek to establish valid conclusions (University of Warwick, 2016). They can only be understood by focusing on the individual's description of their perspectives which typically requires an interaction (e.g. an interview). This type of phenomena therefore should be investigated through interpretive constructivist approaches. Contrarily, objectively quantifiable realities, such as assessment scores, are rooted in a single reality that cannot be perceived differently by individuals. A generalisable theory can usually be generated from a positivist approach and researchers aim to establish causality (Bunnis and Kelly, 2010, cited in The Open University, 2024a) (e.g. in the presence of appropriate controls, learners who used a reward-based educational app performed better than learners who did not, therefore reward-based apps are more effective).

3.2 Philosophical Framework

The philosophical framework guiding this proposal is dialectical pluralism (DP). DP takes an ontologically pluralist stand (Johnson, 2012) and recognises the existence of subjective, objective and multiple realities, depending on the individual's lived experiences. Educational outcomes are impacted by contextual factors (e.g. socio-economic background) and learners' ability for affective self-regulation, i.e. the capacity to purposefully regulate their 'motivations, intentions, emotions, interests, satisfactions, values, goals, and attitudes' (Viberg *et al.*, 2023, p.3). Learning is therefore a subjective experience with measurable outcomes. Mertens (2012, cited in Cohen, Manion and Morrison, 2017, p.34) refers to DP as one of the three paradigms in MMR, alongside pragmatism and the transformative paradigm.

The research questions aim to explore student progress in both quantitative and qualitative ways, i.e. call for acknowledgement of both subjective and objective realities. According to Johnson (2012, p.752), DP ‘dialectically listens’ to different theories/perspectives, and combines ideas from competing paradigms – in this case, an epistemologically positivist reality that demonstrates a quantifiable measure of the effect of language apps, and an interpretive/constructivist reality that accepts a different truth as individuals perceive it. According to The Open University (2021c), the appropriateness of combining qualitative and quantitative approaches is debatable and leads to ‘conflicting assumptions about the nature of the social world’ and our understanding of it. However, Fetters (2020, p.2) argues that MMR gives researchers the freedom to be more creative and stretch the boundaries, whilst it provides sufficient structure to the novice researcher cautious about excessive freedoms.

3.3 Theoretical Framework

The proposed research questions aim to explore the impact of mobile language learning apps and learner perspectives on learning outcomes. It is also important to note the pedagogical principles employed by the apps to support further research. The themes relevant to the research questions emerged from the literature review and informed the identification of the relevant key theories and concepts in Table 1.

Table 1. Theories and concepts relevant to the proposed study

Theme	Theme summary	Key theories and concepts
Gamification	Apps employing game-based instruction showed a medium effect size (Chen <i>et al.</i> , 2020), but they do not guarantee the achievement of the desired outcomes or sustained learner motivation (Isbell <i>et al.</i> , 2017). Analysis of qualitative interviews showed that gamification with challenges, tracking, multimedia elements is motivating (Berns <i>et al.</i> , 2016). Competitive elements were found to be personally rewarding and motivating by Alm (2021).	<ol style="list-style-type: none"> 1. Theory of gamified learning (Landers, 2014) 2. Csikszentmihalyi (1997) 3. Cognitive behaviour theory (Piaget)
Education-specific design, instructional methods	Apps that are specifically designed for learning and experimentally validated might be more effective than general apps without proven effectiveness (Mihaylova <i>et</i>	<ol style="list-style-type: none"> 1. Spaced practice 2. Constructivist theory 3. ZPD 4. Scaffolding

	<i>al.</i> , 2022) or apps not using appropriate instructional methods (Loewen <i>et al.</i> , 2019).	<ol style="list-style-type: none"> 5. Cognitive load theory (bite-size learning) 6. Behaviourism - reinforcement and repetition; classical conditioning (Ivan Pavlov); operant conditioning (Skinner) 7. Bloom’s taxonomy
Personalisation	Personalisation is a UNESCO recommendation for advancing progress towards ‘Education for All’ (West and Vosloo, 2013). Peng, Jager and Lowie (2021) showed that asynchronous, individualised activities showed the largest effect sizes.	<ol style="list-style-type: none"> 1. Cognitive development theory (Piaget) 2. Adaptive learning 3. Cognitive load theory 4. Universal design for learning
Collaborative learning	MALL can enable collaborative learning (Adams <i>et al.</i> , 2010), which can be used as successfully an instructional approach as shown by the large effect sizes demonstrated by Chen <i>et al.</i> (2020).	<ol style="list-style-type: none"> 1. Sociocultural theory (Vygotsky)
Motivation	<p>Learner interest in the topic/language and a sense of achievement provided by game-based elements have positive effects on outcomes and motivation (Alm, 2021), (Loewen, Isbell and Sporn, 2020) (Berns <i>et al.</i>, 2016).</p> <p>Low motivation negatively affects learning outcomes (Mihaylova <i>et al.</i>, 2022) (Loewen <i>et al.</i>, 2019).</p>	<ol style="list-style-type: none"> 1. Experiential learning theory (Dewey, Kolb) 2. Discovery learning (Bruner)

3.3.1 Theory of Gamified Learning

‘Gamification is frequently dismissed as a fad’ despite its currency, dynamic nature and ability to grab attention (Bell, 2017, p.154). According to Reiners and Wood (2015, p.48), games play an essential role in learner retention and engagement and are also important for the development of self-regulation, empathy, and academic and social learning (Weisberg *et al.*, 2013, cited in Reiners and Wood, 2015, p.48).

The literature review revealed gamification to have a positive impact on both learning outcomes and motivation, Landers (2014) however claims mixed success in industry and teaching, and calls for the exploration of the specific processes used by gamification that aim to improve learning (Landers, Bauer, Callan and Armstrong, 2015, cited in Landers, 2014). This could explain why the employed techniques influence outcomes as they do. Landers (2014, pp.752-768) proposes two processes by which gamification affects learning: (1) a moderating process that strengthens the link 'between instructional design quality and outcomes', (2) a direct mediating process that causes learning (e.g. due to good design). These processes are the foundation of the theory of gamified learning (Figure 1).

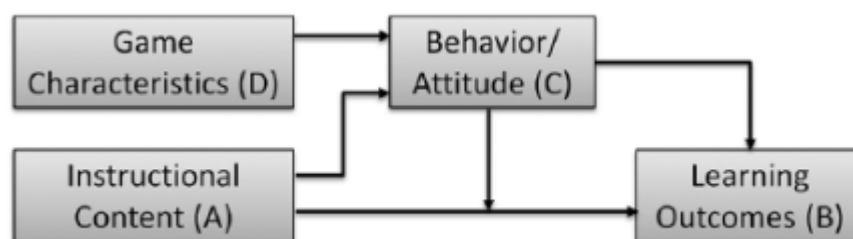


Figure 1 – Landers' theory of gamified learning.

'D → C → B and A → C → B are mediating processes. The influence of C on A → B is a moderating process. Directional arrows indicate the theorised path of causality.'

Landers makes 5 propositions: (1) instructional content influences learning outcomes and behaviours, (2) behaviours/attitudes influence learning, (3) game characteristics influence changes in behaviour/attitudes, (4) game elements affect behaviours/attitudes that moderate instructional effectiveness (5) the relationship between game elements and learning outcomes is mediated by behaviours/attitudes. He emphasises that for gamification to be effective, the instructional content must also be so. This resonates with Loewen *et al.*'s (2019) stance: gamification alone without the appropriate pedagogy is insufficient for achieving the intended outcomes. An app that prioritises game elements over the constructs of appropriate pedagogy, such as scaffolding, the consideration of short- and long-term goals, learners' existing knowledge and experiences, and ensuring the inclusion of diverse learners (Husbands and Pearce, 2012), is unlikely to achieve as good outcomes as a pedagogically sound but less gamified product. Oliveira *et al.* (2022), citing previous studies, voice similar thoughts: despite gamification's aim to increase motivation and engagement, results are

mixed and even negative, if good design principles are not followed. Arguably, if gamification increases engagement, lack of it may impact engagement negatively, this however could potentially be negated by good app design and learner motivation stemming from faster progress in learning. As described in Chapter 2, Landers agrees that games may affect motivation and engagement, but he points out that the primary purpose is to provide instructional content.

Chou (2017) identifies eight motivating core drivers in game design that he claims elicit behaviours that fuel engagement through inspiration, empowerment, manipulation, and obsession. He presents these in his Octalysis gamification design framework (Figure 2). Chou argues that if no core drivers are present in a product, no motivation will be evoked and user retention will plummet. The literature review did not reveal another theory that lays out in such detail the attitudes that drive engagement and specific game elements that are associated with each attitude/behaviour, however, Chou's concept strongly resonates with the findings and theories already presented in this paper, i.e. that there is a definite correlation between feelings that game elements elicit, learner interest, motivation, and engagement. What the framework does not offer is commentary or evidence on the impact of gamification elements on learning outcomes.



Figure 2 – Octalysis Framework by Yu-kai Chou (n.d.) is licensed under CC BY-SA 4.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by-sa/4.0/?ref=openverse>.

3.3.2 Flow Theory

Flow is the ‘holistic sensation that people have when they act with total involvement’; it typically occurs when the challenges of the moment and one’s confidence in being able to successfully rise to those challenges are perceived to be in balance (Csikszentmihalyi, 1975, cited in Beard, 2015, p.353). According to Csikszentmihalyi (1997), excellence is bred by full immersion in the flow which allows total focus on clear and compatible goals with instantaneous feedback. Csikszentmihalyi argues that when these factors are present (i.e. clear goals and rules, the need to provide appropriate responses, correct level of difficulty that allows new skills to be gained, full involvement in conquering the challenge, and feedback – these form part of Csikszentmihalyi’s 9 dimensions of flow), flow can be produced, potentially leading to an improvement in one’s quality of life. The flow experience is commonly associated with the gameful experience (Högberg *et al.*, 2019, cited in Oliveira *et al.*, 2022), and students’ educational performance (Csikszentmihalyi 1997, 2000, 2014a, cited in Oliveira *et al.*, 2022), therefore understanding the concept of flow can offer support with designing optimal e-learning experiences (Rodríguez-Ardura and Meseguer-Artola, 2017).

3.3.3 John Dewey's Experiential Learning Theory

Learner interest serves as a powerful motivator for learners to invest the time and effort to achieve their goals. Dewey believed that 'student interest and curiosity were the key to learning' (Watters, 2021, p.96) and should be taken into consideration when planning instruction (Williams, 2017). However, without clear learning objectives and alignment with curriculum goals, it can fail to achieve its ultimate objective: maximising educational gains.

According to Dewey, a pragmatist (Williams, 2017), education has psychological and sociological sides and knowledge is a social construct. Dewey argued that a curriculum should be based on students' interests; understanding the motive, the meaning that the learner derives from studying, and the learner's context (i.e. how learning is affected by the learner's experiences) is key (Li, 2020, pp.213-216) to growth. Dewey believed in an 'education of doing, not listening' (Li, 2020, p.228) and he advocated for learners to be active constructors of knowledge through activities representing real life (Bhetuwal, 2022), rather than being passive vessels carrying already existing knowledge. Dewey thought that 'socially engaging learning experiences' should be part of progressive education (Dewey, 1938, cited in Williams, 2017, p.92). It is human interaction with the world through which independent discovery and growth can occur that gives rise to educational experiences (Pappas, 2023). Dewey's social constructivist views asserted that mental functioning is developed by engaging in sociolinguistic practices and through these sociolinguistic transactions, subjective meaning emerges (Garrison, Reich and Neubert, 2012, p44).

In his article comparing Dewey's and Vygotsky's ideas about the role of activities and context in the learning process, Glassman (2001, p.3) notes that a large proportion of Dewey's thinking was shared by Vygotsky, who also believed that everyday activities and the social environment have a major role in learning and that 'social history, experience/culture, and human inquiry in the educational process' are factors that affect learning as a singular unit made of three components, i.e. their impact cannot be considered separately from each other. It is the nature of the relationship between these three factors where Dewey's and Vygotsky's theorising differs, along with their thinking about how and why activities should be utilised in classroom instruction. Dewey deems the process of education of primary significance from which individual inquiry and knowledge construction emerge. On the other

hand, Vygotsky views learning as a *tool* rather than the *driver* of the developmental process; he places more importance on the teacher being more proactive, whilst Dewey views them as facilitators providing less direction and more space for students to explore and construct their own meaning.

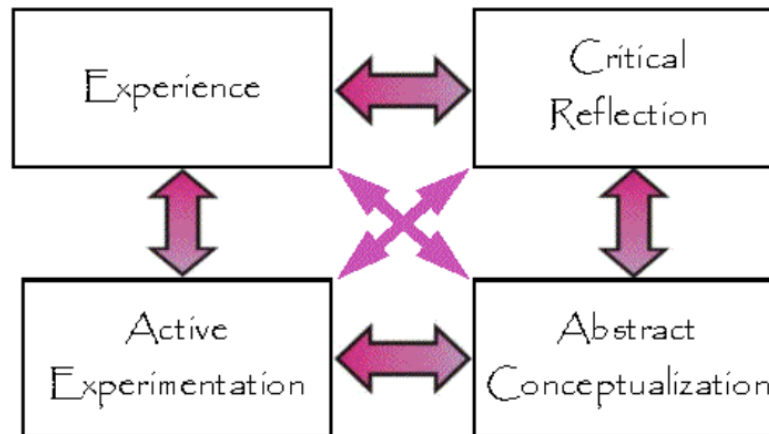


Figure 3 - Experiential Learning Cycle (Zhou and Brown, 2015)

Dewey's experiential learning theory, along with Kurt Lewin and Jean Piaget, provided the basis for David Kolb's four-stage model of experiential learning and is regarded 'as a foundation for experiential learning' (Miettinen, 2000). Critics point out that a dissonance exists between Kolb's interpretation and Dewey's original theory (Miettinen, 2000, p.55) and that Dewey provides a 'richer, less impoverished notion of experience' (Ord, 2011, p.69). According to Ord, Dewey sees experience as transactional and something that gives meaning to life; for it to be educative, experience must be meaningful, pointing back to the idea that emerged from the literature review: that motivation and interest support better learning outcomes. In contrast with Dewey, Kolb considers experience 'concrete' and an entirely separate phase from the other three and this disconnect causes tension. Miettinen (2000, p.61) goes as far as to claim that Kolb constructed the model 'to substantiate the validity of [his] learning style inventory'. Dewey did not envisage a complete separation among the four phases of the model like Kolb and thought that knowledge developed through inadequacy (i.e. living through problems) and solving contradictions; for solving problems, reflection is a must (Miettinen, 2000).

3.3.4 Lev Vygotsky's Zone of Proximal Development

Vygotsky's 'zone of proximal development' (ZPD) theory acknowledges the teacher's role in supporting learners to maximise their potential in both formal and informal settings (The Open University, no date - c). Concepts of ZPD can also be implemented in MALL, for example by providing adaptive learning scaffolds and customised assessments. How technology is used across the continuums of formal/informal, active/passive and isolated/social contexts, and how it can be configured to enhance educational outcomes (Warburton, 2007) can be explored through the use of Warburton's re-thought version of Conole *et al.*'s framework (The Open University, no date - d) (Figure 4). A combination of these concepts can support the development of learner-centred and contextually relevant learning environments.

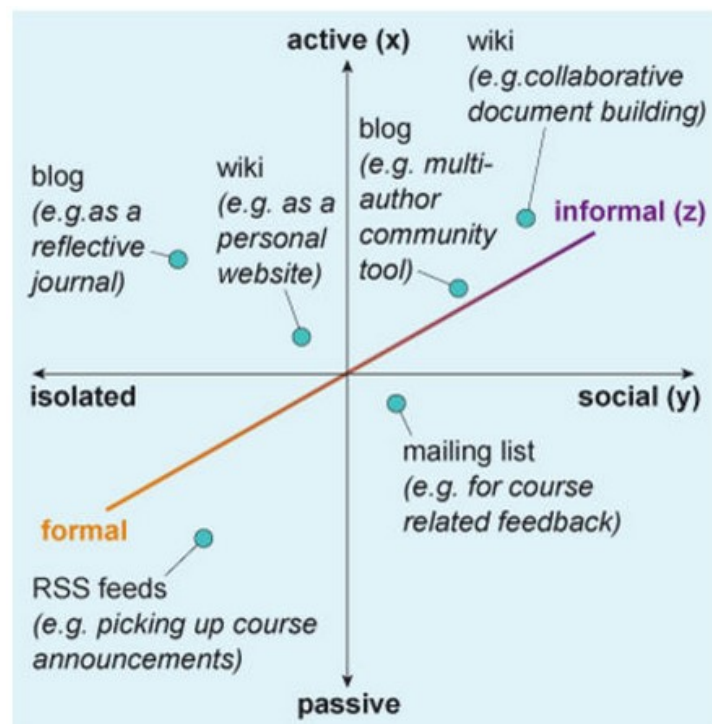


Figure 4 - Warburton's Framework (2007) cited by The Open University (no date - d)

Vygotsky defined the ZPD as:

'the distance between the actual development level as determined by independent problem solving and the level of potential development as

determined through problem solving under guidance or in collaboration with more capable peers.’ (Vygotsky, 1978, cited in Eun, 2019, p.19).

ZPD assumes that children can do and understand better when collaborating with others and that effective teachers provide just enough support so the learner can solve the issue or understand the concept and can therefore progress. Eun (2019) refers to varying interpretations of ZPD and identifies three prevailing understandings: (1) the ZPD is ‘the distance between individual performance and assisted performance’, (2) the ZPD is ‘the distance between understood and active knowledge’ (Hedegaard, 1988, cited in Eun, 2019, p.20), (3) the ZPD is ‘the distance between individual activity and societal activity’ (Engeström, 1987, cited in Eun, 2019, p.20). Language learning apps commonly associate with the first interpretation of ZPD and scaffold the learning process by providing supports such as visual cues, help-on-demand, and adjusting the difficulty of the task (Walker, 2022), thus the app effectively acts as a knowledgeable teacher supporting a less competent student until they internalise the learning content. ZPD can also be effectively used to understand learners' current capabilities and create supportive learning conditions (Lantolf and Thorne, 2006, cited in Ameri, 2020). Application of this concept can be seen in the Spanish pathway in Duolingo where activities presented to the learner are based on the learner’s responses and adapted to provide sufficient scaffolding to allow progression. The app also provides opportunities to review mistakes, thus encouraging reflection (one of the 4 phases in Dewey’s model of experiential learning, see Figure 3) and addressing gaps in knowledge. Silalahi (2019) identifies six factors in relation to ZPD, that must be present in order to develop capability: (1) scaffolded assistance that is adapted to the needs of the child, (2) the mediatory functions of tools such as language or a more knowledgeable person, that influence ‘the mind and behavior’ (Daniels, 2001, cited in Silalahi, 2019, p.176), (3) mutual cooperation and interaction between the learner and the more knowledgeable person, (4) imitation of what is not yet learned, (5) the target which depends on the child’s potentiality – in line with constructivist thinking, the aim is not simply knowledge transfer, but development relative to the capabilities of the learner, (6) crises indicating that development is taking place.

3.3.5 Bloom's Taxonomy

Bloom's taxonomy (Figure 5) is a useful framework for understanding the progression of cognitive complexity and devising appropriate learning objectives in educational programmes. When educators accurately specify what cognitive behaviours are expected from learners, they can form objectives that align with these behaviours (Churches, 2008; Neelakandan, 2019). For example, are learners expected to remember a foreign word in isolation, should they be able to use this word in context in its learnt form, or should they be able to apply various tenses and conjugations to it and use it creatively in various contexts? Understanding the objectives will inform the learning activities offered and help determine the most suitable content. Bloom's taxonomy is useful in maintaining learner interest and motivation – activities not pitched at the level suited to the individual can lead to boredom, frustration and loss of motivation, ultimately resulting in the learner abandoning the activity. Scaffolding, regular feedback and adaptive difficulty of tasks can be used to mitigate this.

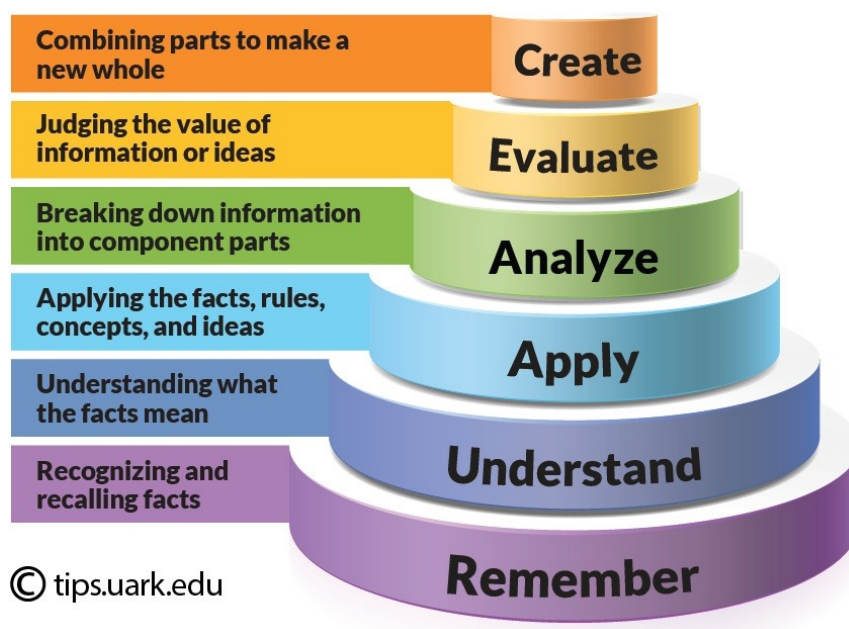


Figure 5 - Illustration depicting Bloom's taxonomy (University of Arkansas, 2022)

3.3.6 Universal Design for Learning

In addition to customised learning in terms of task complexity and difficulty level, learning must also cater for the unique needs of each individual. A framework that can help provide 'genuine learning opportunities' and 'optimise teaching and learning for all' (CAST, 2010) is Universal Design for Learning (UDL). UDL works on the premise that (1) engaged learners are motivated and purposeful, (2) appropriate presentation of content results in resourceful and knowledgeable learners, (3) providing varying methods for actions (e.g. ways of responding or navigating) and supporting executive functions (e.g. guiding goal setting) will empower learners to be strategic and goal-oriented. In line with the principles of UDL, Rufi'i and Rochmawati (2019) claim that for effective teaching to occur, learners should be provided with flexible opportunities to address their needs. However, they point out that despite the popularity of UDL, its effectiveness has not been rigorously researched. In their study, Rufi'i and Rochmawati explored a constructivist-based *Statistics* learning module built in alignment with UDL principles. They found that motivation was affected by factors such as the organisation of learning resources, teaching skills, and accessibility. The study also showed that UDL enables collaborative learning and engagement, meaning making, and minimises barriers. This constructivist approach is used by some apps, whilst others align with a behaviourist approach or a mix of the two. The *Community* section of the Busuu app, for example, enables collaborative construction of knowledge by inviting members to correct each other's exercises (Garnes-Tarazona, 2018), whilst with its reward system and lack of context, Duolingo takes a behaviourist approach (Teske, 2017).

3.4 Methodology and Positionality

Methodology asks how social reality can be studied and what the 'technical instruments of the cognitive process' are (Corbetta, 2003, p.13), i.e. what guides our choices during all stages of the research process. The proposed methodology is informed by my ontological and epistemological viewpoints as presented earlier. Positivism emphasises a scientific method; to try and understand social phenomena and complex human behaviours would be hugely challenging using this approach; interpretive and constructivist approaches, however, derive an understanding of the social world through the belief that human behaviour is not governed by universal laws and individuals hold the key to deciphering the world around us (Cohen,

Manion and Morrison, 2017). It is this duality that drives the proposed methodology which utilises mixed methods research (MMR).

MMR is the combined use of qualitative and quantitative approaches that considers the underlying philosophical and methodological bases (Fetters, 2020). According to Fetters, MMR offers more depth and breadth to research than qualitative or quantitative methods only, leading to a greater understanding of the problem; it acknowledges both 'the strengths and weaknesses inherent in [...] approaches' that generate data at the opposing end of the continuum (Denzin, 2008; Plowright, 2013, cited in The Open University, 2020a). It facilitates triangulation, complementarity (the clarification of one outcome by another method), the development of subsequent methods, and a wider research range. Creswell (2013) agrees that MMR produces richer detail than an approach using one type of data. It is not only data that can be mixed, however. Biesta (2012, p.148, cited in The Open University, 2020b) categorises 7 levels at which mixing can occur, including methods, epistemologies and ontologies. The proposed design mixes all of these for reasons set out at the beginning of the chapter. For MMR to be high quality, Johnson (2012), refers to the multiple validities legitimisation and claims that both qualitative and quantitative components must meet quality standards for their respective method, along with the study as a whole. Indeed, MMR's critics argue that this approach grapples with the issue of commensurability (Cohen, Manion and Morrison, 2017, p.36). Despite this, I agree with Reams and Twale's (2008, p.133, cited in Cohen, Manion and Morrison, 2017, p.37) view that mixed methods are 'important in addressing information and perspectives' and that the mixed approach can be leveraged to corroborate the result of one method with the other, resulting in 'more accurate conclusions'.

MMR enables insider and outsider perspectives (Cohen, Manion and Morrison, 2017, p.33), each holding the potential to impact the research design, data analysis and power balance through the researcher's values, experiences and beliefs (The Open University, 2024b). My position is dual – an insider due to my extensive experience with language apps (which may give rise to bias), and also an outsider due to holding no affiliations with research participants and having no prior knowledge of their perspectives. Understanding the setting, access to participants, approvals, and qualitative data collection may be easier as an insider, however

it may also cause short-sightedness and ultimately thinner data (Mercer, 2007). Unfamiliarity can increase objectivity and offer a new perspective.

Part B

Chapter 4 – The Research Proposal

The proposed case study aims to explore the correlation between language learning applications and linguistic gains, as well as the contextual factors (e.g. the spacing of sessions, the influence of location/physical environment when using the app, the learner's ability to personalise the app, the factors they found motivating, etc.) that may affect outcomes of learning. The focus of the study emerged from a combination of personal interest in language learning, professional experience in using technology to enhance educational gains and opportunities, and the literature review undertaken for this dissertation. The latter highlighted the multitude of factors that affect the outcome of learning activities (both self-perceived and numerically measurable) and raised questions about how they compare to other modes of language learning.

The link between educational outcomes and influencing factors has also become evident. Exploration of the wider impact of these could expose serendipitous consequences (Chatwin, 2024b) such as increased learner interest in the cultural heritage of the country associated with the target language, or exploring further opportunities that utilise technology to enhance learning.

By investigating a broader set of open-ended impacts and linking these to the extent to which apps helped to achieve the intended aims, insight can be gained into how apps can be leveraged in formal and informal education and what accommodations can help maximise gains. The research questions that aim to pave the path to a better understanding of the above are:

1. What is the impact of mobile language learning applications on student progress in learning a foreign language?

2. How do learner motivation and contextual factors affect linguistic outcomes for language learning app users?

The literature review also revealed concepts and ideas that, along with the content presented throughout the three post-graduate modules, became the foundation of the proposed theoretical and overall conceptual framework. The emerging concepts prompted a deeper examination of specific app design features and underlying pedagogical approaches which could be explored in subsequent research projects.

My positionality as a researcher, as described in Chapter 3, stems primarily from personal experiences of many years of studying languages and other disciplines. My readings reinforced and helped articulate my ideas about the process of learning, namely that it is not a phenomenon that occurs in isolation but is highly circumstantial and dependent on the individual and thus it requires both interpretive and positivist approaches. Personal values and beliefs can give way to researcher and confirmation bias, therefore an awareness of these and how they guide choices during all stages of the research process (i.e. reflexivity) must be practised (Harmeling, 2020).

Chapter 5 details the elements of the proposed research design which aims to investigate the issues described above and provide responses to the research questions.

Chapter 5 – Research Design, Research Methods and Methods of Analysis

5.1 Research Design

A small-scale, mixed methods single case study investigation with a concurrent parallel mixed approach is proposed for this research.

As shown in the literature review, emotions are inextricably linked to performance. Anxiety, boredom and pride have the power to shape ‘students’ motivation, learning, and achievement’ (Chamani, Razi and Xodabande, 2023, p.2). Boredom and disengagement may lead to decreased attention which, in turn, can hinder effectiveness. It is therefore important

to examine learners' perspectives and factors that can affect progress and achievement, alongside the numerically measurable outcomes. Collection and analysis of both objective statistical data and subjective evidence is therefore proposed. Quantitative methods can 'give weight to qualitative narrative' and give some credit (O'Leary, 2017) to quantitative data that is not derived from a statistically representative, generalisable sample. The generalisability of the proposed research is limited (partly due to the small number and limited diversity of participants - realistically, only a limited number of participants can be interviewed due to the resource-intensive nature of the process) but can be improved as described below.

Observing individual units, such as a community, in a bounded system (Creswell, 1994, cited in Cohen, Manion and Morrison, 2017, p.375), case studies can include both quantitative and qualitative approaches, with emphasis on the latter, resulting in deeper insight (Academic Educational Materials, 2016). Rather than presenting 'abstract theories and principles', case studies represent 'real people in real situations' (Cohen, Manion and Morrison, 2017, p.376) and generate extensive rich data with thick descriptions (The Open University, 2023a). Case studies reject a single reality (Cohen, Manion and Morrison, 2017, pp.376-377) and acknowledge variables within a single case, for instance, the numerous contextual factors affecting each learner's outcomes, therefore generally utilise several sources of evidence and more than one data collection tool. Case studies recognise complexity, nuance and occasionally conflict (Bradley, 2024). However, they lack rigour and findings are often claimed to be non-generalisable (Bassey, 1999, p.34), partly due to doubts about sufficiently representative samples (Hammersley, Gomm and Foster, 2009, p.234). In contrast, Yin (2009, cited in Cohen, Manion and Morrison, 2017, p.380) claims that case studies opting for analytic generalisability can contribute to growing research and theory generalisation. Shaughnessy *et al.* (2003, pp.290-299, cited in Cohen, Manion and Morrison, 2017, p.378) argue that making assumptions and drawing cause-and-effect relationships from case studies is problematic and there is a risk of bias, particularly if the researcher acts both as participant and observer.

This proposal sets no initial hypothesis to be tested although exploratory case studies can be used for this purpose (Cohen, Manion and Morrison, 2017, p.377). It does not seek to solve a specific problem but aims to explore the impact of linguistic apps and learner context; the

research questions have been devised to focus on this. This research is likely to raise further questions and hypotheses for subsequent studies, for example about the merits of various pedagogical approaches in apps and the efficacy of each. Exploratory case studies are often used as preliminary steps to designing research that establishes possible cause-effect relationships, particularly in new fields, although this is not their primary focus (Herbert, 1990, p.19). Due to their flexibility in research design, data types, and data collection methods, exploratory studies are particularly well-suited to situations 'where the preliminary collecting of data for eventual generalization is a precondition to develop successive causal studies' (Mills, Durepos and Wiebe, 2010, pp.372-373).

The mixed nature of this exploratory single-case design will be reflected in the proposed research: it will evaluate learning outcomes, tell learners' stories, and theorise about the impact of apps – although its purpose is not to test an actual theory (Bassegy, 1999, pp.67, 81). The study will focus on a representative group of participants with no comparisons being offered to a control group.

The various pedagogical approaches in the apps will be noted, however, their impact will not be analysed – a more extensive study could help explore the merits and drawbacks of these. All selected apps aim to teach vocabulary, grammar and speaking. Apps that only focus on a single area (e.g. vocabulary only) are deliberately excluded to provide a more comprehensive view of learning gains.

5.1.1 Data Collection

The qualitative and quantitative strands will be planned and data will be gathered simultaneously, in no particular order, as the two strands are not dependent but complementary to each other. This allows corroboration and cross-validation of the results as they surface and is more time-efficient (Terrell, 2012). Time-lapsed or concurrent mixing is possible in parallel mixed designs when the research questions are both quantitatively and qualitatively driven and different paradigms are involved (Tashakkori and Teddlie, 2010, pp.11, 341).

Quantitative data will be collected through a 105-minute-long post-assessment, based on the DELE¹ standardised language assessment ([Appendix A](#)), to measure proficiency levels after app use for a period of ten weeks. Test scores will be measured on a ratio scale, which ‘has an absolute zero and equal intervals’ (Herbert, 1990, p.82) and is therefore suitable for comparing participants’ results to each other, and to the benchmark of the maximum 100 points on the original DELE test. The post-assessment score is the dependent variable as it is a consequence of aspects such as the extent of motivation, frequency of app use, the perceived usability of the app, and the barriers experienced (i.e. the independent variables).

Qualitative data will be collected through participant journals completed throughout the intervention period, followed by semi-structured interviews ([Appendix B](#)) using rating scales and open-ended questions to explore participants’ experiences and attitudes. A combination of scales of measurements (ordinal, nominal) will be used across them. Semi-structured interviews enable the ‘scope and narrative of the interview’ to be shaped by the interviewee whilst they allow researchers to prompt, probe and further explore salient points (The Open University, 2022a). Structured interviews, with their pre-determined questions and response categories, would not allow for a sufficient variation of responses across participants (Marvasti and Freie, 2017) although would make for less complex data collection and analysis processes. Interviewing in itself is a more time-consuming method than the more impersonal surveys, therefore participant numbers must be realistic. However, this method enables a better understanding of personal perspectives (The Open University, 2022b). Participants will be provided with the interview questions at the beginning of the intervention, allowing them to consider relevant aspects of their language-learning journey. An audio-only recording device shall be used alongside note-taking during the interview, subject to participant consent, to support higher accuracy and deeper engagement, as well as the quality of the interaction between the researcher and participant (Rapley, 2004, cited in Rutakumwa *et al.*, 2020). Rutakumwa *et al.* highlight a recorder’s paradoxical role: although it can enhance the validity and credibility of data, it may also lead to less sincere responses. In addition, Jensen and Laurie (2017) identify some factors during data collection and analysis that can impact

¹ ‘DELE Diplomas are official qualifications certifying levels of competence in and mastery of Spanish. They are awarded by Instituto Cervantes on behalf of the Ministry of Education and Vocational Training and the Ministry of Foreign Affairs, European Union and Cooperation of Spain.’ (Instituto Cervantes, 2024a)

the quality of the final output; these include the consideration of contextual factors that may affect participants' responses (e.g. location of the interview) and the selective use of data to support pre-existing assumptions which may lead to biased and unrepresentative results.

In their journals, participants will make notes related to their experiences of using the app. Journals make it less likely that they overlook aspects that may have impacted their learning.

5.1.2 Participants

Nine participants will be selected through random sampling from a pool of students at a UK university. Random sampling allows the selection of participants from the population with 'equal probability' (Herbert, 1990, p.48). Although this type of sampling enables inferences to be made about the entire population (Little, 2014), it is not only the impact of apps on university students' language acquisition the study aims to explore (i.e. it does not look for representativeness for this population only), but it looks to establish some generalisability among app a diverse set of users (e.g. children, adults, elderly, people with and without qualifications, and varying experiences of learning). To achieve statistical generalisation, the population to be sampled could be more diverse and the sample size could be increased (Verschuren, 2003, cited in Cohen, Manion and Morrison, 2017, p. 381), however, this may be challenging within the constraints of this small-scale study.

Participant selection will be informed by a survey ([Appendix C](#)). Participation is not mandated as part of the university programme, as this may negatively impact participants' motivation to complete the study (Loewen *et al.*, 2019). Participants will learn Spanish using one of three commercially available products (Duolingo, Babbel, Rosetta Stone), randomly assigned (three learners for each app). Participants will have no previous experience of studying the target language. Although existing knowledge levels could be measured through a pre-assessment, this may not provide an accurate picture unless it is a more extensive test, which further increases the level of commitment required from participants. Experience of using language learning apps will be disregarded as in the real world, not all users would have had the same experiences either, therefore results are better generalisable. However, inexperienced participants may take longer to effectively use the app, potentially leading to some reduction of gains. This is expected to be negligible, given the fact that apps are not overly complex

(age-rated 4+ and 12+), and the length of the intervention period which allows participants to get used to the app. The effects of this could be mitigated through a short familiarisation period. There may be an increased risk of bias due to participants' pre-existing notions of certain apps.

5.1.3 The Intervention

To measure app effectiveness, participants will use them for a total of 30 hours over 10 weeks. This requires significant participant commitment therefore compensation in the form of a gift card from a major online retailer will be offered upon completion. Participant attrition, which can pose a threat to validity (Cohen, Manion and Morrison, 2017, p.267) and can be affected by 'the number of waves of data collection, the intervals between waves, [and] the burden of the data collection exercise' (Lewis-Beck, Bryman and Futing Liao, 2004, pp.42-43), may be reduced by offering incentives (Cohen, Manion and Morrison, 2017, p.416). Participants will be asked not to use the app for less or more than 30 hours during the intervention period, even if they feel motivated to do so, in order to generate more consistent and comparable data. Spanish was chosen as the target language as measurable gains need to be demonstrated within a relatively short time. Too long a timeframe increases the risk of non-compliance and can lead to abandonment of the programme. Spanish is a category I language (i.e. one of the easiest languages for speakers of English). General professional proficiency (level B2-C1) can be achieved in approximately 600-750 hours (Vare, 2024; US Department of State, Foreign Service Institute - no date). According to the Instituto Cervantes (2024b), an elementary level of CEFR² level of A1.1 can be reached during a 30-hour course (although there is no information on whether additional self-study is required). CEFR levels and study hours are shown in [Appendix D](#).

5.1.4 Data Analysis

The three apps chosen for this study have no common metrics for comparing learning progress against each other or a benchmark, other than the achievement of set stages, which are claimed to correspond to CEFR levels (Rosetta Stone, no date; Duolingo, 2020; Babbel GmbH, 2024). The knowledge and skills demonstrated during app use, however, are unlikely

² CEFR: Common European Framework of Reference for Languages

to translate accurately into real-world CEFR levels, partly due to apps offering limited *real-world-type* interactions and the predictable nature of many exercises; answers can often be guessed from memory or context and do not always require knowledge. Quantitative findings therefore are benchmarked against a post-intervention assessment, providing data in four areas of competency ([Appendix A](#)).

The primary quantitative data analysis aims to measure learner progress towards a CEFR level A1.1 in Spanish, where the maximum achievable score is 100 points. This will show to what extent the apps support learners in achieving level A1.1 in 30 hours; the purpose of the analysis is, therefore, exploration - in contrast with explanation and testing of a hypothesis (The Open University, 2020c). This can be achieved by calculating the mean, median, standard deviation, minimum and maximum points achieved on the post-intervention assessment. These values provide a way to 'describe and present' the data (Cohen, Manion and Morrison, 2017, p.727). Mode can also be calculated to show points achieved by the most participants, although given the small number of learners and the fact that they may achieve different scores, this would not provide significantly useful insight.

[Post-intervention interview questions 1-5](#) have been designed in a way (using Likert scales and categorisation) that allows for qualitative data to be quantified, enabling quantitative analysis (Halevi Hochwald *et al.*, 2023). To establish relationships between variables and calculate the effect sizes, the measures presented in Table 2 are proposed (Cohen, Manion and Morrison, 2017, pp.766, 841, 845).

Table 2 - Effect sizes, scales and measures to be calculated for each independent variable (against the dependent variable)

Independent variable	Effect size to be calculated	Scale of measurement	Measure of relationship
Extent of motivation	How does lower/higher motivation relate to test results?	Ordinal data (Ordered data where 'bigger means more' (Herbert, 1990, p.81)	Spearman rank order
Frequency of app use	How does spacing impact learning outcomes?		
Perceived usability	How better/worse usability/accessibility design impact learning outcomes?		
Barriers experienced	Is a higher number of barriers more likely to result in lower test results?	Nominal data (Responses categorised by numbers denoting qualitative responses)	Point-biserial

Qualitative data from participant journals and interviews ([questions 6-16](#)) that cannot be quantified will be reduced in size and scope to make it manageable and easier to extract salient points (The Open University, 2020d). It is proposed that handwritten journals and interview notes be typed up into Word documents and then imported into a computer-assisted qualitative data analysis software (CAQDAS), such as nVivo or ATLAS.ti for easy organisation, annotation, search and display (Schmider and Christian, no date). If a CAQDAS is unavailable, the digitised text documents should be coded by themes (for example, comments on ease of use or technical issues), code categories labelled with broader interpretive statements (Cohen, Manion and Morrison, 2017, pp.677-678), and significant findings selected for thematic analysis. Codes should be matched to relevant existing or new theoretical concepts (Jensen and Laurie, 2017). Thematic analysis enables the identification and classification of themes, patterns, and participants' shared meaning (The Open

University, 2020e; 2020f), followed by a process of identification of connections between themes.

It is proposed that data analysis and interviews are carried out by multiple researchers to increase equivalency. Internal consistency, the other component of consistency, is already addressed by the use of multiple data sources and types (Mills, Durepos and Wiebe, 2010b, pp.801-802). This triangulation of different perspectives (quantitative/qualitative, positivist/interpretive) demonstrates concurrent validity by showing that the findings of the two research strands are consistent, lending greater trustworthiness to the findings (Cohen, Manion and Morrison, 2017. p.258, 265) and ultimately increasing research quality. (Contradictory findings are possible - alongside complementary findings, these 'capture nuances' (De Lisle, 2011, p.106) and inform further investigations.)

The themes that emerged during qualitative data analysis will be correlated to quantitative findings to identify possible links and cause-effect relationships. For example, participants may have found gaining points within the app so motivating that they completed more sessions which led to learning more vocabulary, ultimately resulting in higher scores on the post-intervention assessment. Given the limitations posed by the sample size and homogeneity of the sampling pool, this must be done with caution, however.

5.2 Ethical Considerations

For the proposed research to be ethical, 'rigorous, valid and reliable', the BERA guidelines (British Educational Research Association [BERA], 2024) will be followed and consequential, external, relational and deontological ethical perspectives considered (i.e. the positive consequences, potential harms, methods of participant selection, how good participant relationships will be built, etc.) (The Open University, 2022c; 2023b). Voluntary participants devote considerable time to taking part and it must be ensured that their time is effectively utilised – this, along with ensuring that participants understand the benefits of the study (Stutchbury and Fox, 2009), supports reduced attrition and increased compliance.

An ethical assessment of the research proposal will be carried out and information to gatekeepers and participants will be provided as per the Ethical Appraisal Form ([Appendix E](#)).

Informed consent - which encompasses space for options, preferences and negotiation of terms (Alderson and Morrow, 2020, p.130) - will be gained from gatekeepers and participants upon verbal and written explanation of what the research involves ([Appendices F-I](#)). Data collection, storage, processing and disposal will be undertaken in accordance with the Data Protection Act (UK Government, 2018). Information collected will be pseudonymised – this can help reduce potential harm and prevent participant worry about being judged on their skills, which may impact research validity (for example, participants may be more likely to use additional learning aids to improve their scores). Unlike anonymisation, pseudonymisation allows easier data linkage between data sets so socio-economic data, for instance, can be linked to assessment scores without using names (The University of British Columbia, 2021). Similarly to anonymity, it can also promote the loss of inhibitions, therefore a point should be made about participants using appropriate language which does not render data unusable (Oliver, 2010, p.81). Re-identification is a risk.

It will be clear to participants that the study is not sponsored by any app owners. Sponsorship may cause participants to question research credibility (e.g. about methods used and/or expectations of research findings) (Cohen, Manion and Morrison, 2017, p.114), lead to non-compliance with the process, and deter participants from withdrawing if they wish.

Researcher bias will be reduced by my non-categorical stance on the insider-outsider continuum. Building trust and understanding participants' contexts and viewpoints may be more challenging as an outsider (The Open University, 2024c), however this can be mitigated to some extent by the consideration of ethical issues and the power balance between researcher and participant (The Open University, 2022d). The issue of selective reporting will be taken into consideration.

Postscript - Narrative Critical Reflection

My motivation for undertaking E822 bloomed from the success of my first post-graduate module, H880, which focused on technology-enhanced learning. A keen learner of languages and user of mobile applications that support my often-challenging learning journeys, I have been fascinated by how technology is leveraged in increasingly innovative ways to help learners. I am also interested in the role of technology from a professional standpoint; I am currently an instructional designer, developing digital resources to support learners and training providers in achieving their goals. It was therefore clear from early on that my dissertation would explore an area of digital learning.

Throughout my post-graduate studies, I have been praised for my written communication and presentation skills, however I had been advised to develop my critical analysis and evaluation skills. In previous assignments, I failed to use sufficient references and over-relied on long quotations. I tried to address these issues in this dissertation, not only to give myself the best chance to succeed but I also saw this as a development opportunity I could benefit from at work. In my professional capacity, I am involved in the creation of short courses; this often requires me to write scripts and create content, based on research. Criticality of resources, ideas and concepts, along with creativity and accuracy in synthesising information is essential to create high-quality outputs. As suggested by my tutor on EE831, I perused the information about using the critical framework diamond on the 'Masters: Education, Childhood and Youth' website. I paid particular attention to being less descriptive and more analytical. Instead of accepting what I read at face value, I developed a more sceptical mindset, looked at opposing viewpoints, and searched for limitations and influences which may have caused bias. Reading through numerous pieces of literature helped me compare and contrast how other researchers approach their studies and what their justifications for these approaches were.

To better utilise and refer more to the literature, I tried to engage with it more deeply, carried out backward citation searching, and used the referencing software Zotero to organise my sources. The latter was also helpful in ensuring that I did not omit any citations.

One of the most challenging parts of the dissertation was the data analysis. I was already familiar with some of the principles of qualitative analysis from EE832, however, quantitative analysis was unknown to me. I had not thought through how quantitative data would be analysed until I came to write Chapter 5 and I was surprised to see the number of decisions and choices I had to make about what would be calculated and how. Due to my limited knowledge, some of my original interview questions had to be re-structured to allow for qualitative data to be quantifiable. This highlights the importance of pre-planning, as in a real-world setting it would have jeopardised the entire project.

[Appendix J](#) outlines how the feedback I received and the goals I set for myself helped to shape my journey and ultimately, this dissertation.

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Appendix A – Post-Assessment Structure Example

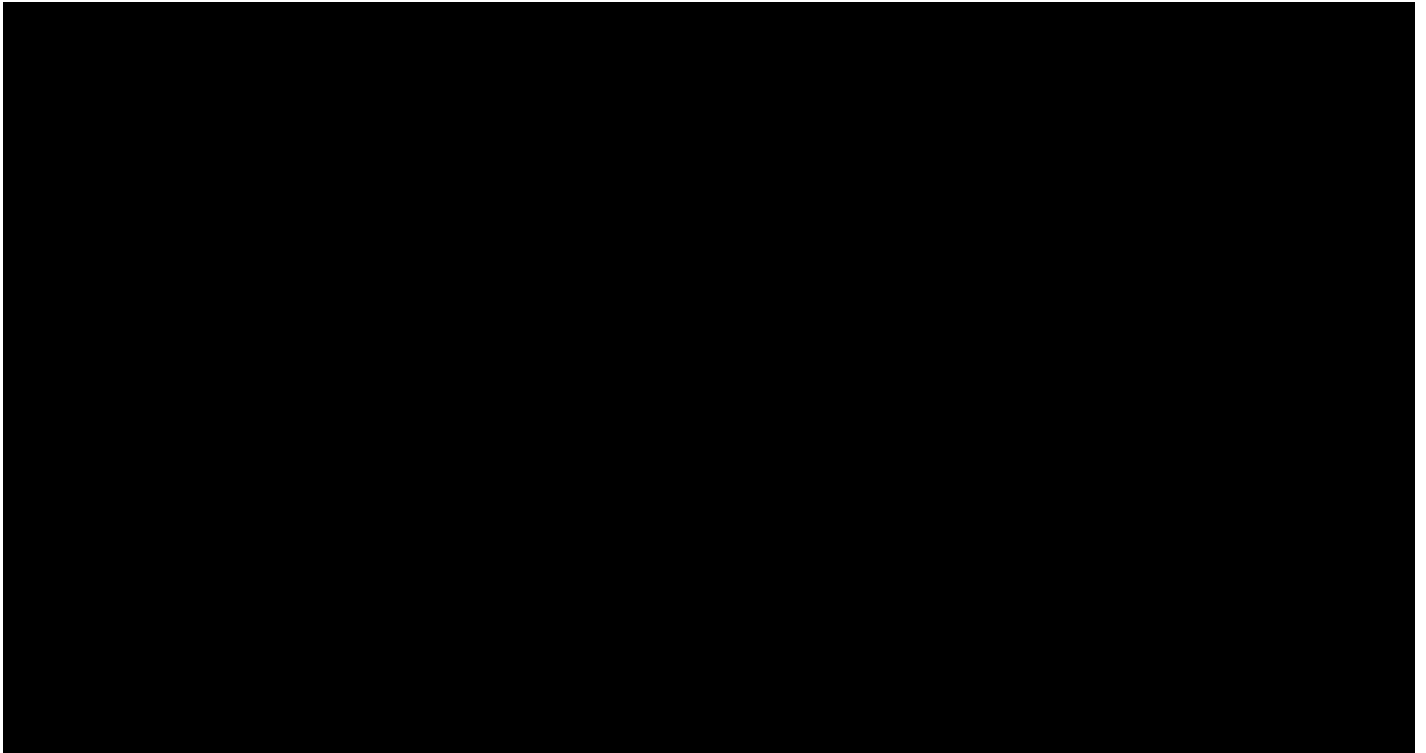


Figure 6 – Adapted from DELE A1 (version 2020) sequence of test administration (Instituto Cervantes, 2020)

APPENDIX A REDACTED FOR COPYRIGHT REASONS

Post-Assessment Contents Examples

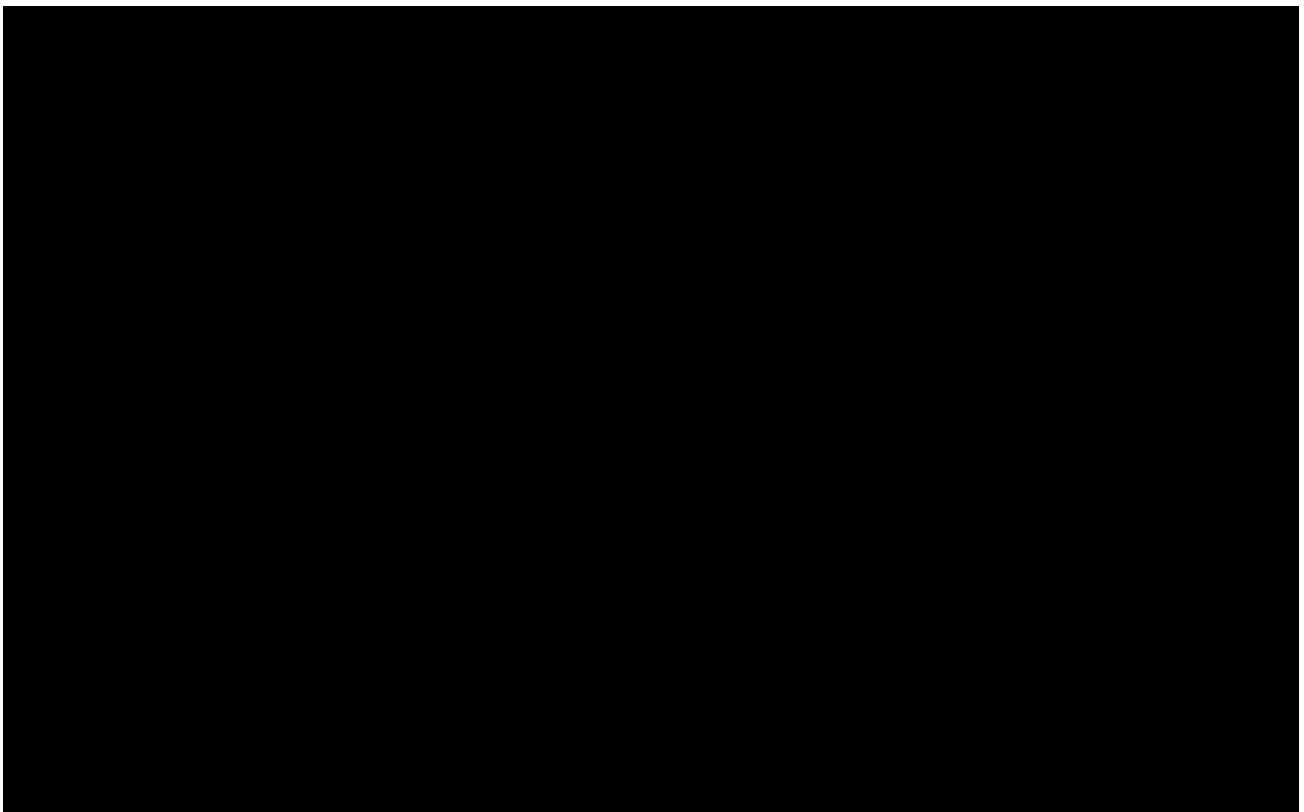


Figure 7 - Spanish level A1.1 Cervantes Institute Leeds course content to inform the content of the post-intervention assessment (Instituto Cervantes, 2024c)

Appendix B – Post-Intervention Interview Questions

1. How often and for how long did you use the app (spacing)? Please tick as applicable.

Approx. the same amount of time each day (i.e. 26 minutes/day)	Approx the same amount of time each week (i.e. 3 hours/week)	I completed fewer but longer sessions
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other:		

2. At the start, how motivated did you feel to learn Spanish? How did this influence your motivation to use the app?

Not at all		Somewhat		Very
1	2	3	4	5
Explanation/examples:				

3. How intuitive and user-friendly did you find the app’s user interface?

Not at all		Somewhat		Very
1	2	3	4	5
Explanation/examples:				

4. How well did the app features and content support your progress in the following areas?

	Not well at all		Well		Extremely well
	1	2	3	4	5
Reading understanding					
Hearing comprehension					
Written expression and interaction					
Oral expression and interaction					

5. What challenges/barriers did you experience that affected your learning on the app?

	Tick as applicable
I was too busy/tired	
I found it difficult to get motivated	
I experienced technical issues	
The app or content was not accessible for my needs	
Other/notes:	Total number of barriers:

6. When and where did you use the app the most? (For example, whilst travelling to university/work, in the evening before going to bed.)

7. How conducive to learning was your physical environment where you undertook learning sessions? How did this affect your ability to learn? Think about the noise levels, lighting, and support available from others.

8. To what extent did you think that the learning topics were appropriate?

9. What did you think about the difficulty level of the activities and the information provided for you to be able to give the correct answer/solve the task?

10. How did it make you feel when you were able and unable to complete a task/reach the next level/earn a badge?

Able:

Unable:

11. How customisable was the app? For example, could you skip activities and progress faster than the default or choose learning topics that interested you?

12. Which aspects of the app did you find most motivating (e.g. game elements, AI conversations, immediate feedback, time-based challenges, XP points)? How did these affect your engagement with the app? For example, did you want to use the app more so you could get to the top of the leaderboard?

13. Did you use any of the collaborative learning/community features in the app? If so, how did this affect your experience?

14. What is your preferred language learning method and why? For example, do you prefer to use an app, attend classes, use print books, have one-to-one tuition, etc? Why do you prefer one method over another?

15. How did your pre-existing digital skills and experience with technology-enhanced learning affect your learning with the app?

16. Apart from the effect on your language skills, have you experienced any consequences of learning Spanish using the app? For example, a change in your level of interest in the culture of Spanish-speaking countries, exploring other languages, or trying other educational apps?

Appendix C – Participant Selection Survey Questions

Name	
Age	
Gender	

1. What is your mother tongue?

2. Do you speak or have ever studied other languages? If so, please state which one(s).

3. If you answered yes to question 2, state your proficiency levels for each language you speak.

	Which language?	Proficiency level (beginner, intermediate, advanced)
Language 1		
Language 2		
Language 3		
Language 4		

4. Please list the prior qualifications you hold.

5. What is your household income per annum?

£25,999 and under

£26,000 to £51,000

£52,000 to £99,9999

£100,000 and above

6. If you have prior language-learning experience, please state which of the below methods you have used. Select all that apply.

Traditional classroom in school

Private language learning courses

One-to-one tutoring

Self-directed using books

Self-directed using a desktop/laptop computer

Self-directed using mobile applications

Other Please state:

7. If you have used language learning apps before, please state which one(s).

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8. On a scale of 1-5, how interested are you in studying Spanish? Please indicate by circling the number that applies to you.

1	2	3	4	5
---	---	---	---	---

9. What are your motivations for taking part in this study?

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Appendix D – CEFR Levels and Study Hours

Common Reference Levels

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

Figure 8 – Common Reference Levels (Council of Europe, 2024)

CEFR Study Hours

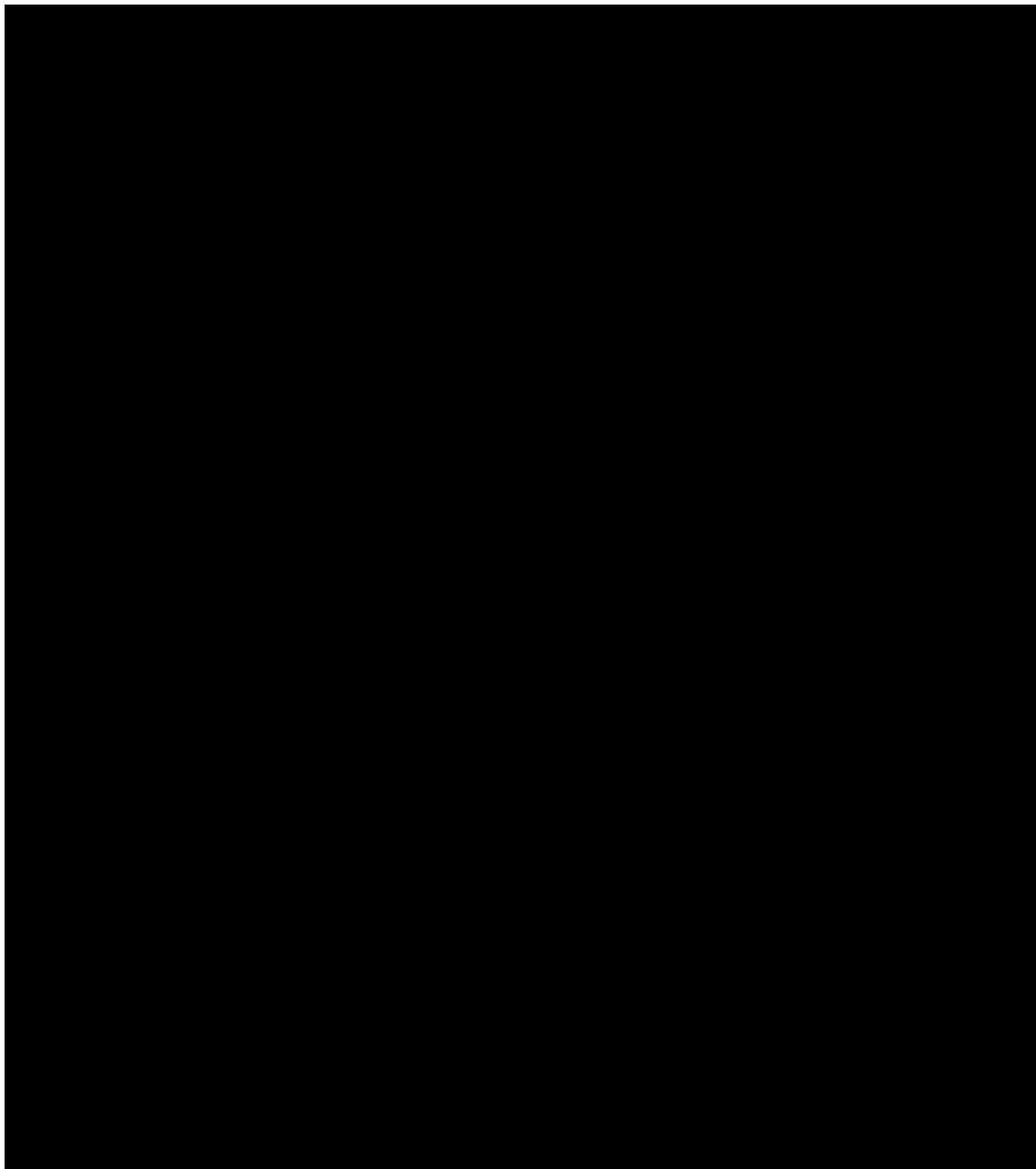


Figure 9 - CEFR study hours (Instituto Cervantes, no date)

IMAGE REDACTED FOR COPYRIGHT REASONS

Appendix E - Ethical Appraisal Form

Masters: Education, Childhood and Youth

NB: it should be noted that The Open University is unable to offer liability insurance to cover any negative consequences students might encounter when undertaking 'in-person' data collection. It is therefore very important that you follow appropriate research protocols which should include seeking Gatekeeper permissions to undertake any data collection within your setting and adhering to ethical principles for the safety of yourself and your participants.

Because ethical appraisal should precede data collection, a completed version of this form should be included with TMA02 for those developing a Small-Scale Investigation (SSI) and as part of the EMA submission for those completing an Extended Literature Review and Research Proposal (EP) form of the Dissertation.

Section 1: Project details

a.	Student name	Gabriella Wraith	
b.	PI	[REDACTED]	
c.	Project title	The impact of mobile apps on student progress in learning a foreign language	
d.	Supervisor/tutor	Ray Chatwin	
e.	Qualification	Masters in Education	<input checked="" type="checkbox"/>
		Masters in Childhood and Youth	<input type="checkbox"/>
f.	MA pathway (where applicable)	Learning and teaching	
g.	Intended start date for fieldwork	TBC	
h.	Intended end date for fieldwork	TBC	

i.	Country fieldwork will be conducted in <i>If you are resident in the UK and will be conducting your research abroad please check www.fco.gov.uk for advice on travel.</i>	England
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Section 2: Ethics Assessment		Yes	No
1	Does your proposed research need initial clearance from a ‘gatekeeper’ (e.g. Local Authority, head teacher, college head, nursery/playgroup manager)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Have you checked whether the organisation requires you to undertake a ‘police check’ or appropriate level of ‘disclosure’ before carrying out your research? ³	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Have you indicated how informed consent will be obtained from your participants (including children less than 16 years old, school pupils and immediate family members)? Your consent letters/forms must inform participants that they have the right to withdraw from the study at any time. ⁴	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Will your proposed research design mean that it will be necessary for participants to take part in the study without their knowledge/consent at the time (e.g. covert observation of people in non-public places)? If so, have you specified appropriate debriefing procedures? ⁵	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	Does your proposed design involve repetitive observation of participants, (i.e. more than twice over a period of more than 2-3 weeks)? Is this necessary? If it is, have you made appropriate provision for participants to renew consent or withdraw from the study half-way through? ⁶	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6	Are you proposing to collect video and/or audio data? If so, have you indicated how you will protect participants’ anonymity and confidentiality and how you will store the data?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Does your proposal indicate how you will give your participants the opportunity to access the outcomes of your research (including audio/visual materials) after they have provided data?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Have you built in time for a pilot study to make sure that any task materials you propose to use are age appropriate and that they are unlikely to cause offence to any of your participants?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

³ You must agree to comply with any ethical codes of practice or legal requirements that maybe in place within the organisation or country (e.g. educational institution, social care setting or other workplace) in which your research will take place. If required an appropriate level of disclosure (‘police check’) can be obtained from the Disclosure and Barring Service (England and Wales), Disclosure Scotland, AccessNI (Northern Ireland), Criminal Records Office (Republic of Ireland), etc.

⁴ This should normally involve the use of an information sheet about the research and what participation will involve, and a signed consent form. You must allow sufficient time for potential participants to consider their decision between the giving of the information sheet and the gaining of consent. No research should be conducted without the opt-in informed consent of participants or their caregivers. In the case of children (individuals under 16 years of age) no research should be conducted without a specified means of gaining their informed consent (or, in the case of young children, their assent) and the consent of their parents, caregivers, or guardians. This is particularly important if your project involves participants who are particularly vulnerable or unable to give informed consent (e.g. children under 16 years, people with learning disabilities, or emotional problems, people with difficulty in understanding or communication, people with identified health problems). There is additional guidance on informed consent on the Masters: Education and Childhood and Youth website under Project Resources.

⁵ Where an essential element of the research design would be compromised by full disclosure to participants, the withholding of information should be specified in the project proposal and explicit procedures stated to obviate any potential harm arising from such withholding. Deception or covert collection of data should only take place where it has been agreed with a named responsible person in the organisation and it is essential to achieve the research results required, where the research objective has strong scientific merit and where there is an appropriate risk management and harm alleviation strategy.

⁶ Where participants are involved in longer-term data collection, the use of procedures for the renewal of consent at appropriate times should be considered.

9	Is your research likely to involve discussion of sensitive topics (e.g. adult/child relationships, peer relationships, discussions about personal teaching styles, ability levels of individual children and/or adults)? What safeguards have you put in place to protect participants' confidentiality?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10	Does your proposed research raise any issues of personal safety for yourself or other persons involved in the project? Do you need to carry out a 'risk analysis' and/or discuss this with teachers, parents and other adults involved in the research?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11	Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12	Will the study involve recruitment of patients or staff through the NHS or the use of NHS data?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If you answered 'yes' to questions **12**, you will also have to submit an application to an appropriate National Research Ethics Service ethics committee (<https://www.hra.nhs.uk/about-us/committees-and-services/res-and-recs/>).

Appendix F – Participant Information Letter

What is the aim of this research?

The aim of the interview is to gain learners' perspective on the efficacy of language learning applications and explore the extent to which it impacts learning outcomes.

Who is conducting the research and who is it for?

The proposed research is part of my studies on the Open University Masters module 'E822 Multidisciplinary Dissertation: Education, Childhood and Youth'. My task is to create a small-scale educational research proposal.

Why am I being invited to participate in this research?

You have been chosen as you are a learner in this setting and might be prepared to offer your perspective.

If I take part in this research, what will be involved?

This case study research involves collecting quantitative and qualitative data. Participants will be asked to:

- Use a language learning app for 30 hours for a period of 10 weeks to learn Spanish (the app will be assigned by the researcher)
- Keep a journal about their experiences
- Take part in a follow-up interview (approximately 2 hours, audio recorded and transcribed)
- Take part in a post-intervention language assessment (105 minutes)

For the interview, a mutually convenient time and place will be arranged, in a private setting. If there is anyone else affected by the interview, such as a member of staff, they will also have been consulted about when would be a convenient time and permission has been granted from the gatekeeper/lecturer.

The interview will be audio recorded and notes will be made by me about your responses. You will be provided with the transcript for your approval.

What will we be talking about during the post-intervention interview?

The focus of the interview will be to find out your perspective and experiences as shown in the 'Post-Intervention Interview Questions' document.

How will confidentiality be maintained?

Your participation will be treated in strict confidence in accordance with the Data Protection Act (2018). No personal information will be passed to anyone else. The information collected will be pseudonymised. If you disclose anything during your interview which I consider means that you might be unsafe or have been involved in a criminal act, because this is a safeguarding concern, I will need to pass this immediately to the organisational Designated Safeguarding Officer. In the case of any recordings and handwritten notes, these will be kept confidential and typed up as soon as possible and stored securely on password-protected devices. These may be shared with my personal tutor at the University. The original notes and recordings will then be destroyed.

What happens now?

After reading this information sheet, please review and complete the consent form. Your participation is entirely voluntary and you can withdraw your consent up until the week after the data collection by letting me know. If you have any other questions about the study, I would be very happy to answer them. Please contact me at [REDACTED].

Adapted from the OU document 'EE831 Learner Interview for post-18 learners ONLINE VERSION'

https://learn2.open.ac.uk/pluginfile.php/3575071/mod_folder/content/0/EE831%20Learner%20interview%20-%20information%20leaflet%20for%20post-18%20learners%20ONLINE%20VERSION.docx?forcedownload=1

Appendix G – Participant Research Consent Form

Please indicate YES or NO for each of the questions below:

Have you read the information about the proposed research?	YES	NO
Has the nature and aims of this research been explained to you?	YES	NO
Do you understand the stages of this research and are you happy to take part (app use, post-intervention assessment, follow-up interview)?	YES	NO
If there are any parts you do not wish to take part in, please specify:	_____	
Are you happy for the interview to be recorded?	YES	NO
Have you asked all the questions you want?	YES	NO
Have you had your questions sufficiently answered?	YES	NO
Do you understand that you can withdraw your consent up to a week... ...after data collection?	YES	NO
Are you happy to take part in the research?	YES	NO

If any answers are 'no', please feel free to ask for further information. If you **do not** want to take part, please let the researcher know (as soon as practical) and **do not** sign your name.

If you consent to taking part, please write your name and today's date. You can withdraw consent up until the week after the data collection by letting me know.

Your name _____

Date _____

The researcher to sign below:

Print name _____

Sign _____

Date _____

Adapted from the OU document 'EE831 Teaching And Learning Observation Consent Form For Teacher/Educator'
https://learn2.open.ac.uk/pluginfile.php/3575073/mod_folder/content/0/EE831%20Observation%20of%20Learning%20and%20Teaching%20-%20consent%20form%20for%20educators.doc?forcedownload=1

Appendix H – Letter to Gatekeepers

Dear [enter name],

I am currently studying on the Masters module 'E822 Multidisciplinary Dissertation: Education, Childhood and Youth' at the Open University in the Faculty of Wellbeing, Education, Language and Sport. My studies are being supervised by a personal tutor Dr Ray Chatwin, supported by the module team [contactable at:] and follow research protocols approved by the University.

As part of my studies on this module, I am proposing a small-scale investigation that will explore the efficacy and impact of language learning applications on learner progress and outcomes. My case study research involves collecting quantitative and qualitative data. Participants will be asked to:

- Use a language learning app for 30 hours for a period of 10 weeks
- Keep a journal about their experiences
- Take part in a follow-up interview (approximately 2 hours)
- Take part in a post-intervention language assessment (105 minutes)

Participation is voluntary and written informed consent will be gained after providing participants with information about the purpose of the research, the methods used, data collection particulars and how findings will be disseminated.

Information collected will be de-identified and kept confidential, being stored securely on password-protected devices. In the case of paper copies of the questionnaire and interview recordings, these also will be kept confidential and responses typed up as soon as possible. The original notes and recordings will then be destroyed.

If you do not consent to participate, this is absolutely fine: simply do not complete the questionnaire. It is not possible to withdraw your consent because the questionnaires are de-identified and therefore cannot be identified for removal.

If you consent, please complete and return the questionnaire. If you would like more information about the questionnaire before completing it, please contact me at [redacted].

Yours sincerely,
Gabriella Wraith

Adapted from the OU document 'Letter for Organisational Gatekeepers 24J'

<https://learn2.open.ac.uk/local/moodleglobalsearch/tracklink.php?searchtoken=1e34da9f18&pos=4&url=%2Fmod%2Fresource%2Fview.php%3Fid%3D2220533&contextid=2332321>

Appendix I – Gatekeeper Consent Form

Please indicate YES or NO for each of the questions below:

Have you read the information about the proposed research?	YES	NO
Has the nature and aims of this research been explained to you?	YES	NO
Do you understand what this research will involve... ... and the impact it will have on participants?	YES	NO
Have you asked all the questions you want?	YES	NO
Have you had your questions sufficiently answered?	YES	NO
Do you understand that you can withdraw your consent up to a week after data collection?	YES	NO
Are you happy for participants in your institution to take part... ... in the research project?	YES	NO

If any answers are 'no', please feel free to ask for further information. If you **do not** give permission for the research to be conducted in your institution, please let the researcher know (as soon as practical) and **do not** sign your name.

If you consent, please write your name and today's date. You can withdraw consent up until the week after the data collection by letting me know.

Your name _____

Date _____

The researcher to sign below:

Print name _____

Sign _____

Date _____

Adapted from the OU document 'EE831 Teaching And Learning Observation Consent Form For Teacher/Educator'
https://learn2.open.ac.uk/pluginfile.php/3575073/mod_folder/content/0/EE831%20Observation%20of%20Learning%20and%20Teaching%20-%20consent%20form%20for%20educators.doc?forcedownload=1

Appendix J – Reflection Grid

Category	Feedback received, targets achieved and areas of development worked on	How did this shape my learning journey and dissertation?
Knowledge and understanding	<p><u>EE831 TMA03 tutor feedback:</u> ‘... you have a good understanding of module concepts and you understand how these relate to the field. In most areas, this understanding is excellent. Your assignment demonstrates strong engagement with theories and perspectives, and an excellent ability to synthesise different ideas and construct persuasive arguments. You are making very good links between theory and practice, and your reflections are thoughtful, insightful and carefully considered.’</p> <p><u>E822 Tutor group forum, my comments:</u> At the beginning of E822, I was confused about whether paradigms can be mixed as my tutor EE831 advised that research must be carried out within one particular paradigm and it is not possible to use mixed paradigms. However, the recording on mixed methods on the OU website states that paradigms, methodologies and methods can all be mixed.</p> <p>My tutor on E822 helped me clear this up and recommended further resources.</p> <p>The thread and tutor’s response are available on the hyperlinked forum page: https://learn2.open.ac.uk/mod/forumng/discuss.php?d=4565667</p>	<p>This comment confirmed to me that my skills had improved from TMA01 and TMA02 and was more positive than previous feedback. This gave me the confidence to progress onto the final module of the masters.</p> <p>The comments about paradigms prompted me to explore in depth my epistemological and ontological positions, the meaning of axiology, rhetoric, and the methodologies I may want to consider for my research proposal.</p> <p>I found these ideas and how they link quite complex to explore, so I created a brief PowerPoint slide deck to help summarise them and guide my thinking. I shared this on the tutor group forum in the hope that it would prompt some discussion of the topic. The notes I made at this stage and the slide deck helped me keep in line with my philosophical assumptions and not drift down different paths unintentionally at various points throughout the writing of my dissertation.</p> <p>Throughout the course, my tutor provided me with additional resources I found useful. I was able to purchase and access both</p>

	<p><u>E822 Dissertation forum, tutor comment:</u> 'I don't know if you will be able to find this book, Martin Herbert (1990) Planning a Research Project, Cassell, but it is a useful one for research in 'the helping professions' (quote). I think his background is clinical psychology. Chapter 7 Statistical Analysis pp 75-93 may be the one you need.</p> <p>There is also Chapter 6 The Nature of Quantitative Research pp 139-162 in Alan Bryman's 'Social Science Research Methods', Oxford, (2008).'</p>	<p>books mentioned in this example and found them invaluable in helping me understand quantitative data analysis.</p>
<p>Critical analysis and evaluation</p>	<p><u>EE831 TMA01 tutor feedback:</u> 'There is some evidence of critical analysis and evaluation. There are some opportunities for development and these lie in how you organise the sentences and your paragraphs. Avoid an over-reliance upon quotations to make your arguments for you and instead use your own words, addressing this will help you to gain more marks in future assessments.'</p> <p><u>EE831 TMA02 tutor feedback:</u> 'There is an improvement in your critical evaluation skills.'</p> <p>'I particularly liked your answers to questions one and two, I thought these answers were much more developed where the use of your critical thinking and writing skills were concerned. There are still opportunities for development...'</p> <p><u>E822 TMA02 tutor feedback:</u> 'Critical evaluation of both theoretical and conceptual material show an ability to analyse, synthesise (to produce a new level of understanding) and your own critical voice emerges from this</p>	<p>Critical analysis is an area I have found difficult to improve on and I have relied on many resources (from the OU and external sources). Looking back at the previous years of my post-graduate studies, I can see a marked improvement in my ability to critically evaluate and write. This is supported by the example comments provided from year 2 and year 3.</p> <p>There are often times, still, when I find my writing too descriptive for masters-level study and it is a skill that needs a lot of honing and practise but I am pleased with my development in this area.</p>

	<p>critical engagement and thus demonstrates 'clear evidence of engagement with the ideas' (descriptor).'</p> <p><u>E822 Dissertation 1st draft feedback:</u> 'Too often students simply provide references to support their argument or claim assuming that all sources are of equal value or all research designs are rigorous when they are not. I think you have avoided this and I commend you for doing so.'</p> <p><u>E822 Dissertation 2nd draft feedback:</u> 'I do think you've rendered it as a debate, and that's quite unusual, as most MA students don't seem, at least to me, to really engage in the way you have.'</p>	
Links to professional practice	<p><u>EE831 TMA03 tutor feedback:</u> 'As you build on this work and prepare for your EMA, you are strongly encouraged to increase your use of referencing. You have clearly read a range of materials and engaged with module concepts but the writing itself does not always cite the sources that you have used. It is very important in academic writing that all sources are signposted through referencing.'</p>	<p>The literature review and sources on research methods helped me develop my own ideas about the conceptual and theoretical frameworks I would propose, as well as the overall research design. I found that in addition to reading about theory, it was useful to also see practical examples of completed small-scale studies.</p> <p>My research and writing process have remained relatively constant throughout the year. A significant change from last year is that this time around I have used the referencing software Zotero which made referencing easier and less time-consuming. In response to previous feedback, I also increased the use of referencing. I think I had shied from this in the past as it seemed to make my text more cumbersome and difficult to read. I found the OU Library resources on referencing useful in realising its importance and helping with the formatting (as Zotero does not always format all types of entries correctly).</p>

		<p>I am a long-term user and advocate of language learning apps and have been conscious of the need for researcher reflexivity and reducing bias in my proposal. I tried to formulate my research questions, methodology and post-intervention interview questions in a way that minimises the risk of bias, however an objective view of an independent researcher or a pilot study would be beneficial in confirming whether I was able to achieve this.</p> <p>My research questions and post-intervention questions for participants evolved through many iterations and varied in number throughout the writing process. At times, I found myself veering off in a slightly different direction than intended and realised that there was a dissonance between the various parts of my proposal. Other times, as I gained more knowledge about data analysis techniques, it became clear that my suggested data collection methods would not answer the research question. It was definitely an exercise in trial and error - one I have learnt a lot from and hoping to utilise in my workplace setting.</p> <p>I have found managing my workload and personal motivation challenging at times, however easier than last year. This was partly due to being closer to the 'finish line', and partly due to my choice of research topic. Unfortunately, last year I chose a topic that I was only mildly interested in, and I did not consider the negative impact of this choice on my motivation. This year, therefore, I knew I had to choose a topic I was passionate about. It was an easy decision to make as my passion lies in language learning and educational technology.</p>
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<p>Structure, communication and presentation</p>	<p><u>EE831 TMA01 tutor feedback:</u></p> <p>‘You use headings to clearly structure your assignment and you have gained marks for this.’</p> <p>‘You communicate your ideas clearly and you have also gained marks for this.’</p> <p>‘There is an opportunity to also gain more marks by structuring some of your arguments more clearly and I have left an example for you in the script.’</p>	<p>I feel that the clear structuring of my documents with the use of appropriately placed headings and paragraphs has always been my strong point. However, I often find it difficult to structure my arguments and decide what piece of information goes into which paragraph or section, particularly when I write about interlinked ideas.</p> <p>Tutor feedback on EE831 drew my attention to the structure of paragraphs and the order of sentences within each paragraph, as well as the tone used. After some research, I found that applying the PEEL (Point, Evidence, Explanation, Link) technique and following the critical reading, thinking and writing skills advice on the OU website, did help improve this skill. However, it is something that I will need to keep working on.</p> <p>In structuring my research proposal and guiding my choice of methodology, I found Jewitt’s and Aubrey-Smith’s (2023) ‘Research Onion’ useful; this was introduced to me during EE831. After selecting my paradigm, I worked my way inwards through the layers to determine my approach, method, strategy, and data collection methods.</p> <p>I think I communicated succinctly however I am over the word count. I identified a vast array of concepts and pedagogical approaches linked to language learning apps and included the most relevant ones to give justice to the complexity of the topic. As the word count is only <i>approximated</i> at 12,000 words in the assessment guidance (page: 11. Option EP), I decided that the benefits of a more extensive content that aids the reader’s understanding of my topic were outweighed by the potential drawbacks of exceeding 12,000 words.</p>
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