AN INVESTIGATION OF ENGLISH LANGUAGE TEACHING IN VIRTUAL REALITY AND METAVERSE PLATFORMS

Sevda AMAÇ
211113104

MASTER OF ARTS THESIS

Department of Foreign Languages Education
English Language Teaching Programme with Thesis
Advisor: Asst. Prof. Dr. Hakan DİLMAN

İstanbul
T.C. Maltepe University
Graduate School
January, 2024

AN INVESTIGATION OF ENGLISH LANGUAGE TEACHING IN VIRTUAL REALITY AND METAVERSE PLATFORMS

Sevda AMAÇ
211113104
ORCID: 0000-0003-1455-551X

MASTER OF ARTS THESIS

Department of Foreign Languages Education
English Language Teaching Programme with Thesis
Advisor: Asst. Prof. Dr. Hakan DİLMAN

İstanbul
T.C. Maltepe University
Graduate School
January, 2024



JÜRİ VE ENSTİTÜ ONAYI

SEVDA AMAÇ'ın "An Investigation of English language teaching in virtual reality and metaverse platforms" başlıklı tezi 22.02.2024 tarihinde aşağıdaki jüri tarafından değerlendirilerek "Maltepe Üniversitesi Lisansüstü Eğitim ve Öğretim Yönetmeliği" nin ilgili maddeleri uyarınca Yabancı Diller Eğitimi Anabilim Dalı Yüksek Lisans/Doktora/Sanatta Yeterlik tezi oy birliğiyle/oy çokluğuyla, başarılı/başarısız olarak kabul edilmiştir.

	Unvanı. Adı ve Soyadı	İmza
Üye (Tez Danışmanı)	Dr.Öğr.Üyesi Hakan DİLMAN (Danışman) Maltepe Üniversitesi	.....
Üye	Prof.Dr. Aysu ERDEN Maltepe Üniversitesi	.....
Üye	Dr.Öğr.Üyesi Aybars ERÖZDEN Okan Üniversitesi	.....

Enstitü Müdürü

ETİK İLKE VE KURALLARA UYUM BEYANI

Bu belge, Yükseköğretim Kurulu tarafından 19.01.2021 tarihli "Lisansüstü Tezlerin Elektronik Ortamda Toplanması, Düzenlenmesi ve Erişime Açılmasına İlişkin Yönerge" ile bildirilen 6698 Sayılı Kişisel Verilerin Korunması Kanunu kapsamında gizlenmiştir.

ACKNOWLEDGEMENTS

First and foremost, I would like to thank to my advisor Asst. Prof. Dr. Hakan Dilman, who supported me from the very beginning of my study on this challenging topic. I am sincerely grateful to him for his encouragements, suggestions, continuous help, and guidance throughout the stages of this thesis.

I am also grateful to my parents, Mustafa and Hidayet Şekeroğlu, who have helped me to develop a vision of lifelong learning. It is thanks to this vision that I have always been in search for the better in my studies and teaching. I really appreciate their constant support. I am also thankful to my husband, Teoman Amaç, who was very supportive throughout my thesis writing process.

Last but not least, I thank to my colleagues for their support and encouragement throughout my thesis process.

.

Sevda AMAÇ

January, 2024

ÖZET

SANAL GERÇEKLİK VE METAVERSE ORTAMLARINDA İNGİLİZ DİLİ ÖĞRETİMİ ÜZERİNE BİR İNCELEME

Sevda Amaç
Yüksek Lisans Tezi
Yabancı Diller Eğitimi Anabilim Dalı
İngiliz Dili Eğitimi Tezli Yüksek Lisans Programı
Danışman: Dr. Öğr. Üyesi Hakan Dilman
Maltepe Üniversitesi Lisansüstü Eğitim Enstitüsü, 2024

Bu çalışmada, sanal gerçeklik ve metaverse teknolojilerinin İngiliz Dili Eğitimindeki kullanımının incelenmesi amaçlanmıştır. Bu amaç doğrultusunda, sanal gerçeklik ve metaverse platformlarının eğitsel özellikleri, bu platformların İngiliz Dili Eğitiminde sağladığı öğrenme kazanımları ve bu platformların İngiliz Dili Eğitimindeki kullanım yolları araştırılmıştır. Araştırma sorularının yanıtlanması ve çalışmanın amacının gerçekleştirilmesi için meta-sentez yöntemi kullanılmıştır. 2012-2022 yılları arasında yapılmış 41 çalışmanın sonuçları incelenmiştir. Veriler, çeşitli çevrimiçi arama veri tabanları ve dergi web siteleri aracılığıyla toplanmıştır. Toplanan bilgiler analiz edilmiş ve tablolar ile sunulmuş. Daha sonra bulgular karşılaştırılarak, bulunan benzerlikler ve farklılıklar sentezlenmiştir. Çalışmalardan edinilen bilgiler, var olan özelliklerinin sanal gerçeklik ve metaverse platformlarını İngiliz Dili Eğitiminde kullanmaya uygun kıldığını; sağladıkları öğrenme kazanımları açısından öğrencilere birçok eğitsel fırsat sunduklarını; ve İngilizce derslerine farklı şekillerde dahil edilebilmelerinin mümkün olduğunu göstermiştir. Bu bilgilere ek olarak, sanal gerçeklik platformlarının ve cihazlarının İngiliz Dili Eğitimi sınıflarında kullanılmasının zorlayıcı yanlarının olabileceği saptanmıştır. Sonuç olarak, geleceğin bu kaçınılmaz teknolojisinden olabildiğince erken faydalanabilmek adına bu konuda daha fazla çalışmanın yapılması önerilmiştir.

Anahtar Sözcükler: sanal gerçeklik, metaverse, sanal gerçeklik platformları, metaverse platformları, İngiliz Dili Eğitimi, İngiliz Dili Eğitiminde sanal gerçeklik, İngiliz Dili Eğitiminde metaverse

ABSTRACT

AN INVESTIGATION OF ENGLISH LANGUAGE TEACHING IN VIRTUAL REALITY AND METAVERSE PLATFORMS

Sevda Amaç
Master Thesis
Department of Foreign Language Education
English Language Teaching Master's Programme with Thesis
Thesis Advisor: Asst. Prof. Dr. Hakan Dilman
Maltepe University Graduate School, 2024

This study aims to explore the use of virtual reality and metaverse platforms in English Language Teaching. More specifically, it is aimed to provide insights into the characteristics of virtual reality and metaverse platforms in educational use, the learning gains from using these platforms in ELT and the ways of using them in ELT. Meta-synthesis method was adopted to investigate the research questions and to achieve the aims of the study. The results of 41 studies that were conducted between the years of 2012 and 2022 were investigated to perform a meta-synthesis. The data were collected through journal websites and various online search databases. The findings obtained from the studies revealed that the characteristics of virtual reality and metaverse platforms make them suitable for their use in the ELT field and they provide many educational opportunities for foreign language learners regarding their learning gains. It was also found that it is possible to integrate virtual reality and metaverse platforms into English language lessons in different ways. In addition to these findings, it was seen that the use of virtual reality platforms and devices in English Language Education may have challenging aspects. As a result, it is suggested to conduct more studies in order to understand this topic better and reap the benefits of this inevitable future technology as early as possible.

Key words: virtual reality, metaverse, virtual reality platforms, metaverse platforms, English Language Teaching, virtual reality in ELT, metaverse in ELT

GENİŞLETİLMİŞ ÖZET

SANAL GERÇEKLİK VE METAVERSE ORTAMLARINDA İNGİLİZ DİLİ ÖĞRETİMİ ÜZERİNE BİR İNCELEME

Bu çalışma, sanal gerçeklik ve metaverse ortamlarının İngiliz Dili Eğitimindeki kullanımlarının incelenmesi amacıyla yapılmıştır. Özellikle, sanal gerçeklik ve metaverse ortamlarının eğitsel özellikleri, bu platformların İngiliz Dili Eğitiminde sağladığı öğrenim kazanımları ve bu platformların İngiliz Dili Eğitimindeki kullanım yolları araştırılmıştır. Elde edilen bilgilerle, İngiliz Dili Eğitimi alanındaki araştırmacılara ve eğitimcilere sanal gerçeklik ve metaverse platformları hakkında bütüncül bir bakış açısı sağlanmak istenmiştir.

Araştırma amacının gerçekleştirilebilmesi için, bireysel araştırmaların sistematik bir şekilde incelenmesini ve sonuçlarının sentezlenerek daha kapsamlı genel bir çerçeve oluşturulmasını sağlayan meta-sentez yöntemi kullanılmıştır. Bu bağlamda, 2012-2022 yılları arasında yapılmış 41 bireysel çalışmanın sonuçları incelenmiştir. Öncelikle, çalışmaların sonuçları analiz edilmiş ve edinilen bilgiler karşılaştırılarak benzer noktalar belirlenmiştir. Bu bulgular tablolar halinde özetlendikten sonra, araştırma sorularını yanıtlayacak şekilde sentezlenerek yorumlanmıştır.

İlk araştırma sorusu göz önüne alındığında, sanal gerçeklik ve metaverse platformlarının 14 eğitsel özelliği olduğu tespit edilmiştir. Bu özellikler, araştırmalardaki bahsedilme sıklığına göre: gerçekçilik, eğlendiricilik, etkileşimlilik, ilgi uyandırıcılık, sarmalayıcılık, ilginçlik, kullanımda kolaylık, uyarlanabilirlik, eşitçilik, çağdaşlık, günümüz öğrencileriyle ilişkilendirilebilirlik, kullanışlılık, yaratıcı ve artistik olma, ve şeffaflıktır.

Sanal gerçeklik ve metaverse platformlarının gerçekçilik özelliğinin sanal ortamda bulunan gerçekçi öğrenme ortamlarına, materyallere, etkinliklere ve anadili İngilizce olan kullanıcılarla yapılan konuşmalara dayandığı saptanmıştır. Eğlendiricilik özelliğinin, sanal gerçeklik ve metaverse platformlarındaki oyun benzeri unsurlar, kişileştirilebilen avatarlar, çok sayıdaki görseller ve sanal ortamın resmi olmayan doğası ile

ilişkilendirildiği görülmüştür. Sanal gerçeklik ve metaverse platformlarında, diğer kullanıcılarla, sanal karakterlerle ve ortamın kendisi ile etkileşim sağlanabilmesinin bu ortamları oldukça etkileşimli hale getirdiği görülmüştür. Bahsedilen bu etkileşimliliğin ve farklı iletişimsel görevlerin, öğrencilerin sanal ortamda aktif rol almasını sağladığı ve bu durumun da öğrenme aktivitelerine karşı ilgi uyandırdığı ortaya koyulmuştur.

Sanal gerçeklik ve metaverse platformlarının öne çıkan bir diğer özelliğinin ise sarmalayıcılık olduğu belirlenmiştir. Bu özellik, kullanıcıların sanal gözlükler ve benzeri araçlar aracılığıyla görsel, işitsel ve yazılı uyaranlara maruz bırakılması ve bu şekilde sanal ortamın içindeymiş gibi hissetmeleri anlamına gelmektedir. Eğitimsel açıdan sarmalayıcılık özelliğinin, öğrencilerde sanal ortamlarda gerçekten var oluyormuş hissi yaratarak, öğrenme etkinliklerine daya iyi odaklanmalarını sağladığı tespit edilmiştir. Bu bulgulara dayanarak, sanal gerçeklik ve metaverse platformlarının yabancı dil öğrenimini destekleyici özellikleri olduğu ve bu nedenle İngilizce öğrenenlere birçok fayda sunabileceği sonucuna varılmıştır.

Sanal gerçeklik ve metaverse platformlarını İngilizce öğreniminde kullanmanın getirdiği öğrenme kazanımlarına ilişkin ikinci araştırma sorusuna yönelik bulgular, bu platformların bilişsel, duyuşsal ve sosyal kazanımlar sağladığını göstermiştir. İncelenen araştırmalarda, en çok rastlanan öğrenme kazanımları bilişsel kazanımlardır. Tespit edilen bilişsel kazanımlar, bilginin akılda kalıcılığının, öğrenci özerkliğinin, problem çözme becerilerinin, eleştirel düşünme becerisinin, üst düzey düşünme becerilerinin, yaratıcılığın ve görselleştirme becerisinin artması olarak tespit edilmiştir.

Bilişsel kazanımlar arasında en yaygın olanlar akılda kalıcılığın ve öğrenci özerkliğinin artmasıdır. Sanal gerçeklik ve metaverse platformlarının bilgilerin akılda kalıcılığını arttırmasının sebepleri, etkileşimli ortam ve zengin içeriğe atfedilmiştir. Akılda kalıcılığın artmasının nedenleri, sanal gerçeklik ve metaverse platformlarında akranlar, yabancı kullanıcılar, sanal karakterler ve sanal ortam ile birçok etkileşim fırsatının bulunması; yazılı, sözlü ve görsel etkileşim araçlarının varlığı; ve çoklu girdiler ile dil öğreniminin desteklenmesi ile ilişkilendirilmiştir. Bir diğer yaygın bilişsel kazanımın, sanal gerçeklik ve metaverse platformlarının öğrenci özerkliğini güçlendirmesi olduğu saptanmıştır. Bu durumun, sanal ortamlarda bulunan aktivitelerin öğrencileri öğrenme

süreçlerinde bağımsız davranmaya ve sorumluluk almaya teşvik etmesinden kaynaklandığı görülmüştür. Bu tür aktiviteler, sanal ortamda içerik yaratma ve etkileşimli görevler olarak örneklendirilebilir.

Bilişsel öğrenme kazanımlarına ek olarak, sanal gerçeklik ve metaverse platformlarının İngiliz Dili Eğitiminde kullanılmasının, bazı duyuşsal öğrenme kazanımları olduğu belirlenmiştir. Bu kazanımlar, motivasyonun artması, yabancı dil kaygısının azalması ve avatarların yarattığı olumlu etkilerdir.

İlk olarak, sanal gerçeklik ve metaverse platformlarının ilgi çekici, etkileşimli ve iletişimsel aktiviteler sunarak motivasyonu arttırdığı görülmüştür. Diğer bir duyuşsal öğrenme kazanımının, yabancı dil kaygısının azaltılması olduğu tespit edilmiştir. Bunun temel nedeninin, öğrencilerin gerçek sınıf ortamındaki yüz yüze diyaloglara kıyasla sanal gerçeklik ortamlarında yabancı dilde konuşurken kendilerini daha güvende hissetmeleri olduğu saptanmıştır. Son olarak, avatarların yarattığı olumlu etkilerin de bir diğer duyuşsal öğrenme kazanımı olduğu görülmüştür. Avatarlar, sanal gerçeklik ve metaverse platformlarındaki kullanıcıların sanal ortamda var olmalarını ve eş zamanlı olarak diğer kullanıcılarla iletişim kurmalarını sağlamaktadır. Bu platformlarda, öğrenciler kendi avatarlarını seçip, fiziksel özelliklerini istedikleri gibi değiştirebilmektedirler. Bu durum, öğrencilere kendi kararlarını verme ve kendini ifade etme özgürlüğü sağlayarak öğrenmelerine katkıda bulunur.

İngilizce öğretiminde sanal gerçeklik ve metaverse platformlarının kullanılmasının sağladığı bazı sosyal öğrenme kazanımları da vardır. Bunlar iş birliği ve dayanışma, kültürlerarası iletişim, yönlendirici destek (scaffolding) ve sosyal yapılandırmacı becerilerde gelişmeyi içerir. İş birliği ve dayanışma becerilerinin gelişmesi, sanal gerçeklik ve metaverse platformlarının akranlarla beraber çalışma ortamları sağlaması ile ilişkilendirilmiştir. Kültürlerarası iletişimin gelişmesi, sanal platformlarda farklı ülkelerden öğrencilerle ya da yerli ve yabancı kişilerle iletişim kurulabilmesi ile sağlanmaktadır.

Yönlendirici destek, sanal platformların sağladığı bir diğer sosyal öğrenme kazanımıdır. Bunun sebebinin, sanal gerçeklik ve metaverse platformlarının öğrencilere ikili veya grup olarak çalışabilecekleri ve birbirleri ile yardımlaşarak akran öğrenmesi sağlayabilecekleri

ortamları yaratması olarak görülmüştür. Aynı zamanda, sanal gerçeklik ve metaverse platformlarında, öğretmenlerle ve sanal karakterlerle etkileşimin de yönlendirici destek sağladığı saptanmıştır.

Sanal gerçeklik ve metaverse platformlarının bir diğer sosyal öğrenme kazanımı da sosyal yapılandırmacı becerilerin geliştirilmesidir. Bu durum, sanal ortamdaki işitsel, görsel ve avatarla ilgili unsurlarla öğrenciler arasındaki sosyal etkileşimin desteklenmesine dayandırılmıştır. Sanal gerçeklik ve metaverse platformlarındaki zenginleştirilmiş kaynakların keşfederek öğrenmeyi desteklemesi ve öğrencilerin sosyal etkileşimler yoluyla anlamlı faaliyetlerde yer alması da sosyal yapılandırmacı becerilerin geliştirilmesine katkı sağladığı görülmüştür.

Son araştırma sorusu göz önüne alınarak, sanal gerçeklik ve metaverse platformlarının İngiliz Dili Eğitiminde kullanım yolları incelenmiştir. Bu konudaki veriler, dersin hedefleri, ders prosedürleri, materyalleri, sanal ortamdaki aktivite süreleri ve değerlendirme türleri şeklinde düzenlenmiştir.

Sanal platformların kullanıldığı derslerin hedefleri dikkate alındığında, en yaygın ders hedeflerinin konuşma becerisi ile ilgili olduğu saptanmıştır. Bu durum, yerli veya yabancı İngilizce konuşan kişiler, bilgisayar tarafından oluşturulan sanal karakterler ve İngilizce öğrenenlerin ana dilini öğrenen yabancı öğrenciler gibi belirli gruplarla gerçek yaşamdakine benzeyen anlamlı iletişimin kurulabilmesiyle ilişkilendirilmiştir. İkinci olarak, yazma becerisiyle ilgili ders hedeflerinin yaygın olduğu görülmüştür.

Yazma becerisine odaklanan tüm derslerde, sanal ortamdaki aktivitelerin, öğrencilerin yazma görevini gerçekleştirmeden önce tamamlandığı tespit edilmiştir. Bu durum, sanal gerçeklik ve metaverse platformlarının öğrencilere zengin içerik ve aktif araştırma imkânı sağlayarak, yazma konuları hakkında bilgi edinmeleri ve böylece yazı yazma süreçlerinin kolaylaşması ile ilişkilendirilmektedir.

Sanal gerçeklik ve metaverse platformlarının kullanıldığı derslerdeki prosedürler incelendiğinde ise her dersin farklı adımlar takip ettiği görülmüştür. Bununla beraber, ders prosedürleri ile ilgili bulgular sentezlendiğinde bazı çıkarımlara varılmıştır. İlk olarak, bazı derslerin sanal gerçeklik ve metaverse platformların ve gerekli teknolojik

cihazların nasıl kullanılacağına dair eğitimle başladığı saptanmıştır. İkinci olarak, ticari bir sanal gerçeklik veya metaverse platformunun kullanılması halinde, bu platformlarda halihazırda mevcut olan ders prosedürlerinin takip edildiği keşfedilmiştir. Üçüncü olarak, çoğu dersin gerçek sınıf ortamında başladığı, ders hedefleriyle ilgili konular işlendikten veya tekrar edildikten sonra, sanal ortamdaki aktivitelere geçildiği görülmüştür. Son olarak, sanal gerçeklik ve metaverse platformlarında sadece konuşma pratiği yapılmasını hedefleyen bazı durumlarda, bu platformların ders dışında kullanıldığı saptanmıştır.

Sanal gerçeklik ve metaverse platformlarının kullanıldığı derslerdeki diğer öğretim materyallerinin, alıştırma kağıtları, testler, multimedya sunumlar, şarkılar, resim kartları, kelime kartları ve çevrimiçi etkinlikler olduğu tespit edilmiştir. Bu materyallerden en yaygın olanları alıştırma kağıtları ve testler iken, daha az kullanılan materyaller ise multimedya sunumları, şarkılar, resim kartları, kelime kartları ve çevrimiçi etkinliklerdir.

İncelenen verilere göre, alıştırma kağıtları, dil bilgisi, kelime bilgisi ve yazma çalışmaları için kullanılmıştır. Alıştırma kağıtlarının çoğunlukla sanal ortamdaki etkinliklerden önce ve/veya sonra kullanıldığı tespit edilmiştir. Sanal gerçeklik gözlüklerin kullanılmadığı durumlarda, sanal ortamdaki etkinlikler sırasında da alıştırma kağıtlarının kullanımının mümkün olduğu görülmüştür. Bir diğer yaygın öğretim materyali testlerdir. Testlerin çoğunlukla sanal ortamdaki görevler tamamlandıktan sonra ve kelime öğrenimini değerlendirmek için kullanıldığı ortaya çıkmıştır.

Sanal gerçeklik ve metaverse platformlarında gerçekleştirilen aktivitelere ayrılan süreler incelendiğinde, en yaygın süre aralığının 25 ile 35 dakika arasında olduğu saptanmıştır. Bu süre aralığı içindeki aktivitelerin, iletişimsel, kelime öğrenmeye dayalı veya dinleme pratiği içeren alıştırmalar olduğu görülmüştür. 15 dakikalık veya 60 dakikalık sanal ortam etkinliklerinin olduğu dersler ise eşit sıklıkta ikinci sırada yer almaktadır. 15 dakikalık sanal ortam etkinlikleri, konuşma ya da yazma becerisine odaklanan derslerde tercih edilirken, 60 dakikalık sanal ortam aktiviteleri konuşma becerisine odaklı derslerde kullanılmıştır. Birer çalışmada görülen 40, 10 ve 5 dakikalık sanal ortam etkinlikleri de bulunmaktadır. 40 dakikalık sanal ortam aktiviteleri, kelime öğrenmeye yönelik bir derste ve sürükleyici olmayan bir platformda gerçekleştirilmiştir. 10 dakikalık ve 5 dakikalık sanal ortam aktivitelerini içeren dersler ise yazma becerisine odaklanmıştır. Aktivitelere

ayrılan sürelerdeki farklılıklar göz önüne alındığında, kullanılan sanal ortamın türü, sanal gerçeklik cihazlarının sayısı ve dersin hedefi gibi durumların belirleyici olabileceği sonucuna varılmıştır.

Son olarak, sanal gerçeklik ve metaverse platformları kullanılarak gerçekleştirilen derslerdeki değerlendirme türleri incelenmiştir. Buna göre, teknoloji aracılı geribildirim, öğretmen geribildirimi, akran geribildirimi, öğrencilerin öz değerlendirmesi ve testler olmak üzere beş farklı değerlendirme türü tespit edilmiştir.

Bu değerlendirme türleri arasında, teknoloji aracılı geri bildirim ve öğretmen geri bildiriminin en yaygın değerlendirme türleri olduğu görülmüştür. Teknoloji aracılı geri bildirimin yaygın olması, çoğu sanal gerçeklik platformunun öğrencilerin performansını otomatik olarak değerlendirebilmesi ile ilişkilendirilmiştir. Otomatik değerlendirme özelliği olmayan sanal gerçeklik platformlarında ise, öğretmenlerin sanal ortamdaki öğrenci performanslarını kayıt altına alabiliyor olması, öğretmen değerlendirmesini ve geri bildirimini kolaylaştırdığı görülmüştür.

Araştırma soruları doğrultusunda bulunan verilere ek olarak, sanal gerçeklik ve metaverse platformlarının İngiliz Dili Eğitiminde kullanılması sırasında bazı zorluklarla karşılaşılabileceği tespit edilmiştir. Bu doğrultuda, incelenen çalışmalarda bahsi geçen sekiz ana zorluk olduğu görülmüştür. Bunlar, çalışmalarda bahsedilme sıklığına göre, pedagojik sorunlar, sanal gerçeklik platformlarını tanımama, teknik sorunlar, sanal gerçeklik başlığı ile ilgili sorunlar, sosyal sorunlar, sağlık sorunları, akademik çalışmaların azlığı ve kurumsal desteğin eksikliğidir.

En yaygın zorluklar arasında pedagojik konular ve bu platformların tanınmıyor olması yer almaktadır. İncelenen çalışmalarda, en çok bahsi geçen pedagojik problemin sanal ortamlardaki etkinlikler sırasında sınıf yönetiminin nasıl sağlanacağı sorusu olduğu görülmüştür. Özellikle çok sayıda öğrencinin olduğu sınıflarda bu teknolojinin kullanımı ve öğrenci aktivitelerinin takibinin zor olabileceğinden bahsedilmiştir. Ayrıca, öğrencilerin sanal gerçeklik ve metaverse platformlarını tanımıyor olmasının da teknik problemler yaşanmasına veya zaman yönetimiyle ilgili sorunlar yaratabileceğine dikkat çekilmiştir. Bu zorluklar, sanal gerçeklik ve metaverse platformlarının İngilizce derslerinde kullanılmadan önce etkili bir ön hazırlığın gerekliğini göstermektedir. Aynı

zamanda, sanal gerçekliğin öğretim aktivitelerinde kullanımından önce öğrencilere tanıştırılmasının faydalı olacağı sonucuna varılmıştır.

TABLE OF CONTENTS

JÜRİ VE ENSTİTÜ ONAYI ii

ETİK İLKE VE KURALLARA UYUM BEYANI iii

ACKNOWLEDGEMENTS iv

ÖZET v

ABSTRACT vi

GENİŞLETİLMİŞ ÖZET vii

TABLE OF CONTENTS xiv

LIST OF TABLES xviii

LIST OF FIGURES xx

ABBREVIATIONS xxi

CHAPTER 1. INTRODUCTION 1

1.1 Statement of the Problem 7

1.2 Aim of the Study 8

1.3 Significance of the study 9

1.4 Limitations 9

1.5 Key Words and Identification 10

CHAPTER 2. LITERATURE REVIEW 12

2.1 A Brief History of Virtual Reality and Metaverse 12

2.2 Virtual Reality and Metaverse Platforms 17

2.3 Virtual Reality and Metaverse Platforms in Education 21

2.3.1 Virtual reality and metaverse platforms in foreign language education 24

2.3.2 Virtual reality and metaverse platforms in English language teaching 27

CHAPTER 3. METHODOLOGY 32

3.1 Research Questions 32
3.2 Research Design 32
3.3 Data Collection 34
3.3.1 Data collection tools 34
3.3.2 Data collection procedure 35
3.4 Data Analysis Procedure 40
3.5 Validity and Reliability 41
CHAPTER 4. FINDINGS AND DISCUSSION 42
4.1. Findings 42
4.1.1 A Description of the included studies 42
4.1.1.2 Distribution of the included studies according to year of publication 42
4.1.1.3 Distribution of the included studies according to country 43
4.1.1.4 Distribution of the included studies according to sample group 45
4.1.1.5 Distribution of the included studies according to sample size 45
4.1.1.6 Distribution of the included studies according to level of education 47
4.1.2 Distribution of the works included in the meta-synthesis according to purpose 48
4.1.2.1 The studies that examined the effects of virtual reality or metaverse 48
4.1.2.2 The studies that examined the integration of virtual reality or metaverse 50
4.1.2.3 The studies that examined the attitudes towards virtual reality or metaverse 52
4.1.3 Distribution of the included studies according to research methods 53
4.1.4 Distribution of the included studies according to data collection tools 54

4.1.5 Distribution of the included studies according to data analysis methods 57

4.1.6 Distribution of the included studies according to themes 60

4.1.7 Distribution of the included studies according to sub-themes 61

4.1.8 Distribution of the included studies according to virtual reality and metaverse platforms 65

4.1.9 Distribution of the included studies according to the technological devices used ……...68

4.1.10 Distribution of the included studies according to their findings 71

4.1.10.1 Distribution of the included studies according to the characteristics of the virtual reality and metaverse platforms 71

4.1.10.2 Distribution of the works included in the meta-synthesis according to the learning gains from using the virtual reality and metaverse platforms 75

4.1.10.3 Distribution of works included in the meta-synthesis according to their ways of using virtual reality and metaverse platforms in the classroom 77

4.1.10.3.1 The lesson objectives for the integration of virtual reality and metaverse platforms in the classroom 78

4.1.10.3.2. The lesson procedures for the integration of virtual reality and metaverse platforms in the classroom 81

4.1.10.3.3 The lesson materials for the integration of virtual reality and metaverse platforms in the classroom 89

4.1.10.3.4. The duration of the activities for the integration of virtual reality and metaverse platforms in the classroom 90

4.1.10.3.5 The types of assessment for the integration of virtual reality and metaverse platforms in the classroom 92

4.1.10.4 Distribution of works included in the meta-synthesis according to the challenges of using the virtual reality and metaverse platforms 96

4.2 Discussion 99

CHAPTER 5. CONCLUSION AND SUGGESTIONS 121

REFERENCES 127

APPENDIX 149

Appendix 1: The studies included in this meta synthesis study 149

CURRICULUM VITAE 154

LIST OF TABLES

Table 1. Distribution of the included works according to their year of publication 43

Table 2. Distribution of the included works according to country 44

Table 3. Distribution of the included works according to sample group 45

Table 4. Distribution of the included works according to sample size 46

Table 5. Distribution of the included works according to level of education 47

Table 6. The studies that examined the effects of virtual reality or metaverse 49

Table 7. The studies that examined the integration of virtual reality or metaverse 51

Table 8. The studies that examined the attitudes towards virtual reality or metaverse . 52

Table 9. Distribution of the works included in the meta-synthesis according to research method 53

Table 10. Distribution of works included in the meta-synthesis according to data collection tools 56

Table 11. Distribution of works included in the meta-synthesis according to data analysis methods 59

Table 12. Distribution of works included in the meta-synthesis according to themes .. 61

Table 13. Distribution of works included in the meta-synthesis according to sub-themes 64

Table 14. Distribution of works included in the meta-synthesis according to virtual reality and metaverse platforms 68

Table 15. Distribution of works included in the meta-synthesis according to the technological devices used..... 70

Table 16. Distribution of works included in the meta-synthesis according to the characteristics of the virtual reality and metaverse platforms 75

Table 17. Learning gains from using virtual reality and metaverse platforms 77

Table 18. The lesson objectives for the integration of virtual reality and metaverse platforms in the classroom 80

Table 19. The lesson procedures for the integration of virtual reality and metaverse platforms in the classroom 86

Table 20. The Lesson Materials for the Integration of Virtual Reality and Metaverse Platforms in the Classroom 90

Table 21. The Duration of the Lessons or Activities for the Integration of Virtual Reality and Metaverse Platforms in the Classroom 92

Table 22. The types of assessment for the integration of virtual reality and metaverse platforms in the classroom 95

Table 23. Challenges of using the virtual reality and metaverse platforms 99

LIST OF FIGURES

Figure 1. Simplified representation of a Reality-Virtuality (RV) Continuum. 3

Figure 2. Brewster's Stereoscope 12

Figure 3. An Early Model of the View-Master 13

Figure 4. The Sword of Damocles 14

Figure 5. Google Cardboard 15

Figure 6. Search frequency of the term Metaverse from January 2012 to December 2022 16

Figure 7. Oculus Quest 2 and Oculus Quest 3, respectively 17

Figure 8. A scene from ImmerseMe 19

Figure 9. vTime environments 20

Figure 10. Steps in the process of meta-synthesis 36

Figure 11. The Process of Selecting the Studies to Be Included 39

ABBREVIATIONS

VR **:** Virtual Reality

MV **:** Metaverse

ELT **:** English Language Teaching

CHAPTER 1. INTRODUCTION

Technology appears in many areas of life in the 21st century, and rapid technological developments are constantly taking place. As new technologies are usually beneficial for human activities, they are quickly adopted in many different fields. Education, as one of these fields, is also affected by the developments in technology. Educators integrate new technologies into their teaching in order to provide students with more opportunities that support their learning. Therefore, technology use in education is continually increasing.

In alignment with the current advancements in technology, virtual reality (VR) and the Metaverse (MV) platforms are the new centres of attention in the field of education at the present time, and the use of these platforms in education is becoming more widespread. The number of the studies that explore the use of VR and MV technologies in education is increasing, and the benefits of adopting these technologies in education are frequently encountered in the literature (Chen & Chen, 2016; Van Ginkel et al., 2019; Parmaxi, 2020). However, to become familiar with VR and MV technologies and to gain insight into their potential in education, it is first necessary to have an understanding of what virtual reality is.

The first use of the term ‘virtual reality’ can be traced back to the year 1988, when the computer programmer Jaron Lanier used it to describe a type of advanced computer (Tunç, 2018). In the following years, this definition was expanded as virtual reality technology improved. Accordingly, Jaron Lanier (2001) later described virtual reality more explicitly as a combination of a networking system and digital worlds that brings many people together in a virtual environment via a head-mounted device. The precise meaning of the term ‘virtual reality’ can also be found in many dictionaries. For instance, the Turkish Language Association Dictionary defines virtual reality as:

> [1] a three-dimensional environment which is created by imitating real environments in a virtual sphere that provides 360-degree vision via artificial

> intelligence, is used for various purposes such as solving complex problems, transferring information, entertainment, etc., and where unreal environments can be experienced as real. (n.d.)

According to Cambridge Dictionary (n.d.) a virtual reality system is "*a set of images and sounds, produced by a computer, that seem to represent a place or a situation that a person can take part in*" (para. 1). If the term 'virtual reality' is clarified in a more technical sense, it can be explained as follows:

> a technology that creates an immersive, interactive computer-generated world. The viewer experiences virtual reality while wearing a special headset that removes their vision of the outside world and replaces it with the virtual one, providing the illusion of looking around and moving through the simulated environment. (TechTerms.com, n.d., para. 1)

Some scholars' and researchers' definitions of virtual reality also help understand what virtual reality is. According to Deryakulu (1998), virtual reality is a three-dimensional simulation system, which is designed on the computer and reflects real life, and in which the users can notice, experience and control the environment they are in via various interaction tools they wear. Kuruüzümcü (2007) stated that virtual reality environment can be defined as a combination of three-dimensional audio and video technologies and devices that imitate sensory effects such as movement and touch resulting from different input and output technologies. Additionally, Yaman (2019) pointed out that in a virtual reality environment, users can have a feeling of presence through the mutual interaction they experience with the things or people they encounter.

As indicated in the abovementioned definitions of virtual reality, some prominent features of this technology are its being interactive, real-like and providing a sense of presence. Accordingly, in the literature, some studies emphasize that virtual reality

[1] Translated from Turkish by the researcher. Received from *https://sozluk.gov.tr/* "Yapay zekâ kullanılarak 360 derece görüş imkânı sağlayan sanal bir küre içerisinde gerçek ortamların taklitlerinin verilmesiyle oluşturulan, gerçek olmayan ortamların gerçekmiş gibi deneyimlenebildiği, karmaşık sorunları çözme, bilgi aktarımı, eğlence vb. amaçlarla kullanılan üç boyutlu ortam"

platforms are used in education mainly because they are highly interactive and offer a real-like educational environment to learners (Brooks, 1999; Burdea & Coiffet, 2003; Lee & Wong, 2008), and some others prove the high levels of presence that virtual reality platforms provide (Ausburn & Ausburn, 2004; Erdem, 2013; Xu, 2014).

It must also be noted that there are three different types of VR systems regarding the immersion level. These are non-immersive, semi-immersive and fully-immersive systems (Ma & Zheng, 2011). These systems are graded according to their proximity to reality or virtuality, and as seen in Figure 1, proximity to virtuality increases the immersion level. Accordingly, in non-immersive VR, users insert themselves into a virtual environment only partially via a monitor (Kirner, et al., 2012). Users move around by using a mouse, a keyboard and a computer screen. A semi-immersive VR platform is not totally immersive, and users have limited interaction with the environment. Augmented reality systems can be taken as an example of semi-immersive VR, and it can be described as "*a reality where physical reality and digital holograms are used together*" (Sarigoz, 2019, p. 42). Lastly, a fully-immersive virtual reality system enables users to experience a feeling of full immersion by isolating them from the real world via a head-mounted display (HMD). While first practices of using VR in education began with non-immersive versions, it is possible to utilize all the three types of VR systems in education at the present time.

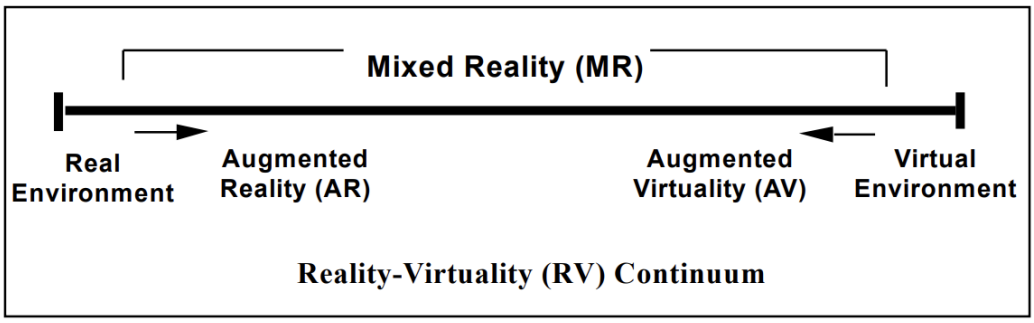


Figure 1. Simplified representation of a Reality-Virtuality (RV) Continuum. (Milgram et al., 1994)

As for the metaverse technology, the term was first coined by Neal Stephenson in 1992 in his science fiction novel Snow Crash. In the novel, the word 'metaverse' was first used in an address written on the back of the main character Hiro's business card to describe a virtual place as follows: "*On the back is gibberish explaining how he may be reached: a telephone number. A half electronic communications nets. And an address in the Metaverse*" (Stephenson, 1992, p. 17). As explained throughout the novel, the Metaverse referred to "*a parallel virtual reality universe created from computer graphics, which users from around the world can access and connect through goggles and earphones*" (Mystakidis, 2022, p. 492).

When etymologically examined, the word 'metaverse' is a combination of the Greek prefix 'meta' and the English word 'universe', which means 'beyond universe' (Atak, 2022). Accordingly, Cambridge Dictionary (n.d.) defines metaverse as "*the internet considered as an imaginary area without limits where you can meet people in virtual reality*" (para. 1). Dictionary.com (n.d.) defines metaverse in more detail as "*a theoretical or emergent networked online space with digitally persistent environments that people inhabit, as avatars, for synchronous interactions and experiences, accessing the shared virtual space through virtual reality, augmented reality, game consoles, mobile devices, or conventional computers*" (para. 1).

With reference to scholars and researchers, there are various explanations for metaverse. Basically, Damar (2021) identified the Metaverse as a three-dimensional virtual world where all kinds of activities can be performed by means of augmented and virtual reality services. It can be said that the Metaverse is a concept that includes technologies like virtual reality and augmented reality and offers an alternative world to the real one. Accordingly, as stated by Tutgun-Ünal (2022), the Metaverse is different from virtual reality as it is rather an ecosystem than an isolated concept. That is, while there are different individual virtual and augmented reality platforms, all these can be assembled in the Metaverse. Today, while most of the existent metaverse platforms are indeed augmented reality or virtual reality rather than the metaverse, they are promoting the development of the Metaverse as an ecosystem (Hwang and Chien, 2022).

While the developments in virtual reality and metaverse technologies are taking place, the characteristics of learners are also evolving. Due to various factors, learners that are in the same or similar generations show certain tendencies. The learners who are the subjects of this current study are often grouped as Generation Z (Gen-Z) and Alpha generation (Gen Alpha). While people born between 1995 and 2010 are named as Generation Z, the ones born in 2010 and afterwards are called Alpha generation (Dilman, 2019). These two generations have particular characteristics in common especially because of their relation to technology. Since they belong to the first generations that have grown up with technology, the members of these generations are regarded as Digital Natives (Prensky, 2001).

People in Gen-Z have grown up with the technology that is commonly used today. Therefore, they have difficulties in living without their technological devices such as smartphones and the internet (Kingston, 2014, as cited in Demir & Sönmez, 2021, p. 684). This generation of students use the Internet, web tools, mobile applications and social media in every aspect of their lives, so the use of images, videos, sound and various forms of texts is essential for these learners to express themselves and to interpret knowledge. As a result, they prefer visuals, interactive games, advance organizers, collaborative projects, and challenges in learning (Rothman, 2016). The generation that follows Gen-Z is Alpha generation. The most notable characteristic of this generation is that they are highly qualified to use technology compared to the previous generations because they are born into a technological environment and start to learn from a very young age (Apaydin & Kaya, 2020). They use technology in every aspect of their lives, from entertainment to education, and they spend much time using technological devices. Since they spend long time in front of screens and possess good digital skills, they are also sometimes called as "*screenagers*" (Bozak, 2021, p. 119). Likewise, some other names may be given to Alpha or following generations in relation to their connection with present technologies. As Tarhan (2020) stated in an interview, the generations are usually defined by the technologies they use for communication; for example, the Generation X is known as 'Radio Generation', Generation Y as 'Television Generation', and Generation Z is called the 'Social Media Generation'. Considering the relationship between the advancements of communication technologies and their effects on the existing generations, Tutgun-Ünal

and Tarhan (2022) concludes that there will be a "*Metaverse Generation*" in the future (p. 65).

Another factor that has caused VR and MV platforms to gain significance in education can be attributed to the digitalization and individualization of the entertainment due to technological developments. In the first place, when television was introduced in the 1950s, it was no longer a necessity for people to go out and socialize for entertainment because they could spend time at home and watch TV as a pastime (Bargh & McKenna, 2004). Then in the 1970s and 1980s, significant developments in the video games took place, and they have become a popular recreation activity (Dhiman, 2023). The spread of personal computers and the quick progress in internet technology also promoted digital entertainment, and new forms of entertainment emerged (Aranyossy, 2022). Certain types of entertainment such as music, cinema, radio, television, and games evolved into digital forms (Sadiku, et. al, 2017). In addition, social media platforms emerged and increased in number. This provided people with a new form of digital entertainment in which they can participate individually and in the comfort of their home. With the emergence and spread of video streaming platforms, the entertainment has become more personal. Meanwhile, as mobile technology has improved, people have made a transition from computers and televisions to laptops, smartphones and tablets. Since new digital native generations often utilize these handheld mobile devices to reach online games, social media and videos streaming platforms, consumption of the entertainment alone, rather than in a group, have increased (Nigam, 2022). Over the years, all these changes in the entertainment industry has led people to spend more time on digital platforms individually.

Following the digitalization and individualization of the entertainment, a dramatic effect on the digitalization of the many other fields of life was enhanced by the COVID-19 pandemic that started in 2019 and lasted for a few years. During the pandemic, people have been deprived of many opportunities in their daily life. The restrictions caused by the pandemic have led to the search for ways to continue the everyday activities by paying attention to distances and in a healthier way. The pandemic, which affected all sectors from the education to the production sector, has further increased the importance of

concepts such as remote working or distance education (Damar, 2021). Concerning the education, when the pandemic started in 2019, it obliged all the educational institutions to run online courses in order to give priority to people's physical health and safeness (Proshkova, 2020). During that period, as stated by Gülen et al. (2022), "*alternative education approaches have come to the fore and it is aimed to continue education by making many applications within the scope of digitalization in education*" (p. 101). At the beginning of the pandemic process, some two-dimensional platforms such as Google Meet, Teams and Zoom were the focus of interest and widely appreciated; however, these platforms were soon found to be restrictive and have a bad influence on educational activities (Voinea, et al., 2022). The lengthy period of quarantine all over the world also added to the need for more effective online education tools. Consequently, the integration of the latest technologies into education systems has become a crucial issue. Being two of these technologies, the use of virtual reality and metaverse platforms has gained in popularity as tools of communication and collaboration during the pandemic.

When the recent innovations in technology, the preferences of the new generations, and the changes produced by the digitalization of various fields are considered, it can be said that the next big change in the ELT field will probably be experienced with the spread of virtual reality and metaverse technologies. Since virtual reality and metaverse technologies have already found a place in English language teaching and will probably become more common, it is necessary to conduct more research on the use of virtual reality and metaverse platforms in English language teaching. Therefore, considering the potential of these technologies in education, this research is aimed at providing a holistic and deeper understanding of the use of virtual reality and metaverse in the ELT field.

1.1 Statement of the Problem

This study thoroughly explores the use of VR and MV in ELT in order to illuminate the questions of what these technologies are, why they are important and how they are used in ELT. Although there have been an increase in research on the use of VR and MV platforms in ELT in recent years, most studies have explored the topic focusing on certain concepts in foreign language learning, like vocabulary, pronunciation and writing.

Therefore, there is still a need for studies on the use of VR and MV platforms in ELT in a holistic way.

Since new requirements in foreign language learning have emerged due to the accelerating developments in technology, changing learner profiles and some other global matters, the integration of virtual reality and metaverse platforms into foreign language classrooms have grown in importance. VR and MV technologies provide convenience, real-like learning environments and alternatives to the traditional educational practices, so their potential for the future should be recognized in the field of ELT.

1.2 Aim of the Study

The main aim of this study is to investigate the use of virtual reality and metaverse platforms in foreign language classrooms in order to illuminate the questions of what characteristics these technologies have, what learning outcomes they produce and how they are used in English Language Teaching. It is intended to answer the research questions by reviewing the related studies conducted between 2012-2022 with regard to the use of these technologies in all levels of education. The following sub-objectives are also specified in order to achieve the main aim of the present study:

- to develop a classification for the data that is applicable to ELT practices
- to provide English language teachers with a review of literature on the topic
- to provide English language teachers with a source that can guide them through the integration of virtual reality and metaverse platforms in EFL classroom

Since certain criteria were established and a thorough investigation of the topic was conducted while selecting the articles to be included, the researcher assumed that the studies selected for the current study were compatible with the topic of this research. In addition, the findings of the included studies were accepted to be objective. It was also accepted that the studies included in this research were conducted following the academic research standards and rules.

1.3 Significance of the study

New technology trends have always influenced the practices in foreign language teaching, and the integration of virtual reality and metaverse platforms is currently one of the trendiest topics in the ELT field. However, as technological advancements continue unceasingly, it is necessary to conduct more research on these technologies and obtain up-to-date information in order to adapt to the necessary changes in educational contexts. Therefore, the inquiry of the existing studies and educational practices in the virtual reality and metaverse platforms is a promising attempt to understand how they can be beneficial to the ELT field.

It is also noteworthy that learning a foreign language requires to practice in lifelike situations in the target language, immersion in the target culture and engaging learning environments. Since virtual reality and metaverse platforms bring all these requirements together, it can create educational opportunities for both learners and teachers. In addition, virtual reality and metaverse platforms in ELT seems particularly relatable to the students of the present time as today's digital native learners favour the use of the technology in their learning experiences. As a result, by providing the relevant information about the use of virtual reality and metaverse platforms, the researcher expects to enlighten the educators and encourage the implementation of these technologies in ELT.

1.4 Limitations

The publications that were investigated in the present study were limited with the ones that met the selection criteria adopted by the researcher as a requirement of the meta-synthesis method. Only the studies published between January 2012 and December 2022 were included. In addition, this current study was limited to the studies that were published in English or Turkish.

1.5 Key Words and Identification

Virtual environment: "*an online environment, where people can communicate, produce and consume information, participate in various activities such as gaming, and be a part of the Internet community*" (Virtual Environments in Social Context, 2023, para. 1)

Virtual World: "*images, sounds, and text used by a computer to create a world where people can communicate with each other, play games, and pretend to live another life*" (Oxford Advanced American Dictionary, n.d., para. 1)

Virtual Reality: an artificial environment created by a computer that looks and feels real to the person using it (Longman, n.d.).

Metaverse: The term refers to an immersive virtual world that is accessed by virtual reality headsets and enables users to interact and perform different activities. The name 'metaverse' is the combination of the words 'meta' and 'universe.' It was first used by Neal Stephenson in his science fiction novel Snow Crash (Mystakidis, 2022).

Virtual reality/metaverse platform: a software system that enables users to take part in different activities "*including education, personal development and social communication, the formation of different social groups with common interests, or simply a place to experiment*" (Rysuľová, 2021, p. 571). Some examples of these are Second Life, ImmerseMe, and Mondly.

Avatar: "*a picture of a person or animal that represents you on a computer screen, for example in some chat rooms or when you are playing games over the Internet*" (Longman, n.d., para. 1).

Augmented Reality: Augmented Reality integrates digital data into the physical world through visuals, audio, texts, three dimensional designs or videos and provide the means to observe this content via a camera of a smart phone (Alizadeh, 2018). Flavián et al. (2019) described augmented reality as "*digital and real-time content that is superimposed on users' actual surroundings*" (as cited in Ameen et al., 2022, p. 2112).

Holistic: "*dealing with or treating the whole of something or someone and not just a part*" (Cambridge, n.d., para. 1).

CHAPTER 2. LITERATURE REVIEW

In this chapter, first, a brief history of virtual reality and metaverse technologies and platforms are presented. Then the previous studies on virtual reality and metaverse platforms in education, foreign language teaching and English language teaching are investigated, and a summary of the related literature on the topic is provided.

2.1 A Brief History of Virtual Reality and Metaverse

While the concepts of virtual reality and metaverse have gained popularity in the recent years, but these technologies has long been around. A major milestone in the development of these technologies occurred in the initial half of the 19th century. In 1838, Charles Wheatstone discovered that two images are transformed into one three-dimensional object when looked at separately from each eye, and he invented the stereoscope that enabled viewers to feel a depth effect and immersion (History of virtual reality, n.d.). Later, in the second half of the 19th century, in 1849, a more developed version of stereoscope was introduced by David Brewster, who improved it both aesthetically and technically, which contributed to the broad acceptance of the device (Mehrabov, 2015).



Figure 2. Brewster's Stereoscope, (Pre-cinema instruments, n.d.)

In 1935, Stanley G. Weinbaum, who was an American science fiction author, published a short story named Pygmalion's Spectacles. In the story, the characters wore special goggles and entered a fictional world that they could perceive through their five senses. This imaginary world was one of the first ideas of virtual reality in a modern sense because what the users of the goggles experienced in the story is mostly possible with today's technology (Cruz-Neira, Fernandez & Portales, 2018). In 1939, a device called View-Master stereoscope was developed (Figure 3). It enabled users to be engaged in a three-dimensional environment via the means of specifically made image reels (Scott et al., 2022). The View-Master displayed tourist sights and destinations, like Grand Canyon, and the brand became widely known in a short time (What We Can Learn from the First VR Device, 2020).



Figure 3. An Early Model of the View-Master (Bob Cooney, 2020)

Another early model of virtual reality tool, Sensorama, was introduced in 1962. It was invented by the filmmaker Morton Heilig and aimed to give users a "*theater of experience*" (Zhang, 2023, p. 104). The Sensorama showed a motorcycle ride to the viewers and gave them plenty of sensorial stimulation via three dimensional images, aural, tactile and smell-based input (Rheingold, 1991, as cited in Boas, 2012). In 1968, another important invention, which is mostly regarded as the first virtual reality head-mounted display, was made by Ivan Sutherland. It was named after an old Greek story, the Sword of Damocles, because it hung on the ceiling like the sword above the throne in the story (Boas, 2012).



Figure 4. The Sword of Damocles (Zhang, 2023)

In the 1980s, one of the innovators in the field of virtual reality technology was the computer programmer Jaron Lanier. In 1983, Lanier established VPL Research, a company that developed, produced and sold virtual reality devices (Dixon, 2006). In 1984, the company made the first marketable dataglove, which allowed users to experience the virtual environment more realistically since they now could see a part of their body acting synchronously aligned with their real body movements (Dixon, 2006). This was an important advancement in the VR field. Users' seeing their hands in the virtual world was a game changer since it provided users "*a perceptual anchor*" and made them feel like they were really inside the computer (Pimentel & Teixeira, 1995, p. 67). In 1989, VPL Research also produced the DataSuit that covered the entire body and enabled the wearers a stronger interaction with the other users and the virtual environment (Dixon, 2006).

While the 1980s was considered to be a summer phase of virtual reality technology, the period between 1990 and 2010 was accepted as a VR winter in terms of development of new devices (Surviving VR Winter, 2023). However, there were still some developments related to virtual reality and metaverse during this period. For instance, in 1991, the Virtuality Group introduced some arcade games that required players to wear virtual reality goggles and immersed them into the game through three-dimensional visuals (History of virtual reality, n.d.). In 1992, Neal Stevenson invented the term Metaverse and used it in his futuristic novel Snow Crash (Mystakidis, 2022). It referred to a "*virtual*

reality universe created from computer graphics, which users from around the world can access and connect through goggles and earphones" (Mystakidis, 2022, p. 492). The topic of virtual worlds was also appealing to the film makers. In 1992, virtual reality animation was used in the movie The Lawnmower at a time when computer-created effects were not very common (Failes, 2017). It was an innovative approach at the time and helped the concept of virtual reality reach a wider audience. Then in 1999, the release of The Matrix movie created a huge impact on people and brought the subject of a computer-based simulated world into the general public (History of virtual reality, n.d.).

At the beginning of 2000s, important developments started to take place once again. One of the major events happened in 2003 when the technology company Linden Lab introduced the virtual reality platform Second Life, which paved the way for the practical use of 3D Internet for general use (Antonacci et al., 2008). On this platform, people can create their own content, come together with other users, take part in groups, and do many other things. Users can interact socially via different channels of communication. Therefore, the Second Life is considered as one of the first the multi-user virtual environments and the first metaverse platform that made it possible to meet in a virtual environment and practice different activities.

In 2014, Google Cardboard was released. It was a mobile VR device, and its basic components were two special lenses and some cardboard (Figure 6). By using a smartphone and a suitable VR application, users could start using it. Thanks to its low price and easy-to-use design, Google Cardboard made it possible for more people to experience virtual reality (Lee et al., 2017)



Figure 5. Google Cardboard (Virtual Reality Times, 2015)

From 2016 to 2020, many new VR products, including pc-based and mobile VR devices and stand-alone headsets, were made available to consumers by several technology firms. In 2016, three leading technology companies released their VR headsets for common users: Sony introduced the PlayStation VR, the HTC Vive headset was released by HTC Corporation, and Oculus Rift by Meta that was formerly known as Facebook Technologies. All these VR devices were PC-based and required a wired pc or gaming console (Zhang, 2023). Later, in 2020, the launch of stand-alone VR headsets started. Stand-alone VR headsets do not need any cables or any other devices to be connected. They are portable, more comfortable and easier to use compared to the other types. These qualities make stand-alone VR headsets a better option and a more promising technology. Oculus Quest 2 is an example of stand-alone VR headsets, and it was produced by Meta in 2020 (Figure 7).

In 2021, Mark Zuckerberg's metaverse announcement made the topic of virtual worlds a current issue again (Kocabay-Şener, 2021). Though the idea of creating virtual worlds had long been explored, the announcement of a project that focus on constructing a virtual universe by bringing all the virtual platforms together on one area caused the interest in the Metaverse to grow. Accordingly, as found on the Googe Trends (n.d.), the interest in the Metaverse increased sharply after Mark Zuckerberg's declaration of their project along with a video showing the cutting edge of virtual reality technology.

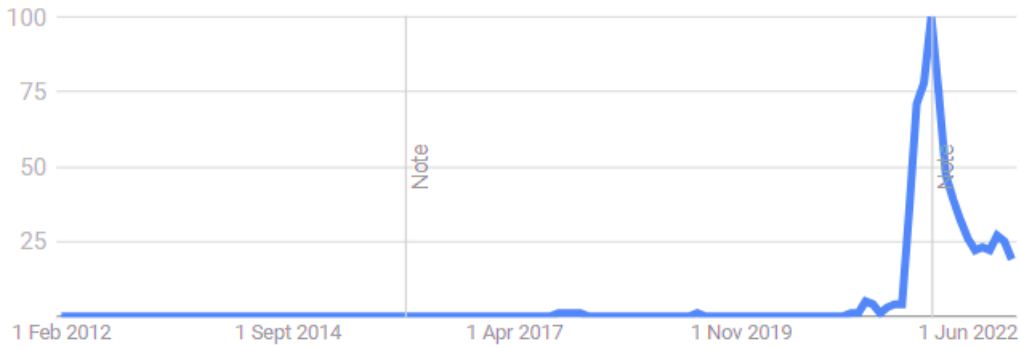


Figure 6. Search frequency of the term Metaverse from January 2012 to December 2022 (Google Trends, n.d.)

Offering the possibility of an alternative virtual world, the Metaverse has rapidly become a promising platform for all sectors. Many metaverse projects are now being developed including the education field. Since the Metaverse has rich educational qualities providing authentic, immersive, creative, and autonomous ways of learning, it is considered as a highly appropriate tool for education in many regards (Wu & Gao, 2022).

One recent development in the field of virtual reality and metaverse technologies was the release of the stand-alone VR headset Oculus Quest 3 in October 2023 (Figure 7). As an upgraded model of stand-alone VR headsets, it added on to the technology that was previously used.



Figure 7. Oculus Quest 2 and Oculus Quest 3, respectively (Meta, n.d.)

2.2 Virtual Reality and Metaverse Platforms

The earliest examples of virtual reality and metaverse platforms can be traced back to the 1970s. For instance, Maze War, which is one of the first multi-user and three-dimensional environments, emerged in 1974 (Ghanbarzadeh & Ghapanchi, 2016). Most of these first examples were developed for gaming. Text-based virtual environments where users could come together in real-time and work in collaboration appeared in 1979, and then the first commercial virtual environments, such as Habitat and the Fujitsu platform, were introduced in 1980s (Dionisio et. al, 2013). However, most of the virtual reality platforms that received more public interest and gained more users appeared in 2000s.

In 2003, the technology company Linden Lab introduced the virtual reality platform Second Life (Antonacci et al., 2008). Second Life can be described as "*an online virtual world that provides interaction and communication among its users, namely residents, through their avatars*" (Aydın, 2013, p. 54). At the time that it was launched, Second Life

was different from the other virtual reality platforms because it was not a game or it did not have certain goals for its users to achieve. It was possible for everyone to enter this virtual world and socialize. Since Second Life was free and for everybody, the platform became very popular in a short time with a lot of subscribers (Edwards, 2006). Additionally, although the Second Life was not created with the purpose of educational use, a large number of educators showed interest in it and explored the effects of using it education (Jee, 2010). In 2007, there were more than 200 universities and other educational institutions enrolled in Second Life, and they owned some virtual land where they could build campuses, classes or any educational environments (Kelton, 2007).

In 2005, Google Earth was released as a virtual model of the planet Earth. The technology behind Google Earth unites three-dimensional geographical depictions of the Earth and newly taken images and other data from satellites (Tooth, 2015). In this way, the users of Google Earth platform are provided with a realistic representation of the world. Since Google Earth provides various materials including images, 3D models, videos and texts, it has been utilized in education. While it can be used especially in teaching geography, it is also found to be useful for teaching of other subjects like astronomy, history and foreign language (Zhong, 2009; Awada & Diab, 2018; Corrales-Serrano).

In 2006, another virtual reality platform called Yoowalk was introduced. The platform simulated an alternative model of surfing the Web (Gibbs, 2008). On Yoowalk platform, users' avatars could walk on the streets where various websites were represented as buildings and use elevators to change their locations (Day et. al., 2009).

In 2015, Google Expeditions was made available for public utilization. This platform allowed users to go on virtual tours of historical and natural places, and the trips were created via images in panoramic view together with some notes, questions and interesting information (Shapovalov et. al., 2019). Google Expeditions was initially presented as a set of tools to be used in the classroom, and the design of the platform made it suitable for educational use. All in all, its display, contents, audio guide and low price enable Google Expeditions to be integrated into educational programs (Craddock, 2018).

ImmerseMe virtual reality platform was also released in 2015. It was designed for foreign language learners specifically for improving pronunciation and oral skills. This is achieved through real-life scenarios that are performed in a communicative event of users' selection from various topics. The conversations take place in locations such as cafés and shops, and users interact with prerecorded native speakers (He & Smith, 2019). The activities on the platform include game elements like getting points for every fulfilled task according to the level of difficulty.

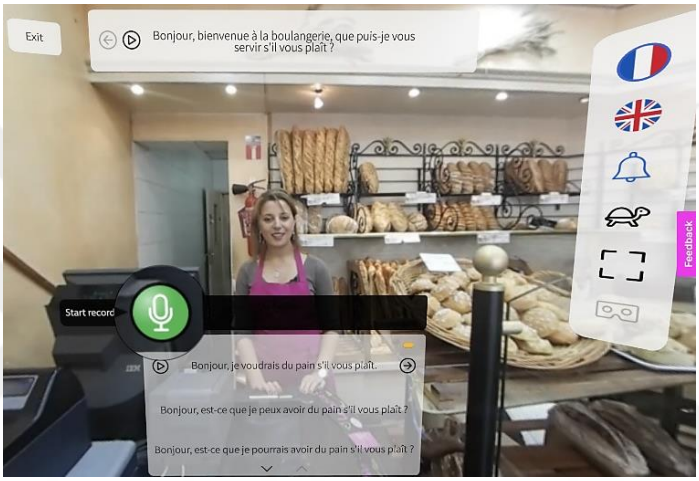


Figure 8. A scene from ImmerseMe (How do I use 'Pronunciation' mode?, 2023)

Another virtual reality platform introduced in 2015 was vTime. vTime provides its users with opportunities to interact via their avatars in a virtual environment regardless of location and time restrictions. On the platform, users can choose an avatar and edit its qualities as they want. The platform enables users to see each other's profile and information about their native languages or what hobbies they have; therefore, people with same interests and speaking the same, or their target language, can easily come together (Demir, 2021). vTime also provides areas like meeting rooms, classrooms and natural spots so that users can enter a virtual environment that best meets their needs and be engaged in social activities (Sun & Gheisari, 2021). Thanks to its communication-based composition, vTime is also preferred by foreign language learners to improve their speaking skills.



Figure 9. vTime environments (vtime.net, 2023)

In 2016, Ovation VR was made available as a virtual reality platform for public speech practice. On the platform, users practice their skills in speaking to a certain audience through their avatars. The platform records presenters' performance and measures them automatically regarding certain criteria including gaze, gesture and voice (Moreira et al., 2022). This platform is also used in education due to the fact that it offers realistic working environments and provides detailed, objective and immediate feedback (McGovern et al., 2020).

Bigscreen is another virtual reality platform that launched in 2016.As the name implies, the distinguishing feature of this platform is the big screen that is provided for the users in the virtual environment. It is a platform where users come together in a virtual environment, perceive each other through their avatars and interact (Sjölie, 2020). As well as enabling users to meet and communicate, the platform allows users to watch movies as a group and share the screen of their computer on a virtual screen (Nemtinov et al., 2022). Therefore, the platform can be used both for giving presentations or lectures and for watching films or videos via the big virtual screen. Bigscreen also offers the possibilities of choosing from various cinema room options and adding some non-player characters, who are not real human users, in order to create a feeling of social presence (Szita, 2023).

In 2017, Immerse, which is a multi-user and interactive virtual language learning platform, was introduced. Immerse offers different types of activities such as games, ready-made lessons and conversation classes with other learners. The activities on Immerse are not based on pre-recorded dialogues or practices, but it is more of a social virtual reality platform that allows users to communicate simultaneously and take real-time classes from language teachers (Hatton, 2022). Various topics and scenarios are presented in a level-based system that aligns with the CEFR, the Common European Framework of Reference for Languages (Satake et al., 2022).

Mondly VR was also made available in 2017. In fact, the first Mondly application was released in 2014, and it focused on vocabulary and speaking practice in foreign language learning. Then Mondly VR was introduced in 2017. On Mondly VR platform, language learners are provided with wide range of topics, goal-driven dialogues, a voice-recognition system and automated pronunciation practice (El Shazly, 2020). A learner first chooses a real-life situation, like visiting a museum, and then has a dialogue with a virtual character that recognizes the learner's speech and give instant and suitable answers (Kondratiuk et al., 2022).

2.3 Virtual Reality and Metaverse Platforms in Education

With the launch of Second Life virtual reality platform in 2003, virtual reality began to be used among the general public. The fact that Second Life can easily be accessed by signing in and creating an avatar, it has also provided a suitable environment for students to experience virtual environment. Additionally, since the platform is free, allows content production and eliminates time and space limitations, it has become an interesting platform for educators and researchers working on the integration of technology into education. Therefore, it can be said that the use of virtual reality and metaverse platforms in education started with the emergence of Second Life.

An early example of the use of Second Life in education is Heart Murmur, designed for medical education. The virtual environment for this activity was prepared by Jeremy Kemp (2006) from San José State University. During the activity, medical students

entered a virtual clinic on Second Life platform. When students walked into the rooms in the clinic, they encountered different patients. They practiced diagnosing each patient's illness by listening to their heartbeat.

Another educational activity that took place on Second Life is a simulation called the Nutrition Game prepared by Ohio University (KirkwoodSLGroup, 2009). In this virtual environment, participants learned about the health effects of eating fast food by visiting different restaurants and choosing what to eat through their avatars (Boulos et. al, 2007). In accordance with the game feature of this activity, those who chose healthier foods during the game won more points. In this way, they experienced an active and experiential learning.

In another research on Second Life platform, a safety training setting was created at a virtual construction site. The researchers produced some scenarios on accidents that occurred in the construction fields in order to provide a collaborative and social safety education. The learners were asked to observe the causes of accidents, find and correct them, and finally complete a task by remembering and following the safety information they learned (Le et al., 2015). As a result of this research, it was found that the use of virtual reality for security training provided opportunities for collaborative and hands-on learning, and it also allowed students to practice.

With the developments in technology and the experience gained from the practices on commercial VR platforms such as the Second Life, educators and researchers also started to produce specialized platforms. Some examples of the research on VR platforms in education include the lesson subjects such as biology, geography, mathematics and music.

To start with, the use of VR platforms for teaching Biology can be exemplified by the study conducted by Minogue et al. (2006), which was named as The Cell Exploration program. In the study, the researchers used a semi-immersive computer-based virtual reality environment and aimed to teach the components of animal cells and how they work . The students in the study explored a typical cell on a three-dimensional model in an interactive way. By using a control stick, the students could turn the cell, make it bigger

by zooming in, hold separate entities and transfer them to intracellular area (Minogue et al., 2006).

Tüzün et al. (2009) also developed a virtual environment to teach seven continents and twenty countries to primary school students. On the Quest Atlantis game platform, they designed an virtual world called the Global Village. They created a background story for the game which was based on the National Sovereignty and Children's Day in Türkiye. According to the story, some foreign children who came to Türkiye for the children's day celebrations got lost, and the students in the study were asked to find these children. In the virtual environment, the students were provided with some information about the countries and continents, and some virtual characters, as the representatives of the lost children, helped them. The findings of this study showed that VR use in teaching geography increased students' motivation and independence while learning process; and, it also created a collaborative, interactive and exploratory learning environment (Tüzün et al., 2009).

In another example from music education, Innocenti et al. (2019) produced a mobile VR environment to teach primary school students how to identify different genres of music. In the study, two scenarios were created. These included a labyrinth to explore music tracks and rooms to learn different music genres. The labyrinth activity required students to find their way following the musical sounds, and the rooms were used to introduce the music genres via some visual and written guidance. According to the results of the study, the use of virtual platforms in music lessons was effective; it improved learning; it helped students with special needs; and students appreciated the VR integrated lessons and found them motivating and engaging (Innocenti et al., 2019).

The Metaverse has also been suggested by some scholars for the educational contexts in the future (Ortega-Rodriguez, 2021; Park & Kim, 2022). The Metaverse has been regarded as a valuable tool for the future of education since it allows learners to be involved in various collective activities. For example, learners can play games, cooperate in group work, debate on a subject, solve problems, and learn through experience on metaverse platforms (Jovanović & Milosavljević, 2022; Park & Kim, 2022).

Some examples of the Metaverse use in education can be seen in STEM education. STEM education involves science, technology, engineering and mathematics, and it emphasizes the importance of problem-based learning (Martín-Páez et. al, 2019). "*The problems experienced in the application areas for STEM education, such as time constraints, integration, and the high number of students, can be eliminated with the metaverse environment*" (Gülen et. al, p. 101, 2022). In the Metaverse, learners can collaborate via avatars, communicate and discuss face-to-face and create things that illustrate their opinions, emotions or beliefs (Davis et al., 2009). Therefore, incorporating the subject areas in STEM into education and learning through this approach can be enhanced via the use of virtual environments in the Metaverse (Won et al., 2015).

In a study carried out by Barry, et. al (2010), teenage students worked in groups on a metaverse platform, and they designed and constructed buildings resistant to global warming. Additionally, in a study that was conducted to examine the appropriateness of the Metaverse for to materials in science education, the students learned about the crystal and atomic structure for some elements by interacting with the models (Farjami et. al, 2011). In another study conducted by Kanematsu et.al (2014) on nuclear safety education, fifth and sixth grade students were taught to measure radioactivity by conducting experiments in a virtual classroom, and it was discovered that using the Metaverse gave good results.

2.3.1 Virtual reality and metaverse platforms in foreign language education

In foreign language education, it is important to experience the target language and culture, interact with other language learners and native speakers, and practise different language skills and structures as much as possible. However, visiting a foreign country or finding native speakers to practise language skills is not easy for most foreign language learners. Due to the developments in technology and the growing awareness about the VR and MV platforms' immersive, interactive and adaptable features, the number of the studies on the potential of these platforms for foreign language education are increasing.

In the existing literature on the use of virtual reality and metaverse platforms in foreign language learning, the benefits of using these technologies were frequently highlighted (Chittaro & Ranon, 2007; Can, 2009; Van Ginkel et al., 2019; Parmaxi, 2020). According to Chittaro and Ranon (2007), using VR platforms in foreign language learning provides several opportunities such as lifelike and elaborate graphics, analysis of an issue from different viewpoints, simpler interaction with classmates, chances of collaboration with peers, and the positive influence of the virtual characters' existence. Can (2009) also stated that "*enriched resources and possibilities for language use, creation and practice*" are the main benefits of using VR environments for foreign language learners (p. 69). Another study conducted by Van Ginkel et al. (2019) explored if the learners' oral presentation skills can be improved by using virtual reality tasks to give feedback. The results showed that the tasks in the virtual environment were effective. More recently, Parmaxi (2020) examined 26 studies on the use of virtual reality in foreign language learning from the years between 2015 and 2018. Parmaxi (2020) reported a large number of positive effects that include the enhancement of authentic learning, cultural learning, motivation, engagement and reduction in foreign language anxiety.

In their study, Von der Emde et al. (2001) conducted a virtual exchange program between German and American students. The students met at regular intervals and completed come communicative tasks that required them to work collaboratively. The VR tasks required students to create their own content in and introduce it to their partners. This provided the students with a meaningful task as they needed to first take responsibility for their creation and then explaining it to a native speaker of their target language. The results of the study highlighted many benefits of using VR platforms in foreign language learning. To start with, it was found that the use of VR platforms in foreign language learning supported "*autonomous learning, peer teaching, individualized learning, play, and intellectual work*" and they gave the student "*self-empowering options*" to learn foreign language (Von der Emde et al., 2001, p. 222). The lively and stimulating environment encouraged students to actively practise the target language and to reflect on their own performance. In addition, their encounter with foreign students improved their understanding of different cultures by leading them to utilize critical thinking skills. This also assisted the students in improving their qualities as a global citizen, arousing their curiosity and increasing their motivation (Von der Emde et al., 2001).

As for the application of the VR technology in foreign language classroom, one of the examples was the study of Sekiguchi, Gruba, and Al-Asmari (2006). In the study, a virtual exchange project was carried out with university level participant students from Japan and Australia. The Japanese students were learning English, and the students from Australia were learning Japanese. The students worked in groups that were made up of participants from both countries. The group members had to meet once a week in order to make conversations to learn about the one another's culture. They could also meet at the times they wanted after classes. According to the results of this study, integrating a virtual reality platform into foreign language learning increased students' motivation to practise outside of class, built their awareness of L2 communication strategies, and improved their intercultural learning.

Peterson (2011) carried out a search of literature to explore the characteristics of virtual worlds and their importance in foreign language learning. According to the findings, virtual environments offer foreign language learners many opportunities via communicative tasks, use of avatars and rich content. First of all, the study showed that virtual environments provide language learners with a meeting place that they can access anytime and get engaged in synchronous communications with various interlocutors including native speakers of their target language. Since virtual platforms have several means of communication such as written, audial and visual ones, learners are exposed to "*multichannel input*" (Peterson, 2011, p. 68). Additionally, as learners can record their language production in VR environment, they have chance to reflect on their language output later, which help learners become more autonomous. Secondly, the study found that the use of avatars has certain advantages. On virtual platforms, as learners can choose an avatar and modify it as they like, they acknowledge their presence in the virtual environment and gain a sense of presence. Learners' interaction with their peers or the other users also strengthens their feelings of community. Also, it was found that rich content that already exists in VR environments and the possibilities for creating content are beneficial for foreign language learners as this increase their interaction with the learning environment and participation in activities (Peterson, 2011).

In another study, Grant, et al. (2013) explored whether the use of virtual reality reduced foreign language anxiety. The study was conducted with university level students, who

were learning Chinese and Spanish, and the virtual reality platform the Second Life was used. The findings showed that students felt less anxious about speaking in L2 in the VR environment compared to the face-to-face communication in the real classroom.

The study conducted by Melchor-Couto (2016) examined whether using virtual reality platforms decrease students' foreign language anxiety about speaking in target language. The participants were the university-level students of Spanish language, and they worked with native Spanish students from a university in Spain during the intervention. They completed some interactive tasks on in a virtual environment, which included talking about risks of social media and some film trailers, discussion about cultural stereotypes, and travelling to some cultural places in the virtual platform. The results of the study showed that the participants the use of VR considerably reduced students' foreign language anxiety, and most students stated that they had felt more confident about interacting orally in VR environment (Melchor-Couto, 2016).

In Cooke-Plagwitz's (2008) study, benefits and drawbacks of using Second Life virtual reality platform for foreign language education were investigated. The findings showed that in VR environments, students can both engage in meaningful activities and do so through realistic social interactions; students' being able to choose avatars and change their appearance as they want allowed them to express themselves freely (Omale et al., 2007, as cited in Cooke-Plagwitz, 2008); it was also found that virtual environments created opportunities both for collaborative learning and for meaningful communication (Schneider & Von der Emde, 2000, as cited in Cooke-Plagwitz, 2008). In addition, a few drawbacks of using VR platforms such as expenses of using this technology, internet connection and security problems were also mentioned in the study.

2.3.2 Virtual reality and metaverse platforms in English language teaching

In their study, Zheng et. al. (2009) put forward a hypothesis that students' attitudes towards learning the English language and their self-efficacy beliefs would increase with the use of VR. To investigate this, they conducted a 25-week study with middle school students on the Quest Atlantis VR platform. On this platform, students explored places in the virtual world to access some information through avatars. In this process, students worked on their writing and reading skills by using the mail and e- chat elements which

are a feature of the platform. Additionally, while trying to complete the tasks on this platform, students had the chance to speak English with people from different countries. According to the results of the research, the presence of game-like features in the virtual reality platform increased the motivation of the students; the VR platform offered students the opportunity to practice reading and writing authentically; the students were given the chance to interact with native English speakers verbally and in writing; and students found the VR experience interesting as they had the chance to speak in English to different people. When the main purpose of the research is considered, it was revealed that students' attitudes towards learning English and their self-efficacy beliefs improved with the use of VR (Zheng et al., 2009).

Jee (2010) explored adult English language learners' attitudes towards using Second Life. Before using the VR platform, the learners were given training in how to use SL. Then the learners completed some communicative tasks like discussions by using the audio chat quality of the platform. The overall result of the study showed the learners' attitude to Second Life VR platform was positive. In addition, the researcher emphasized the importance of prior preparation for using VR platforms and familiarity with the VR tools to avoid technical problems. However, it was also mentioned that the problems occurred during the VR tasks enhanced peer learning and increased communication in the target language. The learners collaborated while helping each other to solve some technical problems faced in the VR environment. It was also suggested that task selection for the different levels should be made carefully since some VR tasks like talking to native speakers may be challenging for low level English learners (Jee, 2010).

A study by Khatoony (2019) investigated the effects of virtual reality on teaching English pronunciation. In the study, some of the students received education with VR games, while others received education with traditional methods. The participants in the VR group first received lessons from the teacher on the pronunciation of certain vowel sounds and then completed some tasks that required them to use the correct pronunciation in the virtual environment. After the application, all the students took a test, and the results revealed that VR games increased students' pronunciation learning in a foreign language.

It was also concluded that the use of VR makes learning English more effective and fun (Khatoony, 2019).

There are also some studies on that investigated the use of VR in teacher education, training, professional development and teachers' attitudes towards these technologies. For instance, Putra, Santosa and Saputra (2020) explored the teacher perceptions of using virtual reality platforms in teaching English. The research also aimed to find out some challenges of using VR in teaching English. The study was conducted via a questionnaire and an interview with high school teachers. According to the findings of the study, the teachers found the use of VR beneficial for students' learning experience. Moreover, the teachers shared that presenting teaching materials to students via VR tasks was a good option since it enabled students to learn by exploring the resources, which would help them gain better knowledge and an enhanced understanding of the subject. There were also some challenges stated by the participant teachers in the study such as the novelty of the VR technology, classroom management concerns and the achievement of the lesson objectives (Putra, Santosa, & Saputra, 2020).

Chen et. al. (2021) investigated what effects the inclusion of virtual reality in problem-based learning had on English language learners concerning students' ability to solve problems, vocabulary gain and motivation for learning English. The students in the experimental group first listened to a PBL scenario told by a virtual avatar on the EduVenture VR platform and identified possible problems in the story. Then the students were asked to find viable solutions for the problems and create VR videos showing their answers to the problem. The students in the control group followed the same procedures without using VR. The results of the study showed that there was not a considerable difference between the groups that worked with or without virtual reality integration. However, it was found that the use of VR in PBL made a significant difference in vocabulary learning. In addition, students found the use of VR in PBL motivating and reported that their interest and positive attitude towards learning English was strengthened (Chen et. al., 2021).

The study conducted by Chen and Hwang (2022) explored the impacts of use of virtual reality on students' English speaking motivation, anxiety and performance. They collected data via a student survey on anxiety about speaking and motivation for learning English as well as evaluating the students' work produced at the end of the learning process. The experimental procedure consisted of four steps, which started with the participants' reviewing some topics with their instructor. Following this, the students in experimental group got involved in some virtual reality activities while the control group worked with slide presentations. Then the experimental group used virtual reality to complete some listening exercises, and the control group did the same with video and sound clips. In the end, all the students prepared a presentation task by using the tools they were exposed to in the previous steps. The results showed that using VR had positive effects on students oral presentation skills, speaking anxiety levels and learning motivation (Chen & Hwang, 2022).

Hoang, McAlinden, and Johnson (2023) investigated the potentialities of using VR to improve EFL students' oral competence and students' perceptions of VR applications. The participants of the study were university level EFL students and they were doing a course on speaking skill. In order to enhance the speaking tasks, VR activities were integrated into the ongoing syllabus via Google expeditions mobile application. The tasks required students to take VR tours first and then the completion of some productive group work activities. The students' spoken performances were evaluated before and after the intervention. Additionally, students answered some interview questions and shared their opinions about using VR for learning English via their mobile devices. The results of the study revealed that the use of virtual reality on mobile devices in learning English may assist students to improve their oral proficiency; provides students with various interaction patterns; allows students to practise at any time and in any place; and supports active, autonomous and collaborative learning (Hoang, McAlinden, & Johnson, 2023).

Kaplan-Rakowski and Gruber (2023) conducted a study that examined how the use of VR for practising public speaking in English affected the students' foreign language anxiety. There were a control and an experiential group in the study, and the students in the both groups experienced public speaking practice eight times during the intervention

period that lasted for three months. While the students in both groups performed speeches on the same topics, their setting was different. The experimental group delivered their speech in high immersive VR environment to virtual people, and the control groups made speeches on the two-dimensional Zoom platform to real people. In addition to the public speaking tasks, some questionnaires about foreign language anxiety and an interview were carried out in the study. The main result of the study was that the students in the experimental group experienced considerably lower levels of anxiety about speaking English in front of an audience. The use of VR in public speaking in English was also found to be more effective, realistic and comfortable. The chance to practice several times added to the effectiveness of VR use for public speaking in foreign language (Kaplan-Rakowski & Gruber, 2023).

Yang, Chen, & Jeng (2010) developed a virtual environment for English language learning in their study. This virtual environment enabled students to interact with the objects and involved six different activities such as listening some phrases, speaking about the phrases and matching pictures with words. During the intervention, while the treatment group worked with VR, the control group learned the subjects via slide presentations. The results of the study revealed that the use of virtual reality enhanced the treatment group's learning performance. The participants in the treatment group found the VR activities fun and interesting. They also shared that interacting with the objects in the virtual environment strengthened their feeling of presence. Additionally, it was found that completing the tasks step by step in virtual reality improved students' feeling of accomplishment (Yang, Chen, & Jeng, 2010).

CHAPTER 3. METHODOLOGY

This chapter provides the information on the research questions, research design, data collection and data analysis procedure of this thesis study.

3.1 Research Questions

The integration of virtual reality and metaverse platforms are gaining importance in foreign language classrooms. However, the number of the studies that provide an overall understanding of VR and MV platforms in the ELT field is still limited. Thus, this study was carried out to examine the questions of what characteristics VR and MV technologies have, what learning gains they produce and how they are used in English Language Teaching. To achieve the purpose of this study, the researcher tries to answer the following research questions:

1. What are the characteristics of virtual reality and metaverse environments in education?
2. What are the learning gains from using virtual reality and metaverse platforms in ELT?
3. What are the ways of using virtual reality and metaverse platforms in ELT?

3.2 Research Design

This current study aims to explore a wide scope of topics in order to explore the use of VR and MV platforms in English language Teaching. Achieving this aim requires the investigation of many individual studies, analysis, comparison and synthesis of a huge number of findings, which agrees well with the procedures of a meta-synthesis study. In view of this, the meta-synthesis method was adopted to investigate the research questions.

Meta-synthesis is a research method that systematically integrates the findings of various isolated studies on the same or similar topic to create a new interpretation (Bair, 1999). According to Çalık and Sözbilir (2014), meta-synthesis means analysing, synthesizing and interpreting the studies conducted in the same subject area by creating templates or themes and from a critical perspective. A good meta-synthesis study addresses where the

topic under study is now, where it is heading, what point it will reach in the future, and what points it cannot achieve in the current circumstances (Bondas & Hall, 2007).

The first meta-synthesis study was carried out by Noblit and Hare in 1988 in order to evaluate together the findings of cultural studies in the field of education, and it was initially named as "*meta-ethnography*" (Polat & Ay, 2016, p. 63). According to Noblit and Hare (1988), meta-ethnography was a synthesis of qualitative works, which required the comparison, interpretation, and generalization of the findings of the related studies. DeWitt-Brinks and Rhodes (1992) named the concept of meta-synthesis as meta-analysis of qualitative researches, and they defined it as the process of synthesizing the qualitative findings rather than the quantitative data. The concept of meta-synthesis was later expanded by Bair (1999) to include qualitative comparisons of qualitative, quantitative, and mixed-method studies. Paterson and Canam (2001) also evaluated the concepts of meta-analysis and meta-synthesis together and called them "*meta studies*" (as cited in Polat & Ay, 2016, p. 54).

Whether a meta-synthesis study includes quantitative, qualitative or both types of research, the main difference of meta-synthesis from meta-analysis is that it is not concerned with summarizing or reducing data such as standard deviation, mean, and effect size; instead, it aims to integrate themes and insights from qualitative findings of individual researches (Scruggs, Mastropieri & McDuffie, 2006). When the studies using this method are examined, it is seen that the main point to be emphasized is the qualitative comparison of the findings (Aküzüm, 2012). In other words, meta-synthesis research investigates the studies conducted within the context of a specific subject area from a qualitative standpoint and reveal the similarities and differences between the studies in a comparative manner (Ünver, 2022).

In the field of education, the number of the studies that employ meta-synthesis method has increased in recent years. Accordingly, when the YOK Thesis Archive, the database of Turkish national thesis centre, was scanned, it was found that there are thirty-five master's theses in the field of education conducted with meta-synthesis method between the years of 2014 and 2022. While there is only one meta-synthesis study each from the

years of 2014, 2017 and 2020, there are two master's theses from 2018, five from 2019, and six from 2021. An increase in the meta-synthesis studies is observed in 2022, with a number of 19 master's theses. However, it was found that there were not any master's theses conducted with meta-synthesis method in the field of English Language Teaching. Therefore, this current work can serve as a sample and encourage other researchers to apply this method in their studies in ELT.

3.3 Data Collection

The data in this study were collected from 36 articles, 3 conference papers and 2 short papers. Before the commencement of the data collection process, it was intended that various types of publications would be involved in this study, including books, master's theses, conference papers and journal articles. However, during the data collection process, it was found that there were limited number of books and master's theses on using VR and MV in English Language Teaching. It was observed that the existing books on VR and MV either consisted of various sections and topics such as health, ethics, privacy, security, social issues and digital currencies, or they presented little data on education. Similarly, the number of the master's thesis studies on using VR and MV platforms in ELT were limited. It was especially difficult to find theses on Metaverse platforms in English Language Teaching since it is a relatively new concept in education. Therefore, the idea of including books and master's theses in this study was abandoned, and data collection was mainly based on the data obtained from 36 journal articles along with 3 conference papers and 2 short papers.

3.3.1 Data collection tools

In the modern world, online databases serve as a valuable tool for the researchers as they provide a large percentage of the existing studies in the literature of any selected topic in a few seconds. Conducting a meta-synthesis study also requires the investigation of a huge number of primary studies in the first place, so access to the most relevant works in a rapid manner is of great importance. As a result, online databases are commonly utilized in the initial phases of meta-synthesis studies.

Online databases were also used for this current study. To do the search for articles on the research topic, different online search databases were used such as Academia.edu, DergiPark, ERIC, Google Scholar, JSTOR, ResearchGate, ScienceDirect, SpringerOpen, Taylor & Francis, and Semantic Scholar. It can be noted that since Google Scholar provides sources from all the other online databases, it was mostly preferred at the starting point. Then the sources presented by Google Scholar were accessed and further examined on their original databases.

Some of the articles included in this study were obtained from online journal websites. They were either reached via Google search engine and Google Scholar database while searching the key words of the current study or via the details provided in the reference lists of the previously found articles. Some of the online journal websites include Teaching English with Technology, English Review: Journal of English Education, Educational Technology & Society, Language Learning & Technology, Journal of Language and Linguistic Studies, J-INSTITUTE, Interactive Learning Environments, International Journal of Interactive Mobile Technologies (iJIM), System, Journal of Intelligence, International Journal on New Trends in Education and Their Implications, Technium Social Sciences Journal, Computer Assisted Language Learning, Journal of Advances in Humanities and Social Sciences, International Journal of Technology in Teaching and Learning, and Turkish Online Journal of Distance Education.

3.3.2 Data collection procedure

The examination of the existing meta-synthesis studies shows that similar steps are followed to carry out a meta-synthesis study, and there are three frameworks that are generally utilized by researchers (Saka, 2019; Altınışık Akgöz, 2022; Biliş, 2022; Güney Demirdöken, 2022; Karakoç, 2022; Korkmaz, 2022; Koyuncu, 2022; Oyar, 2021; Sığnaktekin, 2022; Şimşek, 2021; Ekici Uysal, 2022; Ünver, 2022). One of these frameworks was provided by Noblit and Hare (1988). In this framework, 7 steps were given to conduct a meta-synthesis study. Another one belongs to Cooper et al. (2009), and it also offers 7 steps to complete the process of research synthesis. The last framework

that was commonly used in the existing studies was proposed by Polat and Ay (2016), and it consists of 7 steps as well.

In this current study, the meta-synthesis process explained by Polat and Ay (2016) was followed. Since this framework was created after the examination of many other previous meta-synthesis studies, including Noblit and Hare's (1988), and since it is the most up-to-date version, it provides researchers with a detailed and newer plan. According to Polat and Ay (2016), the seven steps in the process of meta-synthesis are:

Step 1: Identifying questions for research.
Step 2: Determining the keywords for the subject of the study and searching the literature.
Step 3: Accessing, reviewing, naming and evaluating the resources.
Step 4: Identifying the inclusion and exclusion criteria and selecting the studies that will be evaluated
Step 5: Analysing the selected studies to create the common themes and sub-themes and identifying similar and different aspects of themes.
Step 6: Making inferences by synthesizing the findings obtained within the framework of the themes.
Step 7: Producing detailed written reports on the process and findings. (p. 55)

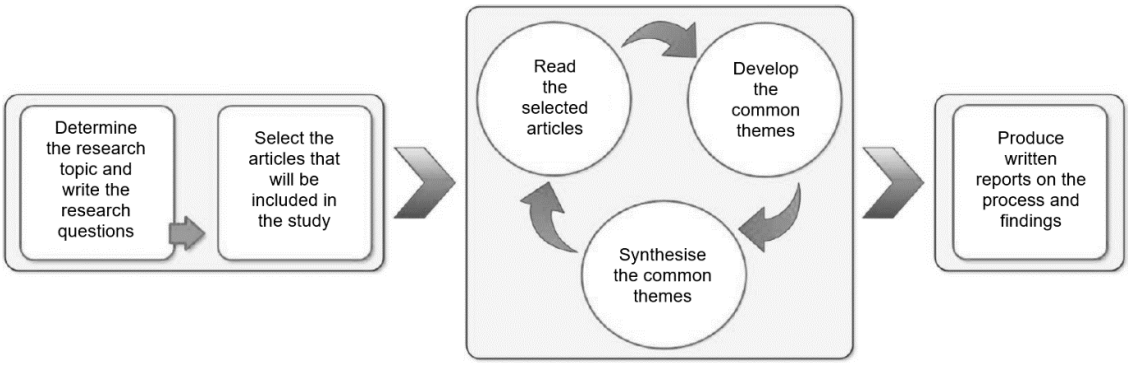


Figure 10. Steps in the process of meta-synthesis (Polat & Ay, 2016, p. 56)

After the steps to be followed were determined, the data collection process started. The first step in meta-synthesis process was the identification of the research questions. In

order to find the most appropriate research questions, the aim of the study was analysed. As the study aimed to produce a comprehensive study on the use of VR and MV platforms in ELT, the researcher decided to create three questions that could provide educators with some illuminating data on the use of these technologies in their teaching environment. Accordingly, the questions were determined to be about the characteristics of virtual reality and metaverse environments in education, learning gains from using virtual reality and metaverse platforms in ELT and the ways of using them.

After the identification of the research questions, the researcher determined the key words and reviewed the literature on the use of virtual reality and metaverse platforms in the ELT field. The key words for reviewing the literature were "virtual reality in ELT", "Metaverse in ELT", "3D worlds in ELT", "virtual learning environment in the EFL Classroom", "immersive learning technologies in ELT", "learning English in virtual environments", "teaching English in virtual worlds", "English Language learning in the Metaverse" "Learning English in The Metaverse" and "Teaching English in The Metaverse". The search was conducted in both English and Turkish, so the same keywords were also used in Turkish.

The studies that were found relevant to the research questions were examined carefully. The ones that were found appropriate were grouped under certain categories such as "virtual reality in ELT", "metaverse in ELT", "virtual reality in foreign language teaching", "metaverse in foreign language teaching", "virtual reality in education" and "metaverse in education". Then some folders were created on computer under these category names, and the relevant studies were stored in the folders in order to be read thoroughly in the selection process.

In the next step, the inclusion and exclusion criteria that would guide the researcher through the selection of the studies were identified. The criteria were determined regarding the aim of the study, the research questions and the novelty of the technologies that are within the scope of this master's thesis. Therefore, the study inclusion was based on the following criteria:

1. all academic studies (journal articles, conference papers, conference proceedings, short papers, theoretical work) that dealt with the use of virtual reality and/or metaverse platforms in learning & teaching English
2. studies that used different types of virtual reality systems in their intervention process
3. studies that were conducted in primary, secondary, high school and higher education levels of education
4. studies that were conducted with ELT teachers or on teacher education
5. all academic studies that applied qualitative, quantitative or mixed research methods
6. studies that were conducted between January 2012 and December 2022
7. studies whose publication language were English or Turkish

The first four criteria were established considering the limited number of the studies on using VR and MV platforms in ELT. In addition, as the aim of the researcher was to prepare a comprehensive study including various aspects of the research topic, the first four criteria enabled the inclusion of the studies that presented different dimensions and insights about the subject at hand. Similarly, the fifth criterion was designated in order to obtain more data on the research topic. At this point, it must be noted that although meta-synthesis method is often associated with the inquiry of qualitative studies, this is not completely agreed by all the scholars. When the studies using this method are examined, (1) it is seen that meta-synthesis method is not only used with qualitative studies, but it is also applied in mixed method studies (Polat ve Ay, 2016; Koyuncu, 2022), (2) there are some studies that deal with both qualitative and quantitative studies (Aküzüm & Özmen, 2014; Kıncal & Beypınar, 2015; Sandelowski et al., 2007), (3) there are also meta-synthesis studies that include qualitative comparisons of qualitative, quantitative, and mixed-method studies (Bair, 1999; Oyar, 2021; Şimşek, 2021; Ünver, 2022; Karakoç, 2022). It is on this basis that the criteria of including all types of academic studies with qualitative, quantitative or mixed research methods was set for this thesis study. Additionally, when the large scope of this study and the novelty of the technologies under examination were considered, the adoption of a more inclusive meta-synthesis approach was determined to be appropriate for the study's effectiveness. As for the sixth criterion, a ten-year limitation was placed on the selection of the articles to be included so that the study could provide data on the most recent applications and developments in the research

topic. The last criterion was simply set on account of the fact that the researcher knows the languages of English and Turkish.

Some exclusion criteria were also used for the selection of the studies. In accordance with the inclusion criteria, the exclusion criteria were determined as follows:

1. abstract-only articles
2. articles without full text available
3. publications in languages other than English or Turkish
4. publications that were not published between January 2012 and December 2022

The application of the abovementioned inclusion and exclusion criteria facilitated the selection of the studies. The inclusion criteria assisted the researcher to find the relevant articles that answered the research questions, and defining the exclusion criteria in advance prevented the researcher from deviations (Tawfik et al., 2019). The process of selecting the studies was illustrated in Figure 12, which was created by the researcher of the current study.

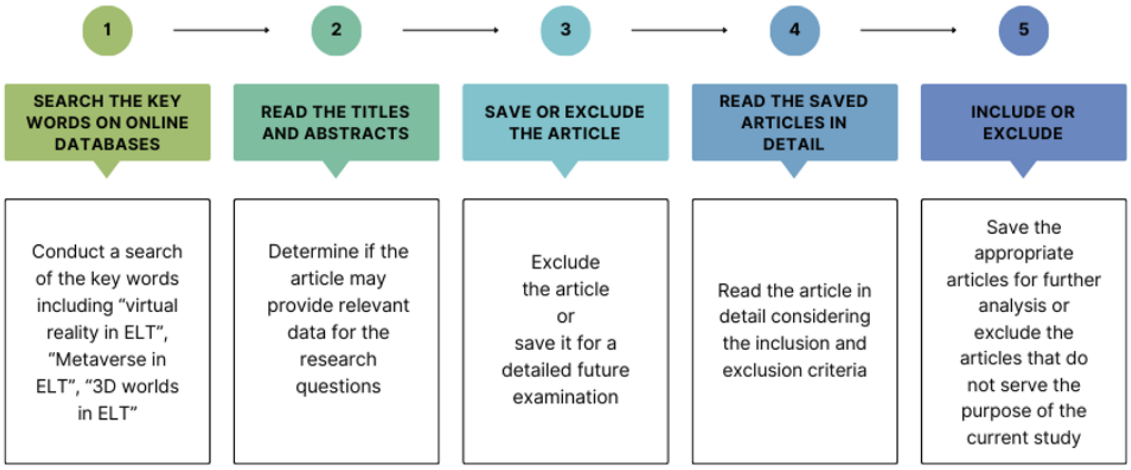


Figure 11. The Process of Selecting the Studies to Be Included

On completion of the selection of the studies, the selected studies were read and examined in detail by the researcher. The data gathered from primary researches was analysed. The common themes and sub-themes of the reviewed articles were identified to find the

similar and different aspects of the studies. The themes aided the researcher in keeping the control of the data (Dinçer, 2018).

After creating the data obtained from the included studies, they were integrated with each other with the purpose of making inferences. During this stage, the findings of the studies were associated with research questions, and they were interpreted by grounding on appropriate qualitative and quantitative data (Walsh & Downe, 2005; Erwin, Brotherson, & Summers, 2011). The purpose of this stage is to enrich the information gathered from the included studies and to present similar different aspects (Saraçoğlu, 2015).

At the last stage, written reports on the process of the meta-synthesis and on the findings from the included articles were presented in a persuasive and clear way. Documenting the results in a way that will provide readers with comprehensive data on the topic was the main purpose of this last stage.

3.4 Data Analysis Procedure

The selected studies were read by the researcher, and the basic information about the articles were recorded in an excel file. During the preparation of the excel file, coding process was also completed. The codes were given as A1, A2, A3, … A41. The articles with the same or similar themes were detected and coded successively. For instance, the two studies on using virtual reality to reduce foreign language anxiety were coded as A1 and A2. The data from each article was written in separate boxes under thirteen headings, which were article name, article code, year of publication, country, aim of the study, method, sample, sample number, theme, sub-theme, data collection tools, analysis of data, and technologies used. Additionally, research questions and the findings of the articles were collected in the same excel file on another page. On this page, the data was recorded under four headings: article name, article code, research questions and findings. This file enabled the researcher to collect all the relevant data from the selected studies in the same place. It was then used while examining the qualities and the findings of the articles in detail. After each study was thoroughly analysed, compared and contrasted, the tables were created to summarise the data.

3.5 Validity and Reliability

To guarantee validity of the current study, every step of data collection process and the inclusion and exclusion criteria were explained one by one thoroughly. By including different types of studies in the meta-synthesis, the verification of the collected data was strengthened. The included studies were read many times and compared with each other. Additionally, exert opinion was sought during the process of research to provide reliability. Decision about the ways to organize and present findings were reached in consultation with the advisor of the current study. The findings from the included studies were also presented in tables in detail, and the data in the tables were frequently compared with the written explanations.

CHAPTER 4. FINDINGS AND DISCUSSION

4.1. Findings

In this part, the findings of the current research are presented. The data collected from the studies are summarized in the tables according to their descriptive qualities, purposes, research methods, data collection tools, data analysis methods, themes, sub-themes, VR and MV platforms used, technologies devices, and their findings.

4.1.1 A Description of the included studies

In this part, the articles included in the meta-synthesis were inquired regarding their year of publication, the countries they were conducted in, their sample group, sample size and level of education.

4.1.1.2 Distribution of the included studies according to year of publication

In this meta-synthesis, 41 studies that were conducted between the years of 2012 and 2022 were included. When the publication years of the articles were examined, it can be seen that there has been an increasing trend in the number of the studies on virtual reality and metaverse platforms in ELT after 2020.

To start with, two studies from 2012 were included in the study (A38, A39). There is one study from every year between 2013 and 2017 (A41, A5, A27, A40, A24). There are two studies published in 2018 (A9, A18) and three studies from the year of 2019 (A6, A16, A19). The number of the studies on the use of virtual reality and metaverse in ELT started to increase in 2020. Accordingly, eight studies from 2020 (A3, A7, A10, A12, A14, A15, A17, A21) and six studies from 2021 (A1, A2, A4, A23, A25, A26) were included in the meta-synthesis.

The number of the studies published in 2022 is the highest with a frequency of 15 (A8, A11, A13, A20, A22, A28, A29, A30, A31, A32, A33, A34, A35, A36, A37). The abovementioned information on the publication years of the included studies was

illustrated in Table 1. The increase in the number of the studies on virtual reality and metaverse platforms between the years of 2012 and 2022 can be seen in the table below.

Table 1. Distribution of the included works according to their year of publication

Year of Publication	Study	Frequency
2012	A38, A39	2
2013	A41	1
2014	A5	1
2015	A27	1
2016	A40	1
2017	A24	1
2018	A9, A18	2
2019	A6, A16, A19	3
2020	A3, A7, A10, A12, A14, A15, A17, A21	8
2021	A1, A2, A4, A23, A25, A26	6
2022	A8, A11, A13, A20, A22, A28, A29, A30, A31, A32, A33, A34, A35, A36, A37	15

4.1.1.3 Distribution of the included studies according to country

When the selected studies were examined according to their countries, it was found that 39 out of 41 studies were conducted in one country. One study was carried out as a joint study and one as a collaborative work.

First, there are nine studies each one of which was conducted in one of the following countries: Azerbaijan (A4), Belgium (A2), Colombia (A14), Georgia (A24), Kuwait (A33), Macedonia (A18), Poland (A5), Saudi Arabia (A20), and South Cyprus (A29). There is one joint study carried out by two universities in the Netherlands and Germany (A17). One collaborative work (A36) conducted by 11 authors from 10 different countries

was also included in this meta-synthesis. Since the study was published in an online journal, it was not specified with a country.

Iran (A3, A8), South Korea (A28, A35) and the USA (A10, A26) follow with two studies per country. There are three studies from Indonesia (A13, A23, A31) and Japan (A1, A6, A19) each. Taiwan has the second highest number of the works (f=7) examined in this study (A11, A12, A15, A16, A21, A22, A40). Last of all, there are 11 studies from Türkiye. Table 2 shows the distribution of the included studies by the countries in which they were carried out. The countries were listed in alphabetical order in the table.

Table 2. Distribution of the included works according to country

Country	**Study**	**Frequency**
Azerbaijan	A4	1
Belgium	A2	1
Colombia	A14	1
Georgia	A24	1
Indonesia	A13, A23, A31	3
Iran	A3, A8	2
Japan	A1, A6, A19	3
Kuwait	A33	1
Macedonia	A18	1
Poland	A5	1
Saudi Arabia	A20	1
South Cyprus	A29	1
South Korea	A28, A35	2
Taiwan	A11, A12, A15, A16, A21, A22, A40	7
The Netherlands & Germany	A17	1
The USA	A10, A26	2
Türkiye	A7, A9, A25, A27, A30, A32, A34, A37, A38, A39, A41	11
Unspecified	A36	1

4.1.1.4 Distribution of the included studies according to sample group

When the included studies were examined, it was seen that 29 out of 41 studies worked with sample groups. Most of the studies involved students as participants. 24 out of 29 studies were carried out only with students (A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A14, A15, A16, A17, A18, A19, A20, A21, A22, A35, A39, A40). There are two studies that were conducted only with teachers (A24, A25). The studies coded A13 and A33 included both students and the teachers in their sample groups. While there was only one teacher in the A13-coded study, sixty-six university instructors participated in the A33-coded study. Last of all, one study (A27) was carried out with pre-service teachers who were enrolled in an English language teaching program at a state university.

Based on the abovementioned information on the sample groups of the included studies, 29 studies that worked with sample groups were listed in Table 3. Since 12 out of 41 studies did not have sample groups, they were not added in the table (A23, A26, A28, A29, A30, A31, A32, A34, A36, A37, A38, A41).

Table 3. Distribution of the included works according to sample group

Sample Group	Study	Frequency
Student	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A14, A15, A16, A17, A18, A19, A20, A21, A22, A35, A39, A40	24
Teacher	A24, A25	2
Teacher and Student	A13, A33	2
Pre-service teachers	A27	1

4.1.1.5 Distribution of the included studies according to sample size

When the sample sizes of the included studies were examined, it was discovered that 29 out of 41 studies were specified with number of participants. Most of these studies (f=9) were carried out with a sample size between one and 19 (A2, A3, A4, A6, A16, A19, A24, A25, A39). These studies were followed by the ones (f=6) that had a participant

number between 20 and 39 (A5, A7, A9, A10, A17, A27). Five studies had a sample size between 40 and 59 (A1, A8, A11, A13, A22). In the studies coded A15 and A21, the number of the participants was between 60 and 79. A12-coded study was carried out with a sample size between 80 and 99.

Five studies had a sample size of 100 or more participants (A14, A20, A33, A35, A40). A14-coded study had 124 participants. The study coded A20 were carried out with 519 participants. The number of the participants in the A33-coded study was 100. The study A35 had 336 participants, and A40-coded study consisted of 448 participants. The sample size in the study coded A18 was not clearly mentioned although it was known that the study was conducted with a sample group.

Table 4 shows the distribution of the included studies by their sample size based on the abovementioned information. 29 out of 41 studies were demonstrated in the table since they were conducted with participants. The rest of the studies (f=12) were not specified with sample sizes as they were not conducted with participants (A23, A26, A28, A29, A30, A31, A32, A34, A36, A37, A38, A41).

Table 4. Distribution of the included works according to sample size

Number of participants	**Study**	**Frequency**
1 - 19	A2, A3, A4, A6, A16, A19, A24, A25, A39	9
20 - 39	A5, A7, A9, A10, A17, A27	6
40 - 59	A1, A8, A11, A13, A22	5
60 - 79	A15, A21	2
80 - 99	A12	1
100+	A14, A20, A33, A35, A40	5
Unspecified	A18	1

4.1.1.6 Distribution of the included studies according to level of education

When the included studies were examined, it was seen that 27 out of 41 studies specified their participants' level of education. Six of these studies were conducted with primary level students (A3, A7, A10, A12, A13, A35). Five studies were carried out with high school students (A4, A5, A11, A15, A22). The highest number of the studies were undertaken with the university students with a frequency of 15 (A1, A2, A6, A8, A9, A14, A16, A17, A18, A19, A21, A33, A27, A39, A40). In one of the studies (A20), there were participants from different levels of education, including primary, middle, and high school, undergraduate, and postgraduate university students.

The abovementioned information on the participants' level of education was summarised in Table 5. 27 out of 41 studies were illustrated in the table by the levels of the primary school, high school, university and different levels. 12 studies that did not have a sample group were not added in the table (A23, A26, A28, A29, A30, A31, A32, A34, A36, A37 A38, A41). Two studies that had teacher participants were also not taken into consideration (A24, A25).

Table 5. Distribution of the included works according to level of education

Level of Education	**Study**	**Frequency**
Primary	A3, A7, A10, A12, A13, A35,	6
High School	A4, A5, A11, A15, A22,	5
University	A1, A2, A6, A8, A9, A14, A16, A17, A18, A19, A21, A33, A27, A39, A40	15
Different levels	A20	1

4.1.2 Distribution of the works included in the meta-synthesis according to purpose

This part shows the distribution of the included studies by their purposes. When the studies were examined, it was seen that their purposes can be grouped under three main categories. Accordingly, the included studies had the purpose of (1) examining the effects of virtual reality or metaverse, (2) the integration of virtual reality or metaverse, or (3) teachers' and students' attitudes towards virtual reality or metaverse.

4.1.2.1 The studies that examined the effects of virtual reality or metaverse

Finding out the effects of VR or MV platforms on English language learning and teaching was a frequently encountered aim in the included studies. Almost all the studies in this category aimed to examine the effects of virtual reality except for the study coded A31, which focused on the effects of metaverse on foreign language learning.

The studies in this group mostly focused on the effects of virtual reality on the four language skills. As for the other language skills, four studies examined writing skill (A7, A8, A9, A10). The A7-coded study also investigated the effects of using VR on reading skill. One study explored the effects of using virtual reality on listening skill (A22).

Apart from the studies that examined the effects of virtual reality on the four language skills in ELT, five studies investigated the effects of VR on learners' language knowledge (A5, A6, A11, A12, A13). Accordingly, the studies A11, A12 and A13 aimed to find out the effects of VR use on vocabulary learning, and the studies coded A5 and A6 explored the effects of VR use on L2 grammar.

The studies coded A31 and A40 also examined the effects of VR and MV use in foreign language learning, but with more specific purposes. The study A31 focused on how the Metaverse may affect the foreign language learning in the future. Lastly, the A40-coded study explored the effects of virtual reality on linguistic and higher order thinking abilities of students.

Based on the abovementioned information, Table 6 demonstrates the 24 studies that examined the effects of using virtual reality and metaverse platforms on foreign language learning and teaching.

Table 6. The studies that examined the effects of virtual reality or metaverse

Digital Space	**Category**	**Purpose**	**Study**	**Frequency**
Virtual Reality	Speaking	effects of VR platforms on L2 communicative skills	A14, A15, A18, A19, A20	5
		examining the impact of VR use on L2 learners' speaking anxiety	A1, A2	2
		exploring the effectiveness of VR use on L2 pronunciation	A3, A4	2
		effects of VR platforms on gaining intercultural communication skills	A16, A17	2
		effects of VR platforms on gaining intracultural communication skills	A21	1
	Writing	investigating the effect of VR use on writing skill	A7, A8, A9, A10	4
	Reading	investigating the effect of VR use on reading skill	A7	1
	Listening	exploring the effects of VR use on L2 listening comprehension	A22	1
	Vocabulary	finding out the effects of VR use on L2 vocabulary learning	A11, A12, A13	3
	Grammar	finding out the effect of VR use on L2 grammar learning	A5, A6	2
	Linguistic and critical thinking skills	effects of virtual reality on students' linguistic and critical thinking skills	A40	1
Metaverse	The future of FL learning	effects of metaverse technologies on the future of FL learning	A31	1

4.1.2.2 The studies that examined the integration of virtual reality or metaverse

The second category about the purposes of the studies is on the integration of VR or MV platforms in ELT. It is worth noting that while nearly all the studies in the previous category focused on virtual reality, most of the studies (f=8) in this category are about the use of metaverse.

To begin with, the study coded A13 sought to find out the ways of integrating virtual reality in the classroom by observing an English teacher in a vocabulary class. Two studies (A23, A32) aimed to investigate the use of VR and MV specifically for authentic foreign language learning. Two studies (A25, A41) examined the use of Second Life VR platform in order to find out the ways educators use Second Life and to raise awareness about it in foreign language teaching. The A27-coded study focused on the ways of using of Second Life platform for prospective foreign language teachers. One study (A38) aimed to show the importance of using Second Life by introducing the platform and the ways of using it. The study coded A26 addressed to the teacher education and explored the VR practices that teacher educators may use in ESL teacher training.

The rest of the studies in this category aimed to examine the ways of using metaverse platforms (A28, A29, A30, A33, A34, A35, A36, A37). The study coded A28 investigated the ways that EFL educators could use metaverse platforms. In the A29-coded study, Immerse platform was given as an example of a metaverse platform, and the ways of using it in English for Specific Purposes (ESP) were explored. At this point, it must be noted that the remaining studies did not focus on the ELT field in particular. Since there was not much research on the use of metaverse platforms in the ELT, some studies on metaverse in education and foreign language teaching were also included this meta-synthesis. Accordingly, while the studies coded A30 and A34 explored the use of metaverse in foreign language teaching, the studies coded A33, A35, A36 and A37 aimed to find out the ways of using metaverse platforms in education from a general view. However, it can be said that all the studies in this second category aimed to understand and introduce the ways of using virtual reality or metaverse platforms in learning and teaching environments.

Table 7 shows the distribution of the included studies that examined the integration of virtual reality or metaverse platforms in education, foreign language and English language teaching. The abovementioned 15 studies were summarised in the table.

Table 7. The studies that examined the integration of virtual reality or metaverse

Digital Space	**Purpose**	**Study**	**Frequency**
Virtual Reality	examining of a teacher's ways of using virtual reality in teaching vocabulary	A13	1
	examining the utilization and importance of VR/MV in authentic foreign language learning	A23, A32	1
	finding out the ways EFL educators use Second Life VR platform and raising awareness about its use in foreign language teaching	A25, A41	2
	exploring the use of Second Life VR platform for prospective foreign language preservice teachers	A27	1
	underlining the significance of using Second Life and how to design activities in learning and teaching English	A38	1
	exploring the VR practices that teacher educators may use in ESL teacher training	A26	1
Metaverse	investigating the researches on the metaverse in English education and the ways EFL educators can use it	A28	1
	introducing ways that an educational metaverse platform, Immerse, can be used in foreign language teaching	A29	1
	examining the place of metaverse and how foreign language education will be in metaverse environments	A30	1
	presenting a theoretical basis and a theoretical contextualization in regard to using metaverse in foreign language learning	A34	1
	exploring metaverse-based education and its future use of in education	A33	1
	raising awareness about the use of metaverse for student-centred constructivist education	A35	1
	examining the development of Metaverse in education, the way it is designed, and research trends in Metaverse	A36	1
	finding out the advantages, contributions, problems and the areas to be improved of Metaverse in education	A37	1

4.1.2.3 The studies that examined the attitudes towards virtual reality or metaverse

The last category of the study purposes is about the attitudes towards virtual reality or metaverse. The studies coded A13, A24, A35 and A39 all aimed to find out teachers' and/or students' views about the use of these new technologies in the classroom.

The studies coded A13, A39 and A24 investigated the viewpoints on VR use in English language classroom. While the study coded A13 examined the attitudes of young learners to VR use specifically in vocabulary learning, the study coded A39 aimed to find out the views of university level students about using VR in foreign language learning. The study A24 aimed to explore EFL teachers' attitudes towards VR use. In addition, the study coded A35 examined the elementary level students' attitudes towards the use of metaverse in education from a student-centred and constructivist perspective.

Based on the abovementioned information about the teachers' and students' attitudes towards virtual reality or metaverse platforms, four studies were listed in Table 8. As can be seen in the table, while three studies examined the attitudes towards virtual reality platforms in foreign language learning and teaching, one study explored the attitudes towards the use of metaverse in education.

Table 8. The studies that examined the attitudes towards virtual reality or metaverse

Digital Space	Purpose	Study	Frequency
Virtual Reality	examining the young students' perceptions of VR use in vocabulary teaching	A13	1
	presenting university students' views about their use of *Second Life* for foreign language learning	A39	1
	inquiring about EFL teachers' attitudes towards VR use in foreign language teaching	A24	1
Metaverse	investigating viewpoints on the use of metaverse for student-centred constructivist education	A35	1

4.1.3 Distribution of the included studies according to research methods

When the research methods of the included studies were examined, it was discovered that most of the studies (f=17) adopted qualitative method. 13 studies were conducted in quantitative method, and seven studies were carried out in mixed method which applies qualitative and quantitative methods together.

Additionally, there were two theoretical studies (A29, A34). While one of these studies (A29) theoretically introduced how to use a metaverse platform in English for Specific Purposes, the other one (A34) provided a theoretical framework for utilization of metaverse in foreign language learning.

Lastly, for two studies the research method was not specified (A16, A21). When the data collection tools and data analysis techniques of these two studies were examined, it was possible to deduce that mixed method was employed. However, since the research methods in these studies were not evidently stated, they were regarded as unspecified. Table 9 demonstrates the information mentioned above. The distribution of the included works according to their research methods can be seen in the table in detail.

Table 9. Distribution of the works included in the meta-synthesis according to research method

Research Method	**Study**	**Frequency**
Qualitative	A13, A14, A17, A18, A19, A23, A24, A25, A26, A28, A30, A31, A32, A37, A38, A39, A41	17
Quantitative	A2, A3, A4, A5, A7, A8, A11, A12, A15, A20, A22, A35, A40	13
Mixed	A1, A6, A9, A10, A27, A33, A36	7
Theoretical study	A29, A34	2
Unspecified	A16, A21	2

4.1.4 Distribution of the included studies according to data collection tools

When the data collection tools of the included studies were examined, it was found that 19 types of data collection tools were used in the included studies. While some of the included studies used various data collection tools (f=17), the others utilized only one (f=24). Most commonly encountered data collection tools in the included studies were questionnaires, surveys, interviews, pre-test & post-test, literature reviews, student works, observations. There were also some data collection tools which were less frequently preferred in the included studies. These were scales, evaluation sheets, focus groups, language proficiency tests, achievement tests, listening comprehension tests, reflective journal entries, recall activities, conceptual memos, field notes, and participants' comments.

Questionnaire was the most common data collection tool in the included studies (f=14). Surveys were utilized in seven studies. The A2-coded study made use of scales that measure the stress levels of the participants during public speaking in order to explore the effects of VR on students' foreign language speaking anxiety. The study coded A5 gathered data about the participants' views on the lessons carried out in a VR environment via an evaluation sheet.

Interview was the second common data collection tool with a frequency of 13. In the A17-coded study, both one-on-one interviews and focus group interviews were conducted. Tests were also utilized to collect data in 12 studies. Pre- and post-tests were used as a data collection tool in 9 studies. A language proficiency test was employed in the study coded A8. In the A7-coded study, an achievement test was applied to collect data. In the A22-coded study, listening comprehension tests were utilized to assess the students' listening comprehension.

In 10 studies, a review of literature was conducted to collect data. It was followed by the students works (f=8). Student works included video recordings and students' written works. Video recordings of the students in virtual environments were also used as data collection tool in three studies (A6, A16, A18). While one of these three studies (A6) utilized both the videos taken in the virtual and real environment, the other two (A16,

A18) collected only the video recordings of the participants that were taken in the virtual environment. Three studies that explored the effects of virtual reality on writing skill used the students' written works to collect data (A8, A9, A10). Reflective journal entries was another data collection tools used in the study A17 with the aim of obtaining information about the participants' attitudes towards their VR experience. Additionally, a recall activity was done in the A22-coded study.

Three studies applied observation as data collection tool (A13, A14, A18). Memos, notes and comments were also used in some studies. Conceptual memos and fields notes were taken by the researcher in the A10-coded study. In the study coded A1, along with the questionnaires, the participants' comments were also used for data collection.

Last of all, there are two studies whose data collection tools were not specified (A29, A34). Though the data collection tools were not specified clearly in their method sections, these studies employed a review of literature and offered theoretical ideas.

The abovementioned information on the data collection tools was summarised in Table 10. The data collection tools used in the included studies were categorized into groups according to their similarities.

Table 10. Distribution of works included in the meta-synthesis according to data collection tools

Category	Data collection tools	Study	Frequency
Questionnaires, Surveys and Scales	Questionnaire	A1, A2, A5, A6, A8, A11, A13, A15, A16, A20, A21, A24, A27, A40	14
	Survey	A10, A14, A16, A18, A19, A33, A35	7
	Scale	A2	1
	Evaluation sheet	A5	1
Interviews	Interview	A9, A10, A11, A13, A15, A17, A22, A24, A25, A27, A33, A39	12
	Focus group	A17	1
Tests	Pre-test & post-test	A2, A3, A4, A5, A8, A11, A12, A15, A40	9
	Language proficiency test	A8	1
	Achievement test	A7	1
	Listening comprehension tests	A22	1
Literature Review	Literature search	A23, A26, A28, A30, A31, A32, A36, A37, A38, A41	10
Student Work	Video-recordings of students in VR or real environments	A6, A16, A18	3
	Written works by students	A8, A9, A10,	3
	Reflective journal entries	A17	1
	Recall activities	A22	1
Observations	Observation	A13, A14, A18	3
Memos, Notes and Comments	Conceptual memos	A10	1
	Field notes	A10	1
	Participants' comments	A1	1
Other	Unspecified	A29, A34	2

4.1.5 Distribution of the included studies according to data analysis methods

When the data analysis methods of the included studies were examined, it was found that 24 data analysis methods were used in the included studies. These data analysis methods were categorized under two main groups, which are qualitative and quantitative analyses. Qualitative analysis included content analysis, document analysis, thematic analysis, cluster analysis, constant comparison method, critical appraisal, homogeneity analysis, item response analysis, SWOT analysis, triangulation of the data, preliminary analysis, requirements' analysis; and quantitative analysis contained descriptive analysis, paired sample t-test, ANOVA analyses, independent-samples t test, frequency analysis, ANCOVA analyses, normality analysis, bibliometric analysis, and Friedman Test.

Qualitative analysis methods were encountered in 32 studies. In 14 of these studies, qualitative data analysis method was used (A6, A10, A11, A13, A18, A19, A22, A24, A26, A28, A30, A33, A38, A41). In other studies that used qualitative methods, more specific data analysis methods were stated.

To start with, content analysis was used in five studies (A9, A21, A25, A31, A36, A37). In the studies coded A14, A32 and A37, document analysis was utilized. Thematic analysis was used in two studies coded A15 and A16. The A15-coded study applied thematic analysis to the data collected from the interviews, and the A16-coded study used it to analyse the themes in participants' answers to the open-ended questions in a survey.

The A1-coded study employed a cluster analysis on the comments of participants about their VR experience. The study coded A39 applied constant comparison method to the qualitative data collected via interviews. The A23-coded study utilized critical appraisal to analyse the literature on the use of virtual reality for authentic learning. Homogeneity analysis was used in the A7-coded study in order to examine the variances of the participant groups' pre-test and post-test scores.

In the study coded A12, item response analysis was carried out on the vocabulary test that was used in the treatment. The A37-coded study applied a SWOT analysis in order to gauge the strengths, weaknesses, opportunities, and threats of the use of Metaverse in

education. In the study coded A27, triangulation of the data was benefitted from. The A17-coded study performed a preliminary analysis on the data gathered via interviews and focus group responses. Since the study coded A20 introduced a mobile virtual reality application that is used for practicing English, a requirement analysis was employed to identify the required features of the application.

Quantitative analysis methods were encountered in 33 studies. In six studies, quantitative data analysis method was applied (A2, A5, A16, A19, A20, A33). In other studies that used quantitative methods, data analysis methods were stated more specifically. Accordingly, five studies applied descriptive analysis to the data collected through interviews, questionnaires or pre-tests and post-tests (A3, A4, A11, A15, A21). Paired sample t-test was employed in five studies (A3, A7, A10, A15, A22), and independent-samples t-tests were used in four studies (A11, A22, A35, A40).

ANOVA or ANCOVA analyses were also employed as a data collection tool. While the studies coded A8, A10, A11 and A12 applied ANOVA analyses, the studies coded A7 and A8 used ANCOVA analyses. The studies coded A7 and A8 also used normality analysis.

In three studies, frequency analysis was performed (A1, A7, A10). In the study coded A36, bibliometric analysis was used to review the literature on the Metaverse in education. In the study coded A9, Friedman Test was used to perform a quantitative analysis of the students' written works. Last of all, data analysis methods were not specified in two studies since they were theoretical works that offered theoretical ideas (A29, A34).

Based on the abovementioned information, 24 data analysis methods that were used in the included studies were illustrated in Table 11. The data analysis methods can be seen in the table in detail.

Table 11. Distribution of works included in the meta-synthesis according to data analysis methods

Category	Data Analysis	Study	Frequency
Qualitative analysis	Qualitative data analysis	A6, A10, A11, A13, A18, A19, A22, A24, A26, A28, A30, A33, A38, A41	14
	Content analysis	A9, A21, A25, A31, A36	5
	Document analysis	A14, A32, A37	2
	Thematic analysis	A15, A16	2
	Cluster Analysis	A1	1
	Constant comparison method	A39	1
	Critical appraisal	A23	1
	Homogeneity analysis	A7	1
	Item response analysis	A12	1
	SWOT analysis	A37	1
	Triangulation of the data	A27	1
	Preliminary analysis	A17	1
	Requirements' analysis	A20	1
Quantitative analysis	Quantitative data analysis	A2, A5, A16, A19, A20, A33	6
	Descriptive analysis	A3, A4, A11, A15, A21	5
	Paired sample t-test	A3, A7, A10, A15, A22	5
	Anova analyses	A8, A10, A11, A12	4
	Independent-samples t test	A11, A22, A35, A40	4
	Frequency analysis	A1, A7, A10	3
	Ancova analyses	A7, A8	2
	Normality analysis	A7, A8	2
	Bibliometric analysis	A36	1
	Friedman Test	A9	1
Other	Theoretical study	A29, A34	2

4.1.6 Distribution of the included studies according to themes

When the included studies were examined, 12 different themes were encountered. The most common theme was speaking, and it was examined in 12 studies (A1, A2, A3, A4, A14, A15, A16, A17, 18, A19, A20, A21). The educational use of virtual reality or metaverse was the second common theme, which was explored in nine studies (A28, A29, A30, A31, A33, A34, A36, A37, A38).

Another theme discussed in some of the included studies was writing. Four studies focused on the effects of using VR on writing skill (A7, A8, A9, A10). Additionally, three studies were on the theme of vocabulary learning via virtual reality (A11, A12, A13), and two studies explored the effects of integrating virtual reality into grammar lessons (A5, A6). There are two studies that examined authentic language learning via virtual reality or metaverse (A23, A32). The A23-coded study explored the theme of authentic language learning in virtual reality, and the study coded 32 did the same in metaverse context.

The studies coded A26 and A27 discussed the theme of teacher education and investigated the use of virtual reality in English language teacher training. Two studies (A24, A25) explored teachers' perceptions towards using virtual reality in English language teaching. Similarly, two studies (A35, A39) investigated students' perceptions towards the use of virtual reality and metaverse in English language learning. While the A35-coded study examined the perceptions towards using metaverse in education, the study coded A39 focused on the use of virtual reality.

The A22-coded study investigated listening skill, and the study coded A7 examined the effects of virtual reality on reading skill together with the writing skill. The study coded A40 focused on the theme of linguistic and cognitive abilities and explored if the use of VR in learning English improved these abilities.

Table 12 shows the distribution of the works included in this meta-synthesis by their themes. As mentioned above, 12 main themes were detected in the studies. These can be seen in detail in the table below.

Table 12. Distribution of works included in the meta-synthesis according to themes

Themes	Study	Frequency
Speaking	A1, A2, A3, A4, A14, A15, A16, A17, 18, A19, A20, A21	12
Educational use of VR/MV	A28, A29, A30, A31, A33, A34, A36, A37, A38, 41	10
Writing	A7, A8, A9, A10	4
Vocabulary	A11, A12, A13	3
Grammar	A5, A6	2
Authentic learning	A23, A32	2
Teacher education	A26, A27	2
Teacher perceptions	A24, A25	2
Student perceptions	A35, A39	2
Listening	A22	1
Reading	A7	1
Linguistic and cognitive abilities	A40	1

4.1.7 Distribution of the included studies according to sub-themes

As previously mentioned, speaking skill was the most common theme encountered in the included studies. Under the theme of speaking, the studies coded A14, A15, A18, A19 and A20 examined the effects of using virtual reality platforms on communicative skills. Three studies examined intercultural communication (A14, A16, A17). Two studies focused on the effects of using virtual reality on speaking anxiety of English language learners (A1, A2). Two other studies examined the impact of virtual reality on participants' pronunciation competency (A3, A4). Last, there was one study (A21) covering intracultural communication as a sub-theme.

When it comes to the other language skills, four studies were on writing skill and examined the effects of virtual reality use on students' writing achievement in English (A7, A8, A9, A10). The study coded A8 investigated how the use of VR affected extrovert and introvert learners' paragraph writing. The A10-coded study explored the effects of virtual reality use on students' writing performance by employing a Funds of Knowledge approach. The impact of virtual reality on reading performance was examined in the study coded A7. The effects of mobile virtual reality on listening comprehension of English learners was researched in the A22-coded study.

The theme of vocabulary learning via virtual reality was investigated in the studies coded A11, A12 and A13. The sub-themes in these studies were the effects of mobile virtual reality platform (A11); the effects of VR use on learner autonomy and collaboration (A12); the practices and the challenges of teaching vocabulary via virtual reality (A13). The studies coded A5 and A6 explored the effects of integrating virtual reality into grammar lessons. The A5-coded study explored the effects of combining browser-based virtual reality with other online activities in learning of second conditional. The study A6 also focused on the effects of virtual reality on learning grammar by exploring if it provided an engaging learning environment.

Two studies that focused on the use of virtual reality or metaverse in English language learning and teaching mentioned the benefits of using these technologies in the language classroom (A28, A38). In some of the studies, the challenges of using virtual reality or metaverse was also a sub-theme (A13, A25, A34, A36, A37 A38). Three studies (A31, A32, A40) explored the effects of metaverse technologies on foreign language learning. Two other studies (A28, A36) investigated the research trends on the use of metaverse in education. Two studies examined authentic language learning by using virtual reality or metaverse platforms (A23, A32).

Three studies examined ways of using metaverse in education (A33, A35, A36). These studies focused on students' experiences and perceptions of metaverse. There are two studies that explored the use of metaverse in English language teaching (A28, A29). Three

studies that examined the ways of using metaverse in foreign language teaching (A30, A32, A34).

There are four studies that examined the theme of teacher in relation to virtual reality or metaverse in education (A24, A25, A26, A27). The sub-themes covered in the study coded A24 were EFL teachers' awareness of virtual reality in language teaching and their attitudes towards this technology. While the study A25 also explored the EFL educators attitudes towards virtual reality in language teaching, it also examined the participant educators' experiences. The A26-coded study researched the potential ways of using virtual reality in English language teacher training and the theories that teacher educators could benefit from. The study coded A27 also explored the use of virtual reality in training English language pre-service teachers.

In addition, there are 10 studies that investigated the students perceptions of virtual reality in learning English (A5, A9, A11, A13, A15, A16, A19, A21, A22, A39) while there is only one study that examined the students' perceptions of metaverse in education (A35).

Table 13 demonstrates the abovementioned information about the sub-themes of the works included in this meta-synthesis. 26 different sub-themes that were found in the studies can be seen in detail in Table 13. The sub-themes were presented in alphabetical order.

Table 13. Distribution of works included in the meta-synthesis according to sub-themes

Theme	Sub-Themes	Study	Frequency
Speaking	The effects of VR on EFL learners' communicative skills	A14, A15, A18, A19, A20	5
	EFL students' intercultural communicative learning through virtual reality	A14, A16, A17	3
	The effects of VR on learners' L2 speaking anxiety	A1, A2	2
	The effects of using VR games on EFL learners' pronunciation	A3, A4	2
	The impact of virtual reality on EFL students' intracultural communication skills	A21	1
Writing	The effects of VR on EFL learners' writing performance	A7, A8, A9, A10	4
Reading	The effects of VR on EFL learners' reading performance	A7	1
Listening	The effects of mobile VR on EFL learners' listening skill	A22	1
Vocabulary	The impact of using VR on EFL learners' vocabulary learning	A11, A12, A13	3
Grammar	The effectiveness of teaching grammar by using VR	A5, A6	2
Educational use of VR & MV	Benefits of using Metaverse in English language teaching	A28	1
	Benefits of using virtual reality in English language teaching	A38	1
	Challenges of using Metaverse in educational contexts	A34, A36, A37	3
	Challenges of using virtual reality in educational contexts	A13, A25, A38	3
	The effects of VR and MV technologies on foreign language learning	A31, A32, A40	3
	The research trends in education in Metaverse	A28, A36	2
	VR and MV for the implementation of authentic learning in EFL classrooms	A23, A32	2
	Ways of using Metaverse in education	A33, A35, A36	3
	Ways of using Metaverse in English language teaching	A28, A29	2
	Ways of using Metaverse in foreign language teaching	A30, A32, A34	3
Teacher education & perceptions	EFL educators' experiences with VR learning platforms	A25, A27	2
	Teachers' perceptions of VR	A24, A25	2
	EFL teachers' awareness of VR-based teaching	A24	1
	The potential uses of VR in teacher training	A26	1
Student perceptions	Students' opinions/perceptions of VR	A5, A9, A11, A13, A15, A16, A19, A21, A22, A39	10
	Students' perceptions of Metaverse in education	A35	1

4.1.8 Distribution of the included studies according to virtual reality and metaverse platforms

When the virtual reality and metaverse platforms used in the included studies were examined, it was found that while existing commercial VR platforms were preferred in most studies (f=19), new virtual reality platforms were also developed and used for some studies (f=7).

To start with, the Second Life was the most commonly used commercial virtual reality platform in the studies. Five studies were conducted by using or examining the Second Life platform (A18, A25, A27, A38, A39). The A18-coded study used the platform to explore the effects of VR use on speaking skill. The studies coded A25, A27 and A38 utilized the Second Life to find the implementation ways of VR in ELT, and the A39-coded study explored the students' views on the Second Life platform.

In the studies coded A1 and A29, the researchers used the Immerse platform. In the A1-coded study, the ready-made lesson plans on the Immerse were employed, and the participants practised their conversation skills by talking to native speakers of English. On the other hand, the A29-coded study specifically focused on the use of the Immerse platform in English for Specific Purposes, and some ways to integrate it in ESP lessons were theoretically suggested.

The Mondly platform was also examined in two studies (A11, A22). In the study coded A11, the participant attended the platform individually and completed the communication tasks by speaking to virtual characters. The A22-coded study utilized the platform in order to find out its effects on English language learners' listening abilities through communicative tasks.

In addition, there are two studies (A9, A13) in which video sharing platforms, like YouTube, were used. The A9-coded study made use of two VR videos on the YouTube platform to explore the effects of VR use on English learners' writing performance. In the study coded A13, the teacher shared the names of two 360-degree videos with the participants and asked them to find the videos on the Internet themselves.

The rest of the virtual reality and metaverse platforms in the Table 12 were encountered only in one study each. In the A17-coded study, some communicative tasks were carried out on the Bigscreen VR platform. This platform allowed its users to have avatars and socialize with people from different parts of the world. In the study coded A21, the Edu Venture VR platform was used. The participants created VR content that presented some tourist areas in their country and shared their work on the Edu Venture VR platform.

The A10-coded study utilized the Google Earth VR as a virtual reality platform. In the study, the participants were required to take virtual tours to three different places by using Google Earth and then write essays about them. Google Expeditions was another virtual reality platform encountered in the included studies (A19). During the activities on Google Expeditions, the students visited certain locations and told their partners the details of that place.

The A14-coded study examined how the utilization of the ImmerseMe platform assist in improving the students' communicative skills. The students were given a certain task, entered the platform one by one and communicated with virtual native speakers. The study coded A2 utilized the Ovation VR platform and explored the effects of virtual reality use on reducing students' speaking anxiety. The Ovation VR platform enabled users to practice their presentation skills in front of a virtual audience.

In the study coded A16, the participants used the vTime platform, which is an open social virtual reality environment, to communicate with foreign people. The vTime platform allowed participants to have an avatar, choose a setting and record their activities. In the study A5, the Yoowalk platform was used. Yoowalk was a browser-based virtual reality environment. In the study, the participants entered Yoowalk in order to practice a grammar point in English by speaking to the other users in the platform.

As for the virtual reality platforms that were specially developed for the studies, seven different VR platforms were encountered in the included works (A3, A6, A7, A8, A12, A15, A20). In the study coded A3, a virtual reality game was created for the treatment in

the study. The game offered different subjects that students could choose from and practice their English pronunciation. The virtual reality platform in the study coded A6 was developed to provide learners with grammar practices. Therefore, this platform enabled participants to interact with the parts of a sentence in the virtual environment and put them in the correct order. For the A7-coded study, an VR application about planets was created in accordance with a unit in the student's book. For the study coded A8, a virtual reality application was also created, and the participants used it via their smartphones and VR headsets. The games in the application focused on paragraph writing.

For the A12-coded study, a virtual platform named WelcomeLand was designed. The platform offered various scenarios such as airports and schools. During the treatment, the participants explored an airport and practised vocabulary by interacting with the objects. In the study coded A15, the researchers developed a virtual reality platform, VRLE, that enabled learners to practice speaking English by interacting with virtual characters. In the study coded A20, the researchers proposed a platform named Language SVR as a mobile social virtual reality application. They aimed to offer a prototype of a virtual reality platform that would particularly be used for the purpose of learning English. On this platform, real-life scenarios would be presented, and language learners would be able to chat with real people.

The abovementioned information about the distribution of the studies according to the virtual reality and metaverse platforms were shown in Table 14. Most of the items in the table shows the brand names of VR and MV platforms (BigscreenVR, Edu Venture VR, Google Earth VR, Google Expeditions, Immerse, ImmerseMe, Language SVR, Mondly, OVATION VR, Second Life, vTime, Yoowalk).

Table 14. Distribution of works included in the meta-synthesis according to virtual reality and metaverse platforms

Category	Platforms used / examined	Study	Frequency
Commercial VR platforms	Second Life	A18, A25, A27, A38, A39	5
	Immerse	A1, A29	2
	Mondly	A11, A22	2
	Video sharing platforms	A9, A13	2
	Bigscreen VR	A17	1
	Edu Venture VR	A21	1
	Google Earth VR	A10	1
	Google Expeditions	A19	1
	ImmerseMe	A14	1
	Ovation VR	A2	1
	vTime	A16	1
	Yoowalk	A5	1
VR platforms developed for the studies	No-name platforms	A3, A6, A7, A8	4
	WelcomeLand	A12	1
	VRLE	A15	1
	Language SVR	A20	1

4.1.9 Distribution of the included studies according to the technological devices used

Since there are different versions of virtual reality technology, such as browser-based, semi-immersive and immersive, the technological devices used in the studies vary according to the preferred VR platform or the resources the researchers have. When the included studies were examined it was found that computers, smartphones and VR headsets were the frequently used devices in the included studies.

VR headsets had the highest frequency (f=13) in the included studies, and nine studies specified the brand names of the VR headsets that were used. Accordingly, Oculus brand headsets were used in the studies coded A1, A6 and A17. Oculus is a brand of Facebook Technologies, and there are different types of Oculus VR headsets. In the study A17, both an Oculus Go and an Oculus Quest headsets were used. An Oculus Quest VR headset was also used in the study coded A6. In addition, another model of Oculus, The Quest 2, was utilised in the A1-coded study.

In the studies A9, A11 and A22, Samsung VR headsets were employed as the technology to access the virtual platforms. While the VR headset used in the study coded A9 was mentioned as Samsung VR Goggles, the ones in the studies A11 and A22 were specified as Samsung Gear VR. These headsets were used with the compatible Samsung mobile phones.

Two other virtual reality brands encountered in the included studies were HTC VIVE and Google Cardboard. In the study coded A15, HTC VIVE was used as a means to access the immersive virtual reality platform by each participant. In the study coded A24, the participant teachers used Google Cardboard in order to watch a digital story.

VR Box was used in the studies coded A13 and A16. VR Box is a virtual reality device that is worn on users' head and works with a smartphone placed inside it. While the VR Box was used to watch two 360° videos in the study A13, it was used to access an open social virtual reality platform, vTime, in the study A16.

Headsets were also used in the studies coded A3, A7, and A14, but the brands or other features of the headsets were not mentioned. In the study coded A3, the virtual reality activities were carried out by using VR glasses in a fully three-dimensional environment. In the study coded A7, the immersive VR headsets were used. The A14-coded study utilized a headset and computer together.

Another technological device used in the studies was computer, and it was utilized in eight studies (A5, A10, A12, A14, A18, A22, A39, A40). Since browser-based virtual

reality platforms were chosen for the studies A5, A10, A12, A39 and A40, a computer was the only necessary technological device in these studies. The computer was a supplementary device for the study coded A14, which used an immersive virtual reality platform. The studies coded A12, A18 and A40 were conducted in computer labs, and the participants used computers to enter the virtual reality platform. In the study coded A22, computers were utilised by the participants in the control group to watch videos.

As for smartphones, they were also utilised in seven studies (A8, A9, A11, A19, A20, A21, A22). In the study A8, the participants installed the VR application and connected their own smartphones to the VR headset. In the study coded A9, a Samsung S7 Edge mobile phone was used, and the participants accessed the virtual reality platform by using it individually. In the studies coded A11 and A22, the participants used a Samsung Galaxy Note 8 to connect to the virtual environments. Since the aim of the study coded A19 was to find out the advantages of using virtual reality over smartphones, smartphones were utilized to access the VR platform as well as being used alone. The brand name or any details about the smartphone were not given. Similarly, in the studies A20 and A21, it was only stated that the VR applications used were accessed via mobile phones.

The abovementioned information about the technological devices used in the included studies was demonstrated in Table 15. The technological devices were grouped under three main types of technology.

Table 15. Distribution of works included in the meta-synthesis according to the technological devices used

Technological Devices	**Study**	**Frequency**
VR Headset	A1, A3, A6, A7, A9, A11, A13, A14, A15, A16, A17, A22, A24	13
Computer	A5, A10, A12, A14, A18, A22, A39, A40	8
Smartphone	A8, A9, A11, A19, A20, A21, A22	7

4.1.10 Distribution of the included studies according to their findings

When the data gathered from the studies were examined, certain themes were identified to classify the findings. In accordance with the research questions of this meta-synthesis, the following themes were analysed further: (1) characteristics of virtual reality and metaverse environments in education, (2) learning gains from using virtual reality and metaverse platforms in ELT, (3) ways of using virtual reality and metaverse platforms in ELT. The challenges of using virtual reality and metaverse platforms in ELT were also presented at the end of this section.

4.1.10.1 Distribution of the included studies according to the characteristics of the virtual reality and metaverse platforms

29 out of 41 studies mentioned the characteristics of the virtual reality and metaverse platforms in their findings. It was found that 14 characteristics of the virtual reality and metaverse platforms were highlighted in the related studies.

To start with, the most frequent characteristic of the virtual reality and metaverse platforms is authenticity. The virtual reality and metaverse platforms were described as authentic in 18 studies (A11, A14, A15, A16, A18, A19, A21, A22, A24, A25, A26, A27, A28, A29, A30, A32, A34, A37). The authenticity of these platforms were mostly attributed to the real-like environments, natural conversations and interactions with native or foreign people on the platforms.

The second most frequent characteristic of the VR and MV platforms is that they are enjoyable. 12 studies indicated that the participants enjoyed their experiences in the virtual environments (A1, A6, A9, A10, A17, A19, A20, A24, A25, A26, A30, A36). Some of the reasons that increase the enjoyment while learning on these platforms are the use of avatars, feeling of involvement, visuals, informality and game-like features in virtual learning environments.

Third, in 12 studies, the virtual reality and metaverse platforms were found to be interactive (A11, A14, A18, A21, A25, A27, A28, A30, A33, A34, A36, A37). Interaction

with peers, teachers, native and foreign people, virtual characters, objects, images and environments were the commonly stated components of the interactive quality of these platforms.

Another characteristic of the virtual reality and metaverse platforms is that they are engaging. In nine studies VR and MV platforms were described as engaging (A9, A11, A13, A15, A23, A24, A27, A32, A36). These platforms were found to be engaging since they allowed active participation of the users, created a feeling of involvement and helped focus on the activities with visual aids.

In nine studies, the virtual reality and metaverse platforms were characterized as being immersive (A11, A14, A15, A19, A21, A22, A25, A28, A32). In these studies, it was discovered that the various stimuli in the virtual reality platforms, feeling of presence, visual tools, simulated scenarios avatars, transcending the limitations relating to space allowed for an immersive environment.

Six studies described the virtual reality and metaverse platforms as interesting (A5, A10, A13, A20, A28, A30). This finding was based on participants' opinions or the literature reviewed for the study. In the studies coded A5, A10, A13 and A20, the participants stated that they found the use of virtual reality interesting. In the studies coded A28 and A30, the use of metaverse in foreign language learning was examined in a qualitative way. Since the data was collected by means of literature review, they cited other studies that had identified metaverse platforms as interesting.

The use of virtual reality and metaverse platforms was also found to be easy. Five studies indicated that these platforms were easy to use (A5, A6, A22, A27, A35). The participants used a standalone head-mounted display (HMD) in the A6-coded study, and mobile-rendered HMDs were used in the A22-coded study. In both cases, the participants found VR systems easy to use. In the study coded A35, there was not a treatment. The participants answered a survey about their experiences and perceptions of metaverse, and the results showed that they did not have any difficulties while using the metaverse platforms.

Another characteristic of the virtual reality and metaverse platforms is that they are adaptable (A23, A26, A30, A36). In the studies coded A23, A26 and A30, the data was collected by reviewing the literature showed that the use of virtual reality and metaverse platforms can be adapted to different learning contexts and different needs of the learners. In the A36-coded study, it was found that the Metaverse was compatible with various fields levels of education.

Virtual reality and metaverse platforms were also found to be egalitarian in three studies (A33, A36, A37). All these studies inquired the use of the Metaverse in education. The studies coded A33 and A37 revealed that metaverse platforms could enable students all over the world to be involved in the learning environments regardless of spatial restrictions. The A36-coded study found that using metaverse platforms allowed users to exceed the monetary and time limits as well as removing the spatial restrictions.

In the findings of the studies A24 and A30, the contemporary feature of the virtual reality and metaverse platforms was mentioned. The researchers in the A24-coded study conducted an interview with five EFL teachers, and one of the interview questions asked if they would utilize virtual reality in their teaching and if they would advise other teachers to use it. One of the answers emphasized that virtual reality could be used and be advised to others because it supported a modern style of learning.

In two studies (A30, A35), metaverse platforms were found to be relatable to today's learners. The A30-coded study revealed that the Metaverse was compatible with the expectations of both university level and younger students. In the study coded A35, the participants were fifth and sixth grade elementary school students, and it was found that using the Metaverse was already a part of the students' lives.

Some other characteristics of the virtual reality and metaverse platforms found in the included studies were their being useful (A24), creative and artistic (A25), and transparent (A28). In the A24-coded study, when the participant teachers were asked about their previous experiences with VR platforms, almost all the participants agreed that using

virtual reality in language learning was useful. One of the questions explored in the study coded A25 was the participant teachers' perceptions of the virtual reality platform Second Life. All of the teachers answered that they had positive attitudes towards the Second Life as an educational tool, and one of the reasons for this was the creative and artistic elements in the platform. Last of all, the transparency was stated to be another characteristic of the metaverse platforms in the study coded A28. Nearly all the information and the things users do can be recorded; therefore, metaverse platforms can provide a transparent educational environment.

Based on the information mentioned above, Table 16 shows the characteristics of virtual reality and metaverse platforms according to the findings of the included studies. 14 characteristics of virtual reality and metaverse platforms can be found in the table.

Table 16. Distribution of works included in the meta-synthesis according to the characteristics of the virtual reality and metaverse platforms

Findings/ Characteristics	Study	Frequency
Authentic	A11, A14, A15, A16, A18, A19, A21, A22, A24, A25, A26, A27, A28, A29, A30, A32, A34, A37	18
Enjoyable	A1, A6, A9, A10, A17, A19, A20, A24, A25, A26, A30, A36	12
Interactive	A11, A14, A18, A21, A25, A27, A28, A30, A33, A34, A36, A37,	12
Engaging	A9, A11, A13, A15, A23, A24, A27, A32, A36	9
Immersive	A11, A14, A15, A19, A21, A22, A25, A28, A32	9
Interesting	A5, A10, A13, A20, A28, A30	6
Easy to use	A5, A6, A22, A27, A35	5
Adaptable	A23, A26, A30, A36	4
Egalitarian	A33, A36, A37	3
Contemporary	A24, A30,	2
Relatable to today's learners	A30, A35	2
Useful	A24	1
Creative and artistic	A25	1
Transparent	A28	1

4.1.10.2 Distribution of the works included in the meta-synthesis according to the learning gains from using the virtual reality and metaverse platforms

This part shows the learning gains from using virtual reality and metaverse platforms in English language teaching, which were concluded from the findings of the included studies. When the learning gains were examined, it was seen that they can be grouped under five main categories: cognitive, affective and social learning gains.

The most common positive cognitive learning gains from VR and MV on learners were found to be better retention time (f=7) and enhancement of learner autonomy (f=7). Improvement of problem-solving skills was encountered in four studies as another cognitive learning gains from VR and MV on learners (A29, A30, A33, A34). This was followed by the promotion of critical thinking skills, which was found in three studies (A26, A30, A34). Two studies (A22, A28) revealed that the use of virtual reality and metaverse platforms helped develop learners' higher-order thinking skills in Bloom's taxonomy. Two other studies (A33, A34) shared that using VR and MV for educational purposes improved creative thinking. It was also found that the use of virtual environments aided in visualizing the subjects being learned (A13, A27). The A28 coded study showed the use of metaverse platforms helped develop critical reflection skills. In addition, in the study coded A7, it was observed that immersive VR environments were highly effective in the improvement of learners' cognitive skills.

When the included studies were examined, affective learning gains from using virtual reality and metaverse platforms were found to be the improvement in motivation, reduction in foreign language anxiety and positive effects of avatars. Twelve studies showed that VR and MV platforms improved motivation (A10, A11, A18, A24, A25, A26, A28, A30, A32, A34, A36 A37). Eight studies found out that the use of VR and MV platforms reduced English learners' speaking anxiety (A1, A2, A17, A18, A24, A28, A30, A32). Positive effects of avatars were mentioned in seven studies (A11, A17, A23, A28, A29, A30, A37).

Four main social learning gains were encountered in the included studies. Eight studies revealed that the integration of VR and MV platforms into English language teaching improved learners' collaborative and cooperative skills (A13, A18, A23, A28, A29, A30, A34, A37). In six studies, it was stated that virtual environments helped learners improve their intercultural communication (A16, A25, A26, A30, A36, A37). In four studies (A12, A13, A26, A34), findings that referred to scaffolding were encountered. In three studies (A18, A30, A34), it was seen that virtual reality and metaverse platforms supported social constructivism.

Table 17. Learning gains from using virtual reality and metaverse platforms

Categories	Learning Gains	Study	Frequency
Cognitive	Better retention	A9, A10, A11, A22, A24, A26, A30	7
	Encouraging student autonomy	A18, A12, A26, A28, A33, A34, A37	7
	Problem-solving skills	A29, A30, A33, A34	4
	Critical thinking	A26, A30, A34	3
	Higher level of thinking ability	A22, A28	2
	Improving creativity	A33, A34	2
	Visualization	A13, A27	2
Affective	Improving motivation	A10, A11, A18, A24, A25, A26, A28, A30, A32, A34, A36 A37	12
	Reducing English speaking anxiety	A1, A2, A17, A18, A24, A28, A30, A32	8
	Positive effects of avatars	A11, A17, A23, A28, A29, A30, A37	7
Social	Collaboration & cooperation	A13, A18, A23, A28, A29, A30, A34, A37	8
	Improvement in intercultural communication	A16, A25, A26, A30, A36, A37	6
	Scaffolding	A12, A13, A26, A34	4
	Enhancement of the social constructivist skills	A18, A30, A34	3

4.1.10.3 Distribution of works included in the meta-synthesis according to their ways of using virtual reality and metaverse platforms in the classroom

This part shows how virtual reality and metaverse platforms were integrated in English language classrooms in the included studies. 21 out of 41 studies were demonstrated in the table since the other 20 studies did not carry out an intervention process. The related findings were organized regarding the basic components usually found in a lesson plan. First, the lesson objectives in the intervention of the studies were shared. This was

followed by the procedures of the lessons. Third, the materials used for the integration of the virtual reality and metaverse platforms were demonstrated. Then the duration of the lessons or activities were mentioned. Last of all, the types of assessment preferred were examined.

4.1.10.3.1 The lesson objectives for the integration of virtual reality and metaverse platforms in the classroom

21 out of 41 included studies conducted experiment lessons. The lesson objectives in these related studies were examined to find out the common lesson objectives showed that lessons in the most studies aimed to help students develop their speaking skill in English.

In seven studies, the lesson objective was to enable students to have a conversation in English in the VR environment (A1, A14, A15, A16, A17, A18, A22). In the A1-coded study, the participant students were provided with scenarios on the Immerse VR platform and asked to make conversations with the people in the virtual environment. In the study coded A14, the teacher gave specific speaking tasks to the participant students depending on their future professions. The students were asked to have a conversation with a native speaker on the ImmerseMe virtual platform. In the study coded A15, the participant students completed speaking tasks such as making a reservation, buying a present or ordering food. The learning objective in the A16-coded study was to provide students with speaking practice in the virtual reality platform vTime. The students could do speaking practice as many times as they wanted, but they were required to record one of their practice. In the study coded A17, students from two different countries worked together and completed the speaking tasks in pairs on the virtual platform named Bigscreen. In the A18-coded study, the participant students made a fieldtrip in the virtual environment working with a native English speaker. In the A22-coded study, each student was assigned a communicative task that required them to make conversations with the virtual characters in certain scenarios on the Mondly VR platform.

The learning objective in the other studies were more specific to be grouped together; therefore, they were listed separately in the table. To start with, the A2-coded study aimed to have students give an oral presentation in English on the Ovation VR platform. The studies coded A3 and A4 aimed to develop students' pronunciations skills. However, the study coded A3 focused on some vowels sounds while the A4-coded study required students to pronounce four consonant sounds correctly. In the study coded A5, the main objective was to enable students to use the second conditional by carrying out a questionnaire among the people in the VR environment. The study coded A6 aimed to have students identify the word order in English sentences. The A7-coded study aimed to develop the participant students' reading and writing skills. The reading activities took place in the VR environment and the writing part was completed after the VR experience. The learning objective of the A8-coded study was to enable students to write a process paragraph with the help of the activities in the VR environment. In the study coded A9, the teacher aimed to have students write a short paragraph based on a VR video they watched. The participant students in the study coded A10 were expected to be able to write an essay about a place from a Funds of Knowledge perspective after they took a virtual trip on Google Earth in order to gain the knowledge about the essay topic.

The learning objective of the A11-coded study was to enable students to learn 25 target vocabulary by completing some communicative tasks in the VR environment. The A12-coded study aimed to teach participant students 20 target vocabulary for "airport" through the activities in a virtual airport. The participant students in the study coded A13 were expected to identify new vocabulary for "things at home" by watching 360° videos. The learning objective of the study coded A19 was to enable students to describe a virtual location to their partners. Last of all, in the A21-coded study, students were asked to produce VR content that introduced the cultural significance of three local sites in Taiwan.

Based on the information above, Table 18 demonstrates the lesson objectives in the interventions of the included studies.

Table 18. The lesson objectives for the integration of virtual reality and metaverse platforms in the classroom

Findings/ Lesson Objectives	**Study**	**Frequency**
Students will make a conversation in English in the VR environment	A1, A14, A15, A16, A17, A18, A22	7
Students will give an oral presentation in front of audiences in VR environment	A2	1
Students will be able to pronounce the vowels sounds /ɪ/, /i/, /ʊ/ and /u/	A3	1
Students will be able to pronounce the consonant sounds /dʒ/, /ʧ/, /ð/ and /θ/	A4	1
Students will be able to use the second conditional by carrying out a questionnaire among the people in the VR environment	A5	1
Students will identify the word order in five sentences by putting the words in the correct places in the VR environment	A6	1
Students will show their understanding of the reading passages about planets in the VR environment	A7	1
Students will perform a writing task about the "planets" after their VR experience	A7	1
Students will be able to write a process paragraph after completing the activities in the VR environment	A8	1
Students will write a short paragraph after watching a VR video	A9	1
Students will be able to write an essay to describe a place from a Funds of Knowledge perspective to after taking a virtual trip	A10	1
Students will be able to recognise and use the target vocabulary by completing the tasks in the VR environment	A11	1
Students will be able to identify new vocabulary for "airport" by completing the activities in a virtual airport	A12	1
Students will be able to identify new vocabulary for "things at home" by watching 360° videos	A13	1
Students will perform a speaking task in pairs by describing a virtual location to their partners	A19	1
Students will be able to produce VR content that introduces the cultural significance of local sites	A21	1

4.1.10.3.2. The lesson procedures for the integration of virtual reality and metaverse platforms in the classroom

When the lesson procedures in the included studies were examined, it was seen that 21 out of 41 studies followed certain procedures during the interventions. The lesson procedures in the related studies showed that each lesson had its own specific procedure.

In the A1-coded study, the ready-made lesson plans found on the virtual reality platform, the Immerse, were used. Therefore, the standard procedures for the lessons on the platform were followed. While the procedures were not explained in detail, the lessons on the platform were described as conversation lessons. The participants were provided with the scenarios suitable for their classes and levels by the teacher. The VR tasks were not performed in class, and the participants were free to conduct the tasks at a time and to work with an instructor they chose.

The participants in the A2-coded study were required to make an oral presentation in VR environment and give feedback for their peers' presentations. Therefore, the lessons started with two training sessions on how to give feedback. Then the students practiced giving presentations on the virtual reality platform OVATION VR and in front of virtual audience. Lastly, the students gave feedback for each other's work.

In the A3-coded study, each lesson started with the introduction of new topics by the teacher. After that, the students played a game in the virtual environment. During the game, the students were encountered with pronunciation instructions through various themes such as animals, jobs and foods. The game was comprised of 10 episodes and it required students to make conversations in different situations, for example ordering food and clothes shopping.

Similar to the A3-coded study, the A4-coded study focused on teaching pronunciation. Each lesson started with pronunciation instruction. Then the students played a VR game which aimed to teach four consonant sounds, and the game was mostly managed by a humanlike robot that acted as the teacher. The recordings of the students' pronunciation were saved for the assessment.

In the A5-coded study, a four-lesson intervention was planned. In the first lesson, the teacher introduced the grammar topic via a digital slideshow. Then the students practiced the grammar topic via online activities and some handouts, which involved multiple-choice questions, translation, and matching activities. In the second lesson, the students completed two online activities. The third lesson also started with the completion of two online activities on the grammar topic, and then the students entered the VR platform to chat with the people there by using the target grammar structure. During the last lesson, the students first answered three online activities. After that, the students carried out a questionnaire that included the related grammar topic the with people on the virtual platform.

The study coded A6 aimed to teach word order in English. The lesson in this study started with the students' entrance to the virtual environment where they could find the words from a scrambled sentence. The activity here required the students to take the words and put them in the correct order and make a correct sentence. When the students completed a sentence, the system checked it and shared a picture and sound according to the result. The students repeated the same process during the activity. In the end, the students were given a cumulative feedback by the system automatically.

As in the A6-coded study, the lesson in the study coded A7 started in the virtual environment. In the beginning, the students entered the virtual platform where they found themselves in a spacecraft. Here, they interacted with the objects and could fly to different planets. At the same time, they read some short texts about the planets they were exploring. After completing the VR task, the students performed a writing activity that required them to use the information they gained from the reading texts in the virtual environment.

In the study coded A8, the students were expected to write a process paragraph after completing the activities in the VR environment. First, the writing process was discussed and taught. Secondly, the students brainstormed some ideas as a prewriting stage. Then the students played with the VR app, which helped them understand the process of

different activities like making a milkshake. After the VR activities, the students wrote their first draft. Then they were given some time for revising their paragraphs. Finally, they wrote their final drafts and shared them with their peers. The lesson finished with peer feedback and consolidation.

In the A9-coded study, students watched a VR video individually by wearing VR goggles and sitting on rotating chairs. Right after watching the VR video, the students wrote a paragraph about the topic in the video by sharing all the details they remembered.

The study coded A10 aimed to teach students to write an essay from a Funds of Knowledge perspective. The lesson included a pre-writing activity, VR activity, essay writing and post-writing activity. Before using the VR platform, the students were asked to gather information from their parents and friends about the writing topics, which were about their three favourite places. Then the students took virtual trips via Google Earth and travelled around these places. They wrote an essay describing these places. Finally, they shared their essay with their peers, parents and teacher via Gmail or Google Documents.

In the A11-coded study, the students were first taught how to use VR headsets and the virtual reality platform the Mondly VR. Then the students were assigned with VR tasks individually. The ready-made scenarios and the tasks on the Mondly VR platform were used for the lessons in the study. The students were expected to complete the communicative tasks in the virtual environment by getting around the virtual places and talking to virtual characters.

In the A12-coded study, there were four experimental conditions. The same procedure was followed in all of the conditions. In two of these, the individual condition and the paired condition, the students used a VR platform to learn new vocabulary. In both conditions, the procedure started with the teacher's introduction of the target words via pictorial flashcards. Then the students completed three tasks. First, a worksheet that contained the map of the airport in the VR environment were given to the students. They were asked to match the airport facilities with target words. Secondly, the students worked

on the sounds of target words. They clicked an icon next to the words at the VR airport, listened to the words and repeated them a few times. Lastly, students were given a task, in which they needed to explore the VR airport, find the bombs, and explode the bombs by labelling their names correctly.

In the study coded A13, first, the previous lesson about the things at home was revised by using a song as a pre-activity. After that, The teacher showed the students how to use the VR goggles. Then the students answered some questions about the topic. Following that, the students watched a 360° video about the topic of things at home. The teacher asked some questions about the video and checked the students' understanding of the topic. After that, the students did a group work in which they needed to write the names of the things at the home they watched in the video.

The lesson in the A14-coded study started with the introduction of the VR vocabulary and a trial of the VR platform ImmerseMe. Then each student was assigned a certain speaking task according to their future professions. The students entered the virtual reality platform one by one and completed the assigned speaking tasks. The ImmerseMe VR platform provided the students with immediate feedback automatically.

The ImmerseMe VR platform was also used in the study coded A15. The students were put into pairs by the teacher. Each pair used the virtual reality platform after class time. The students completed four tasks on the virtual platform, which required them to make conversations in different situations like shopping. Every student's experience in the virtual reality platform was recorded as a video in order to be examined later.

In the study coded A16, the students were first introduced the key concepts and skills for the tasks that required them to introduce themselves, make small talks and have group discussions. Then the students practiced the individual, pair and group tasks on the VR platform. The students recorded one time of their practice of each task and posted their videos on YouTube. After that, the students got feedback from their peers and the teacher. Later, the students entered the virtual reality platform the vTime. They had conversations with the people on the virtual platform by using the knowledge they gained in the first

stage of the lesson. They interacted with as many people as they wanted, but they were required to record one of their interactions. Accordingly, the students saved a video recording of one of their interactions and posted it on YouTube. Then the students gave a short verbal report by reflecting on their VR experience.

The study coded A17 aimed to provide the students with speaking practice in English in VR environment. Two groups of university students from two different countries were grouped in pairs in order to complete some VR tasks. The pairs had virtual meetings at times they arranged after class time. The students were provided with a guideline to carry out the VR tasks. First, the students introduced themselves and shared what they knew about each other's culture. Then the students watched a 360° film and discussed importance of cultures. Last of all, every pair of students performed different tasks such as a virtual city tour, Pictionary game or cultural exchange.

The study coded A18 also aimed to provide the students with speaking practice in English in VR environment. The Second Life was used as a virtual reality platform. The students entered the Second Life and used a foreign language learning setting called Virtlantis. Here, the students met native English speakers and went on a virtual trip together. As the assigned task required, they tried to find some information about a certain place in Virtlantis.

In the study coded A19, the students were first grouped in pairs for a speaking activity. Then one student observed an assigned location in the virtual environment and described it to the other student. The student, who could not see the location, asked questions to receive information about the location in two minutes. After that, the students switched roles and repeated the same activity.

In the A21-coded study, the intervention lessons lasted for 18 weeks. During the first 11 weeks, the students were taught how to use the Edu Venture VR application in order to create VR content. Following this period, from Week 12 to Week 15, the students produced VR content, which included interactive elements, audio and panoramic views.

Finally, in the last three weeks, the students checked their peers' works on the virtual reality application and provided feedback for each other.

In the A22-coded study, the students were first given a short introduction about the task. Then the students were trained on how to use the VR device, and they also tried using various VR platforms to get accustomed to them. After that, each student was assigned an individual task on the virtual reality platform Mondly. The students completed the communicative tasks in the scenarios on the Mondly platform by getting around the virtual places, viewing the objects and talking to virtual characters.

Table 19. The lesson procedures for the integration of virtual reality and metaverse platforms in the classroom

Findings/ Procedure	**Study**	**Frequency**
The ready-made lesson plans found on the virtual reality platform were used. The standard procedures for the lessons on the platform were followed. The participants were provided with the scenarios suitable for their classes and levels by the teacher. The participants conducted the tasks at a time they chose.	A1	1
The lessons started with two training sessions on how to give feedback. Then the students practiced giving presentations on the virtual reality platform OVATION VR in front of virtual audience. Lastly, the students gave feedback for each other's work.	A2	1
New topics were introduced by the teacher. After that, the students played a game in the virtual environment. During the game, the students were encountered with pronunciation instructions through various themes. The game required students to make conversations in different situations, for example ordering food and clothes shopping.	A3	1
Each lesson started with pronunciation instruction. Then the students played a VR game to learn four consonant sounds. The game was mostly managed by a humanlike robot. The recordings of the students' pronunciation were saved for the assessment.	A4	1
In the first lesson, the grammar topic was introduced by the teacher via a digital slideshow. In the second lesson, the students practiced the grammar topic via online activities and handouts. In the third lesson, after completing two online grammar activities, the students entered the VR platform to chat with the people using the target grammar structure. In the last lesson, after completing some online grammar activities, the students carried out a questionnaire with people on the virtual platform.	A5	1

The students entered the virtual environment, where they found the words from a scrambled sentence. The students took the words and put them in the correct order. The students repeated the same process for four other sentences. In the end, the students were given feedback by the VR system automatically.	A6	1
The students entered the virtual environment and found themselves in a spacecraft. They interacted with the objects and could fly to different planets. They read short texts about the planets they were exploring. After completing the VR activities, the students answered some writing questions on a worksheet that also tested their reading comprehension.	A7	1
First, the writing process was discussed and taught. Secondly, the students brainstormed some ideas as a prewriting stage. Then the students played with the VR app, which helped them understand the process of different activities like making a milkshake. After the VR activities, the students wrote their first draft. Then they were given some time for revising their paragraphs. Finally, they wrote their final drafts and shared them with their peers. The lesson finished with peer feedback and consolidation.	A8	1
The students watched a VR video individually by wearing VR goggles and sitting on rotating chairs. Right after watching the VR video, the students wrote a paragraph about the topic in the video by sharing all the details they remembered.	A9	1
Before using the VR platform, the students gathered information from their parents and friends about the writing topics related to places. Then the students took virtual trips to these places via Google Earth and wrote an essay describing these places. Finally, they shared their essay with their peers, parents and teacher via Gmail or Google Documents.	A10	1
The ready-made scenarios and tasks on the VR platform were used for the lessons. The students were assigned with VR tasks individually. The students completed the communicative tasks in the virtual environment by getting around the virtual places and talking to virtual characters.	A11	1
The teacher introduced the target words via pictorial flashcards. First, the students answered a worksheet that contained the map of the airport in the VR environment by matching the airport facilities with target words. Secondly, the students worked on the sounds of target words in the VR environment. Lastly, the students explored the VR airport, found the bombs, and exploded the bombs by labelling their names correctly.	A12	1
First, the previous lesson about the things at home was revised by using a song as a pre-activity. After that, The teacher showed the students how to use the VR goggles. Then the students answered some questions about the topic. Following that, the students watched a 360° video about the topic of things at home. The teacher asked some questions about the video and checked the students' understanding of the topic. After that, the students did a group work and wrote the names of the things at the home in the video.	A13	1
The lesson started with the introduction of the VR vocabulary and a trial of the VR platform ImmerseMe. Then each student was assigned a certain speaking task according to their future professions. The students entered the virtual reality platform one by one, completed the assigned speaking tasks and received immediate feedback automatically on the VR platform.	A14	1

The students were put into pairs by the teacher. Each pair used the virtual reality platform after class time. The students completed four tasks on the virtual platform, which required them to make conversations in different situations like shopping. Every student's experience in the virtual reality platform was recorded as a video in order to be examined later.	A15	1
The students were first introduced the key concepts and skills for the tasks that required them to introduce themselves, make small talks and have group discussions. Then the students practiced the individual, pair and group tasks on the VR platform. They recorded one time of their practice of each task and posted their videos on YouTube. Later, the students entered the virtual reality platform the vTime. They had conversations with the people on the platform and recorded one of their interactions. They posted it on YouTube. Then the students gave a short verbal report by reflecting on their VR experience.	A16	1
Two groups of university students from two different countries were grouped in pairs. They were provided with a guideline to carry out the VR tasks. First, the students had virtual meetings after class time. They introduced themselves and shared what they knew about each other's culture. Then the students watched a 360° film and discussed importance of cultures. Last of all, every pair of students performed different tasks such as a virtual city tour, Pictionary game or cultural exchange.	A17	1
The students entered the Second Life virtual reality platform and used a foreign language learning setting called Virtlantis. The students met native English speakers and went on a virtual trip together. As the assigned task required, they tried to find some information about a certain place in Virtlantis.	A18	1
The students were first grouped in pairs for a speaking activity. Then one student observed an assigned location in the virtual environment and described it to his/her partner. The student, who could not see the location, asked questions to receive information about the location in two minutes. After that, the students switched roles and repeated the same activity.	A19	1
The intervention lessons lasted for 18 weeks. During the first 11 weeks, the students were taught how to use the VR platform in order to create VR content. Following this period, from Week 12 to Week 15, the students produced VR content, which included interactive elements, audio and panoramic views. In the last three weeks, the students checked their peers' works on the virtual reality application and provided feedback for each other.	A21	1
The students were first given a short introduction about the task. Then the students were trained on how to use the VR device, and they tried using various VR platforms to get accustomed to them. After that, each student was assigned an individual task on the virtual reality platform. The students completed the communicative tasks in the scenarios on the platform by getting around the virtual places, viewing the objects and talking to virtual characters.	A22	1

4.1.10.3.3 The lesson materials for the integration of virtual reality and metaverse platforms in the classroom

In this part, the learning materials that were used in the experiment lessons conducted in the 21 studies were investigated. It was found that while 11 studies used VR and MV platforms only, 10 studies utilized different materials during their treatment processes (A5, A7, A9, A10, A11, A12, A13, A15, A16, A21).

One of the most common types of materials used together with VR or MV platforms was worksheet (A5, A7, A12). In the study coded A5, teaching of a grammar topic via VR and online activities was the main focus. The treatment process continued for four lesson hours, and some grammar worksheets were used in the first two lessons. The worksheets included controlled activities such as sentence completion and writing sentences with the given words. In the A7-coded study, a worksheet was utilized after the VR tasks. Although the details were not shared in detail, the worksheet involved a writing task related to the information gained in the VR environment. The study coded A12 made use of three different worksheets. The first worksheet showed one of the floors of the airport that students visited in the VR environment. The students needed to find the bombs in the virtual airport and match them with the words on the worksheet. The second worksheet instructed students to listen to the pronunciation of the words and repeat them. The last worksheet required students to find some objects in the virtual airport and match their pictures with the correct words.

In the studies coded A11, A13 and A15, tests were employed to complement VR learning. The A11-coded study utilized vocabulary tests before and after the VR tasks were completed. The vocabulary test that was given before the VR experience was composed of two parts including a word definition test and a cloze test on the target words. The tests applied after the VR tasks had the same content with the test given before the VR use. The lessons conducted in the study A13 also utilized vocabulary tests. These tests were given after the VR treatment in two separate lessons to evaluate the students' vocabulary comprehension. In the study coded A15, a test that was developed by the researcher to assess the communicative ability of students. The test involved a 10-question listening part and another part that tested dialogic interaction.

As mentioned before, the study coded A5 made use of some grammar worksheets in the treatment lessons. Another material used in the treatment process of this study was a multimedia presentation given by the teacher. It was on the related grammar topic, and it was presented at the beginning of the first treatment lesson. Additionally, some online activities were utilized in the A5-coded study. The teacher used many online activities that involved matching, multiple-choice, sentence completion and translation exercises, which were answered by students before doing the VR tasks. In the study coded A12, picture cards and word cards were used together with the three worksheets mentioned above. These cards assisted students to complete one of the worksheets, the map-matching worksheet. Last of all, in the A13-coded study, a song was used to revise the previous lesson about the things at home.

Table 20. The Lesson Materials for the Integration of Virtual Reality and Metaverse Platforms in the Classroom

Findings/ Materials	**Study**	**Frequency**
worksheets	A5, A7, A12	3
tests	A11, A13, A15	3
multimedia presentation	A5	1
online activities	A5	1
picture cards and word cards	A12	1
a song	A13	1

4.1.10.3.4. The duration of the activities for the integration of virtual reality and metaverse platforms in the classroom

In the study coded A1, lesson duration was determined according to the readymade lesson plans on the Immerse VR platform, and the students were required to complete the VR lessons outside of the classroom. Students first attended three one-hour lessons for a

month, and then they had five thirty-minute lessons in the next month. In the A18-coded study, students were given 60 minutes to complete the tasks on the VR platform. The VR activity required students to meet and communicate with native speakers of English on the VR platform Second Life.

The study A12 explored the effects of VR use on vocabulary learning in a four-week study. Two 40-minute class sessions were allocated for the treatment, and the participants carried out three tasks on the VR platform. The tasks took 20, 12 and eight minutes respectively. In the studies coded A11 and A22, the students were assigned with some readymade communicative tasks on the VR platform Mondly. The tasks in the VR environment lasted about 25 or 35 minutes. As mentioned above, the study coded A1 also had thirty-minute VR tasks.

In the A7-coded study, every student spent 15 minutes on the VR platform in order to read some texts about planets. Then they completed a writing task in the real classroom environment. The study coded A15 lasted for four weeks, and students were required to complete four communicative VR tasks during this period. The researchers allocated 15 minutes for each VR task. In the study coded A8, the effect of VR use on writing skill was investigated. The students took 2-hour sessions twice a week for six weeks. 10 minutes were allocated for the VR tasks in each session. After completing the VR task, the students continued with the writing process. In the treatment process of the A9-coded study, the students watched two three-dimensional videos. The overall duration of the two VR videos was five minutes. After that, the students wrote a short paragraph on what they watched in the video in 15 minutes.

Table 21. The Duration of the Lessons or Activities for the Integration of Virtual Reality and Metaverse Platforms in the Classroom

Findings/ Duration	Study	Frequency
60 minutes	A1, A18	2
40 minutes	A12	1
25–35 minutes	A1, A11, A22	3
15 minutes	A7, A15	2
10 minutes	A8	1
5 minutes	A9	1

4.1.10.3.5 The types of assessment for the integration of virtual reality and metaverse platforms in the classroom

This part summarizes the types of assessment in the experiment lessons conducted in the 21 out of 41 included studies. The types of assessment in the related studies were technology-mediated feedback, teacher feedback, peer feedback, students' self-reflection and tests.

To start with, technology-mediated feedback was the most common type of assessment, and they were used in seven studies (A1, A3, A4, A6, A11, A14, A22). While the studies coded A1, A3 and A4 integrated various technological tools for assessment, the studies coded A6, A11, A14 and A22 used the assessment systems that already exist on the virtual reality platforms.

In the study coded A1, a computer-based oral proficiency interview was conducted. The studies coded A3 and A4 aimed to explore the effectiveness of VR use on L2 pronunciation. Therefore, the Speech Ace software was used to assess the students' performance. The Speech Ace software checked the correctness of the target sounds being learned and gave feedback.

In the A6-coded study, the students worked on English sentence word order. The students' answers were checked by the VR system automatically. The students got both immediate feedback after answering each question and a cumulative feedback when they finished the activity.

In the study coded A11 and A22, the Mondly VR platform was used. Since the platform had its own lesson plans and assessment system, the students were provided with the feedback automatically. The system checked the correctness of the students' speaking and gave feedback accordingly. If the students mispronounced a word or gave a wrong answer, the system gave clues to help the students to continue. If the students' answers were correct, the system showed a check mark in green colour.

In the study coded A14, the ImmerseMe platform was utilized, and it provided immediate feedback for the students. The students needed to speak and pronounce the words correctly to continue the dialogues with the virtual native speakers. If the students' answers were wrong, the platform helped them. When the answers were correct, the system showed some visuals to praise students.

The assessment in the studies coded A5, A9, A10, A12, A13, A15 and A18 were provided by teachers. The lessons in the A5-coded study involved some online activities, handouts and a VR task. While the online activities and handouts were assessed by the teacher, the students' performance in the VR environment was not specifically assessed.

In the study coded A9, the effects of using VR on writing performance was examined. After the students watched VR videos, they wrote a paragraph related to the content of the videos. The students' papers were graded by two raters. The study coded A10 was also on writing performance. The students wrote three essays and shared their essays on an online platform with their teacher. The essays were assessed by both the lead author of the study and the English language teacher.

The practices in the study coded A12 required the students to explore the VR environment and answer the questions on some worksheets. The students' answers were checked by

the teacher. In the A13-coded study, the VR-related activity required the students to write the things they had seen in the VR video. The students' answers for this task were checked by the teacher. In addition, a multiple-choice vocabulary test for the target words given at the end of the lesson was also graded by the teacher.

In the study coded A15, there were two tests, and these tests were graded by the teacher. In addition, for the assessment of the VR task, the students' performance in the virtual environment was recorded and shared with the teacher to be examined later. The VR task in the A18- coded study was also checked by the teacher. The students went on a virtual quest and communicated with a native English speaker on the VR platform. The students' performances were recorded and examined by the teacher.

In four studies (A2, A8, A16, A21), the students were provided with peer feedback. In the study coded A2, the researchers explored if the use of virtual reality and peer feedback together had an impact on students' foreign language speaking anxiety. In the study, the students were given a peer feedback training before the intervention. The A8-coded study focused on the writing performance of the participant students. The students were required to write a process paragraph, share their works with the peers in their groups, and make comments about each other's paragraphs.

In the study coded A16, the participants were assigned with some communicative tasks in VR environment in two phases. First, the students worked with their peers, recorded one of their speaking practices and uploaded their work on the YouTube platform to receive feedback from their peers. Then, in the second phase, they had conversations with different people in the VR platform and followed the same procedure in the phase one. They recorded and shared one of their conversations on YouTube. The A21-coded study examined the effects of making VR content on EFL students' intracultural learning. The students were first taught how to create VR content, and then they individually prepared their work that introduced a local site in their country. Finally, they shared their work on the VR platform and assessed each other's work.

The studies coded A16, A17 and A18 involved student reflection. In the A16-coded study, in addition to the peer feedback students received, every student presented a short oral reflection after they had completed their tasks on the VR platform. In the study coded A17, students were asked to keep a reflective journal so that they could review their learning during the activities they participated in the VR platform. In the A18-coded study, the researcher only mentioned that students' reflections on their verbal communication were collected.

In three studies (A7, A13), tests were used as an assessment tool. In the study A7, an achievement test that aimed to assess reading and writing skills was prepared by the researchers, and a pre-test / post-test model was employed. The A13-coded study investigated the use of VR for vocabulary learning. The teacher in the study gave students multiple choice tests to assess their vocabulary learning after their VR use.

Last of all, the studies coded A1 and A19 did not specify any assessment types. This is possibly because these studies aimed to explore students' perceptions on VR use for speaking activities and did not necessitate to assess students' English proficiency in speaking.

Table 22. The types of assessment for the integration of virtual reality and metaverse platforms in the classroom

Findings/ Assessment	**Study**	**Frequency**
Technology-mediated feedback	A1, A3, A4, A6, A11, A14, A22	7
Teacher feedback	A5, A9, A10, A12, A13, A15, A18	7
Peer feedback	A2, A8, A16, A21	4
Student reflection	A16, A17, A18	3
Tests	A1, A7, A13	3
Unspecified	A19	1

4.1.10.4 Distribution of works included in the meta-synthesis according to the challenges of using the virtual reality and metaverse platforms

Some of the studies included in this meta-synthesis mentioned the challenges faced by the participants. Table 23 illustrates these challenges encountered in the findings of the studies. Most commonly faced problems were related to some pedagogical issues. Accordingly, five studies shared that the use of virtual reality or metaverse platforms in education caused or may cause certain pedagogical problems (A13, A24, A28, A33, A36). The study coded A13 named big student numbers and students' proficiency levels as some challenges of using virtual reality platforms, which requires teachers' extra effort to manage the classrooms. The pedagogical problem mentioned in the A24-coded study was the difficulties in the classroom management during the application of virtual reality activities. In the studies coded A28 and A33, it was stated that lack of a detailed operation plan for using metaverse platforms in education may cause problems since it would require a lot of time to prepare for lessons. Last of all, the study coded A36 stated that time management of students was difficult in the virtual reality platform since they may not know what to do in this new environment. Another challenge found in the A36-coded study was the existing design of the digital resources on metaverse platforms. Since the Metaverse was not created only for educational use, it necessitated teachers to devise their own ways to use it.

Unfamiliarity with the virtual reality and metaverse platforms was mentioned as another challenge of using these technologies in education (A19, A25, A26, A28, A36). In the A19-coded study, the technical problems faced by the participants during the first treatment were attributed to the unfamiliarity with the virtual reality as almost none of the participants had used virtual reality before. The A25-coded study explored the virtual reality platform Second Life, and the participants were EFL teachers. They stated that one of the weaknesses of virtual reality was students' need for practice before using in EFL activities. In the study coded A26, it was stated that some of the negative attitudes towards using virtual reality in English language learning were caused by the unfamiliarity with the virtual platforms. The need for prior practice in using virtual reality was one of the challenges mentioned in the A28-coded study. In the study, it was indicated that teachers' and/or learners' unfamiliarity with VR and MV platforms would hinder the progress of

the lesson. The study coded A36 also concluded that using metaverse platforms required much practice.

Four studies pointed out that using VR and MV platforms may create some technical problems (A19, A26, A28, A37). The studies coded A19 and A28 mentioned that technical problems may occur during the use of virtual reality platforms since the students are not familiar with this new technology. The A26-coded study found that the lack of facial and bodily expressions of the avatars on Second Life platform may be confusing for the students. The A37-coded study also concluded that integrating the Metaverse with the existing Learning Management Systems (LMS) and maintaining the sustainability of metaverse platforms were some other challenges of this technology.

Three studies showed that some virtual reality headset-related problems were faced during the use of immersive virtual reality and metaverse platforms (A9, A13, A37). In the A9-coded study, there were some complaints about the size and weight of the VR goggles. Some participants found the headsets heavy, or they said it did not fit them well. The study coded A13 mentioned that cheaper VR devices were more common in the educational since the quality VR headsets were high-cost; however, the cheaper devices may be uncomfortable or cause motion sickness. The A37-coded study concluded that the cost of virtual reality headsets was also a challenge. Since the implementation of the VR headsets would also require educational institutions to adapt their existing infrastructure and technical equipment to these new technologies, it would add up to the cost.

Some of the included studies (f=3) showed that there are some social issues to be considered before using virtual reality or metaverse platforms. The A31-coded study mentioned that the use of some Metaverse tools may cause a sense of separation, which makes individuals feel as a separate self from other people around and surrounding objects. The studies coded A34 and A37 claimed that using metaverse platforms in foreign language learning may create security problems. In the A34-coded study, it was stated that the use of the Metaverse for learning a foreign language may not be secure especially for young learners' and teenagers'. The A37-coded study concluded that

security of identity was important and must be considered in the Metaverse environment. According to the study A37, some other social challenges that may be faced in the Metaverse by language learners are digital violence, cyberbullying, polarization and populist politics.

In two studies, some health issues that may be caused by long-term use of virtual reality or metaverse platforms were mentioned (A9, A13). In the A9-coded study, some participants said that the virtual environment may cause dizziness when used for a long time or during some activities, for example, one that required learners to be a high place in virtual reality. The participants also affirmed that long-time use of virtual reality headsets may cause eye strain. In the study coded A13, some of the participants complained that they suffered from headaches due to the long-term exposure to the lens of VR headsets.

Another challenge in using virtual reality and metaverse platforms is the lack of academic studies on the integration of these technologies into foreign language classrooms (A36, A37). In the study coded A36, it was detected that most studies on the use of Metaverse in education were literature reviews or theoretical works, but there were not enough quantitative or qualitative studies. In addition, most studies on the metaverse in education were found to be about the Second Life platform. The study coded A37 also confirmed that the number of the studies on the Metaverse in education was insufficient.

Two studies revealed that lack of institutional support may also pose a challenge to foreign language learners and teachers (A33, A37). The study coded A33 mentioned that competence of the faculties were limited in integrating metaverse platforms in education. The A37-coded study pointed out to the lack of experts that would help teachers with application of the Metaverse in their classrooms or with technical issues. Moreover, both studies (A33 and A37) also showed that most teachers had beginner level knowledge about the Metaverse, or metaverse platforms, so lack of institutional support may be a big challenge for educators.

Table 23. Challenges of using the virtual reality and metaverse platforms

Findings/ Challenges	Study	Frequency
Pedagogical issues	A13, A24, A28, A33, A36	5
Unfamiliarity	A19, A25, A26, A28, A36	5
Technical problems	A19, A26, A28, A37	4
VR headset problems	A9, A13, A37	3
Social issues	A31, A34, A37	3
Health issues	A9, A13	2
Lack of academic studies	A36, A37	2
Lack of institutional support	A33, A37	2

4.2 Discussion

In this part of the study, discussion of the findings from the included studies was presented. First, the discussion of the data on descriptive findings of the included studies was provided. In other words, the data such as publication years, countries and sample groups were examined. Then the findings related to the research questions were discussed. Accordingly, the data on the characteristics of the VR and MV platforms in educational use, the learning gains from the use of these technologies and the ways of using them was compared and synthesized.

In this study, 41 articles that were published between the years of 2012 and 2022 were examined in order to deepen the understanding of VR and MV platforms in the ELT field. The examination of the years in which the included studies were published showed that there was an increase in the number of the studies on VR and MV platforms in ELT after 2020. This increase can be attributed to the COVID-19 pandemic which started in 2019 and led to a worldwide use of the online education environments. Since this situation forced people to teach and learn online, the interest in technology integration to the foreign language classrooms has grown. In 2022, the number of the studies on VR and MV platforms in ELT reached a peaked.

While the rapid growth in the number of the studies published in 2022 may be linked to the pandemic, it may have also been caused by the public announcement made by Mark Zuckerberg, who is one of the founders of Facebook. When Zuckerberg announced their big investment in their new platform the Metaverse and defined it as a virtual platform offering an alternative virtual world for everyone and for any purposes, the concept of the Metaverse started to receive more attention (Kocabay-Şener, 2021). Both the Metaverse and other virtual reality environments rapidly became more promising for all sectors including the education field. Therefore, it can be said that both the online education process and the launch and promise of the Metaverse accelerated the number of the studies in 2020, 2021 and 2022.

According to the examination of the included studies, it was seen that most of the included studies were conducted in Türkiye and Taiwan. In both these countries, English language is taught as a foreign language at schools, and it has considerable importance in university admissions and career advancement (Kung, 2017; Demiray Akbulut, 2020). Contrarily, English proficiency levels in both Türkiye and Taiwan are still low. In the light of the EF English Proficiency Index (2018), which provides a classification of countries according to their English levels, Taiwan was ranked in the 'low proficiency' group of countries, and Türkiye was ranked in 'very low proficiency' countries in the same list. While Taiwan was not included in the list after 2018, Türkiye has moved to the 'low proficiency level' recently (EF English Proficiency Index, 2023). This implies that the importance of English language in these countries is combined with the problems in the learning and teaching it, and this leads to an interest and effort in the new ways of teaching in the ELT field.

The analysis of the sample groups in the included studies showed that students were the participants in most of the studies. 29 out of 41 studies worked with sample groups, and 24 studies were carried out only with students. As the VR and MV platforms were investigated from an educational perspective in the included studies, it can be concluded that the effects of these platforms on students and the learners' gains from them were the main interest areas for the researchers. When the number of the participants were considered, it was seen that most studies, nine out of 29, were conducted with the number

of participants between one to 20. This could be due to the newness and the high prices of the technologies that are used to access the VR and MV platforms (Putra, Santosa, & Saputra, 2020).

When the levels of education were considered, 15 out of 29 studies involved university-level students as their participants, which showed that most studies were conducted in higher education settings. This finding is also consistent with Parmaxi's (2020) research that examined 26 studies on VR in foreign language learning and revealed that most studies were carried out with university students. It can be inferred that the novelty of the VR and MV devices and platforms make them more suitable for adult students who can more easily understand the technical and procedural aspects of these technologies.

Another finding of the current study was about the purposes of the included studies. When the articles were examined individually and compared with each other, it was revealed that there are three main purposes of the studies on the VR and MV platforms in ELT. Accordingly, the included studies had the purposes of (1) examining the effects of virtual reality or metaverse, (2) the integration of virtual reality or metaverse, or (3) teachers' and students' attitudes towards virtual reality or metaverse.

With a frequency of 24, the most common purpose of the included studies was the examination of the effects of VR and MV platforms on foreign language learning. However, among these studies that aimed to explore the effects of VR and MV platforms, only one of them focused on MV. The effects of VR platforms on four language skills were especially examined, and speaking skill was the most common theme in the studies. This may be due to interactive, immersive and collaborative environments provided on the VR platforms (Yang, Chen, & Jeng, 2010; Melchor-Couto, 2016; Khatoony, 2019).

Another common purpose in the included studies was about understanding the ways of integrating VR and MV in foreign language classrooms. Regarding the ways of integration, it was seen that most studies focused on MV platforms. At this point, a deduction about the reason for different tendencies towards choosing VR or MV platforms can be made. Most probably, conducting more studies on the effects of VR

platforms and more on the ways of MV integration suggests that there is a need to understand the ways of integrating metaverse platforms into education before exploring its effects on learners. As the Metaverse is a relatively new concept and it is still developing, educators and researchers may be more interested in understanding the features and how to use it.

One last purpose encountered in the included studies was about finding out the attitudes towards VR and MV platforms. It was found that the studies mostly focused on the attitudes of students rather than teachers'. This implies that students' acceptance and appreciation of these platforms are more important than teachers'.

When the research methods of the included studies were analysed, it was seen that there are more qualitative studies on the use of VR and MV platforms in ELT with a frequency of 17. This was followed by 13 quantitative studies. This is in partial agreement with Parmaxi's (2020) study in which the need for more quantitative research on VR and MV platforms was expressed. When the high number of the qualitative studies and the abovementioned purposes of the studies are considered, it may be inferred that researchers prefer different research methods according to the purposes of their studies. For instance, while exploring the effects of VR and MV platforms in ELT, the researchers mostly used quantitative research methods. This could be due to the fact that the effects of VR and MV platforms on learners are more measurable compared to the ways of using them. By using tests, questionnaires or surveys, the results about the effects of VR and MV platforms can be turned into numerical data. However, finding out how to integrate these technologies requires more commentary information. Accordingly, it was seen that the studies that explored the ways of integrating VR and MV collected data qualitatively and mostly depended on the use of interviews, open ended questionnaires and reviews of literature.

The analysis of the themes in the included studies revealed that the most common subject in the studies was the effects of VR and MV platforms on students' speaking performance. Similarly, Parmaxi (2020) found that speaking was the most investigated language skill in the studies on VR in foreign language learning. Regarding the high frequency of

speaking skill as a theme, one reason for this may be the interactive nature of VR and MV platforms. As these platforms enable language learners to interact with their peers, native speakers, virtual characters and the objects around them, they can actively participate in the virtual tasks and scenarios that are not usually available in the real world. This view is also consistent with the existing literature (Von der Emde et al., 2001; Cooke-Plagwitz, 2008; Zheng et al., 2009).

The second common theme in the included studies was on the educational use of VR and MV platforms in educational settings. The frequency of this theme may be attributed to the fact that VR and MV technologies are not fully understood both by educators since they are still developing and not very widespread in education. In alignment with Jee (2010), while VR and MV platforms may be more common among today's technology savvy students, teachers are probably more unfamiliar with these technologies and struggling to learn how to integrate these platforms into the classroom. Additionally, it can be inferred that educators are looking for the ways of using VR and MV platforms in foreign language teaching because these platforms are not used only for educational purposes.

According to the analysis of the VR and MV platforms that were examined in the included studies, it was seen that the Second Life platform was the most common one. The popularity of Second Life is also mentioned in the literature (Stevens, 2006; Jee, 2010; Parmaxi, 2020). The frequent use of the Second Life platform can be attributed to its being free and accessible to everyone (Edwards, 2006). In addition to these features, the absence of game-like goals and settings makes the platform adaptable to various kinds of activities used in foreign language teaching (Cooke-Plagwitz, 2008). For example, while Second Life can be used for meeting with native speakers and practise speaking, it can also be utilized to explore a certain place on the platform and complete a task or solve a problem with peers. In addition, as the Second Life platform is not designed in a way that is suitable only for children or teenagers, it can be adopted for professional development or training. One example of this is Can and Şimşek's (2015) study that used the SL platform for ELT education with pre-service teachers.

Following Second Life, the VR and MV platforms that were specifically developed for the studies by the researchers or educators were commonly examined in the included studies. The reason for this frequency may be attributed to the opportunity they provide to create content (Cooke-Plagwitz, 2008; Parmaxi, 2020). Both on Second Life and the platforms developed for the studies, teachers can produce content by considering their students' needs, the curriculum and the technical infrastructure they have. When a virtual reality or metaverse platform is created from the scratch, the design, the context or the language skill to be taught can be arranged by the educators. Therefore, it may be inferred that flexibility on the VR and MV platforms is a favoured quality for educational use. In alignment with Cooke-Plagwitz (2008), this flexibility gives teachers the freedom to use their own imagination and invent a three-dimensional area that can serve the needs of their students.

As for the technological devices utilized in the included studies, it was seen that VR headsets, computers and smartphones were used during the integration of VR and MV platforms into English language classes. VR headsets were the most common type of technological device with a frequency of 13. The main reason for this result may be the inclusion of the studies only from the years between 2012 and 2022 in the current study, and as mentioned before, the frequency of the studies from the years of 2020, 2021 and 2022 was very high. This implies that as VR and MV technologies has developed year by year, VR headsets are more available today. Therefore, it may be less difficult for educators and researchers to find VR headsets that fit their needs. Another reason for the popularity of VR headsets may be higher immersion they provide compared to the other gadgets used for accessing the VR and MV platforms. The use of VR headsets enables students to be fully immersed in the three-dimensional virtual world, move around freely and have a more realistic experience. This views also align with the findings of some studies in the literature (Kaplan-Rakowski & Gruber, 2019; Chen et. al., 2021).

When the characteristics of VR and MV platforms were analysed, 14 characteristics of these platforms were identified. These characteristics are their being (1) authentic, (2) enjoyable, (3) interactive, (4) engaging, (5) immersive, (6) interesting, (7) easy to use, (8) adaptable, (9) egalitarian, (10) contemporary, (11) relatable to today’s learners, (12) useful, (13) creative and artistic, and (14) transparent.

It was found that the most prominent characteristic of these platforms is their being authentic. Considering the frequency of this characteristic, VR and MV platforms can be considered as beneficial for creating realistic language learning environments since they provide realistic contexts, authentic materials, activities and conversations with native speakers of the target language. This finding is also consistent with the existing literature (Zheng et al., 2009; Parmaxi, 2020; Hoang, McAlinden, & Johnson, 2023). As stated by Zheng et. al. (2009), using VR platforms offers students possibilities to participate in authentic activities with native speakers and enables them to do reading and writing exercises authentically. Hoang, McAlinden, & Johnson (2023) also indicated that the use of VR allowed students to be engaged in various authentic interactions. In addition, Parmaxi (2020) found that enhancement of authentic learning is one of the favourable effects of using virtual reality in foreign language learning.

Other equally common characteristics of these technologies are that they are enjoyable and interactive. These characteristics were often stated in the literature (Yang, Chen, & Jeng, 2010; Melchor-Couto, 2016; Khatoony, 2019; Hoang, McAlinden, & Johnson, 2023). The enjoyment characteristic may be due to game-like features, existence of the avatars, exposure to a lot of visual elements and the informal nature of the VR environments, which makes learners enjoy their learning experiences on VR or MV platforms. Additionally, the interactivity characteristic may be attributed to various interaction opportunities offered by VR and MV platforms. As stated by Chen et al. (2021), these platforms enable students to interact not only with each other, but also with objects, other learning materials, virtual or real characters in the virtual environment.

VR and MV platforms were also found to be engaging and immersive by most researchers, which is consistent with the literature (Cooke-Plagwitz, 2008; Kaplan-Rakowski & Wojdynski, 2018; Hoang, McAlinden, & Johnson, 2023). Regarding the engagement characteristic, Cooke-Plagwitz (2008) indicated that realistic interaction opportunities kept students more engaged during the VR activities. As for the characteristic of immersion, Kaplan-Rakowski and Wojdynski's (2018) study revealed that the use of virtual reality platform especially via VR headsets was found to be highly immersive by the students. These findings imply that VR and MV platforms eliminate the necessity of visiting foreign countries to have realistic communication opportunities in

target language or to be immersed into the target culture. This view is also in agreement with the findings of Von der Emde et al. (2001) and Peterson (2011).

When the characteristics of VR and MV platforms were examined, it was also found that VR and MV platforms were considered to be interesting. This characteristic of VR and MV platforms may be attributed to interactivity as well as their keeping students active during the learning tasks. These interpretations align with the Zheng's et. al. (2009) study in which students used browser-based virtual reality and found the use of VR platform interesting. Zheng et. al. (2009) stated that the use of VR platform provided students with opportunities to communicate with different people from different countries, and students found this interesting as they normally communicated with the same people in their classroom. Similarly, Yang, Chen, and Jeng (2010) reported that the students in their study found the use of VR platform in English lessons interesting due to the missions they were required to complete and the interaction with the objects in the virtual environment.

Another characteristic of VR and MV platforms encountered in the included studies was their being easy to use. One reason for this may be the tendency of today's students to use various technological devices in their daily lives. Since Generation Z and Alpha have grown up with technology and are considered as Digital Natives (Prensky, 2001), using new technologies for learning is not difficult for them. As stated by Jee (2010), students are knowledgeable about technological devices and can learn the qualities of new gadgets without difficulty; therefore, it is reasonable to assume that integration of VR and MV platforms is not a very challenging practice for students.

VR and MV platforms were also found to be adaptable to various kinds of activities. As previously mentioned, VR and MV platforms, such as the Second Life, allows users to create their own content and/or customize the existing facilities for educational purposes. VR and MV platforms can be adapted to and created for different contents in order to be used for foreign language learning. This finding is also supported by Peterson (2011) who pointed out that VR and MV platforms can be customized for student-centred activities or tasks that allow learning by doing.

It was also found that VR and MV platforms were egalitarian. This characteristic of VR and MV platforms can be based on their enabling students from all over the world to join the learning environments on these platforms regardless of time, place and other physical issues. Similarly, there are studies indicating that students are less limited in time and space and they can exist in different places via their avatars thanks to VR and MV platforms (Jee, 2010; Hoang, McAlinden, & Johnson, 2023). Additionally, Innocenti et al. (2019) maintained that the use of VR platforms was beneficial for all the participants in their study including students with special needs, which implies that these platforms can equally assist all learners.

Some other less frequently encountered characteristics of VR and MV platforms are their being contemporary, relatable to today's learners, useful, transparent, and creative and artistic. While these qualities are not commonly found in the existing literature, they are still in alignment with some studies. The contemporary feature of VR and MV platforms can be attributed to modern people's tendencies towards technology use. In modern era, since the advancements in technology are continuously taking place, upgraded models of tablets, smartphones and laptops find place in various fields of life. People are getting more and more adapted to use them in their life. Therefore, it can be concluded that VR and MV platforms are also being a part of modern life and their use in education is consistent with everyday activities in modern time.

As well as being contemporary, VR and MV platforms were found to be relatable to today's learners. This may be because VR and MV games, devices and platforms are already a part of today's learners life, especially encountered in their entertainment. Since today's students are familiar with many technological devices and use them efficiently, it can be assumed that using VR and MV platforms provides today's learners with relatable contents and ways of learning (Jee, 2010).

It was also found that VR and MV platforms are useful in English language education. This characteristic was also encountered in the literature, and it was based on the meaningful communication opportunities that VR and MV platforms can provide (Khatoony, 2019; Kaplan-Rakowski & Gruber, 2023).

One last characteristic of VR and MV platforms was their being creative and artistic. This might be because some VR and MV platforms, like Second Life, enable users to create their content and build new things in the virtual environment. Similarly, Chittaro and Ranon (2007) indicated that the use of VR and MV platforms in foreign language learning creates an artistic atmosphere thanks to their realistic and elaborately designed imagery.

Regarding the second research question of the current study, an analysis of the learning gains from using VR and MV platforms in ELT was also performed. As a result of this analysis, the related findings from the included studies were synthesized and certain inferences were made. Accordingly, the data collected was grouped as (1) cognitive, (2) affective and (3) social learning gains. These learning gains were presented in order of their frequency in the included studies.

Cognitive learning gains were found to be the most common learning gains from using VR and MV platforms in ELT. These learning gains include better retention, enhancement of learner autonomy, improvement of problem-solving skills, critical thinking skills, higher level of thinking ability, creativity and visualization.

The most frequently encountered cognitive learning gain was found to be better retention. As stated by Le et. al (2015), the cooperative learning, interactive environment and games for practice contributed students to focus on the content and remember what was learned better. Likewise, Innocenti et. al. (2019) shared that their students' experiences with VR promoted comprehension and retention of knowledge thanks to the multimodality in the VR environment, which assist to help students remember a certain image or place and then remember all the related information. Hoang, McAlinden, & Johnson (2023) also stated that rich content on VR platforms, the various learning settings and graphic representations help improve retention of information. Accordingly, it can be inferred that VR and MV platforms increase retention via their cooperative, interactive, game-like and multimodal qualities.

Another common cognitive learning gain from the use of VR and MV platforms was enhancement of learner autonomy. This may be due to the fact that the activities on VR

and MV platforms support independent learning and enhance self-reliance. This finding also aligns with the studies of Wu and Gao, (2022) and Hoang, McAlinden, and Johnson, (2023). In their findings about the positive effects VR and MV platforms on education, Wu and Gao (2022) included the autonomous ways of learning that VR platforms provided. Similarly, Hoang, McAlinden, and Johnson (2023) also mentioned that VR use encourages both autonomous and collaborative learning.

Improvement of problem-solving skills was another cognitive learning gain from VR and MV platforms. In problem-based approaches to learning English, students are given some challenging problems, and they engage in meaningful activities while trying to solve these problems in groups. This approach to language learning is important as it ensures meaningful use of the target language during problem solving. Correspondingly, Cooke-Plagwitz (2008) stated that students can become involved in realistic interactions and meaningful activities in VR environments. Therefore, it can be concluded that VR and MV platforms help teachers of English to implement problem-based activities in their lessons through their interactive, realistic and meaningful tasks.

Improvement of critical thinking skills is also a cognitive gain from using VR and MV platforms. As stated by Von der Emde et al. (2001), when students meet native or foreign speakers of English on VR platforms and learn about new cultures, this may lead them to think critically about cultures. Similarly, as mentioned in the study of Chittaro and Ranon (2007), the use of VR platforms in foreign language learning offers opportunities for students to experience collaboration, interaction, engaging and realistic graphics, so they can think critically and analyse various topics from different viewpoints.

Some less frequently encountered cognitive learning gains from VR and MV platforms are improvement in higher level of thinking ability, creativity and visualization. The higher thinking skills refer to the top cognitive abilities in Bloom's taxonomy and involves analysing, evaluating, and creating (Anderson & Krathwohl, 2001). As revealed by Von der Emde et al. (2001), the use of VR platforms facilitates creating ability by enabling students to create their own content by analysing and evaluating what they have learned.

Additionally, using VR and MV platforms improves creativity in students by enhancing interaction with other people and virtual environment. Since students can explore the virtual learning environment independently or work with their peers or other English language speakers, they may have more chances to evaluate things from different viewpoints and produce new ideas. As students can also create content in virtual environments, it may also be inferred that using VR and MV platforms can lead them to think more creatively (Von der Emde et al., 2001; Peterson, 2011).

Lastly, it must be mentioned that VR and MV platforms aids students in visualization. As the simulated environments on VR and MV platforms expose students to a lot of imagery, it may become easier for them to create mental images of the subjects they are studying. Similarly, Chittaro and Ranon (2007) maintained that the presence of three-dimensional and detailed visuals on VR platforms is beneficial for foreign language learning.

Considering the data from the included studies, using VR and MV platforms also proved to create some affective learning gains. These include the improvement of motivation, reduction in foreign language anxiety and positive effects of avatars. To start with, using VR and MV platforms in English language teaching improves motivation. This may be connected to engaging and interactive activities in virtual environments, which lead to students' active participation. As in the study of Sekiguchi, et al., (2006), when students had opportunities to meet and interact with native English speakers on a VR platform, they became motivated to take part in activities and to practise speaking outside of class. Similarly, Zheng et. al. (2009) maintained that communicating in English with people from different countries and game-like qualities on the VR platform increased students' motivation. Chen et. al. (2021) also found similar results and shared that the inclusion of virtual reality in problem-based learning enhanced the motivation of students.

Reduction of foreign language anxiety was found to be another affective learning gain from VR and MV platforms. This finding aligns with the study of Grant et. al (2013), which revealed that students were less anxious about speaking in L2 in the VR environment compared to the face-to-face dialogues in the real classroom. Correspondingly, the findings of Melchor-Couto (2016) showed that using a VR platform

reduced foreign language anxiety as most students shared that they felt more confident about speaking in VR environment. A recent study on the effects of using VR for public speaking practice also agreed that students had lower levels of anxiety about speaking English when they gave presentations in a virtual environment (Kaplan-Rakowski and Gruber, 2023).

Positive effects of avatars were found to be another affective learning gain. Avatars enable the users of VR and MV platforms to exist in virtual environment and to communicate with other users simultaneously. On VR and MV platforms, students can choose their own avatar and change its physical properties as they want. This provides users with the freedom to express themselves and contributes to their learning (Cooke-Plagwitz, 2008). Similarly, Jovanović and Milosavljević (2022) mentioned that the use of customizable avatars allows each student to make their own decisions and to have a more individualized experience. Avatars are also good for eliminating the problems that may occur due to the social, ethnical or racial status. As stated by Park & Kim (2022), "*because avatars change skin color and gender as desired, they have the advantage of reducing preconceived notions about social discrimination in conversations*" (p. 4225).

Some social learning gains from using VR and MV platforms in English language teaching were also found in the included studies. These involve improvement in collaboration and cooperation, intercultural communication, scaffolding and social constructivist skills.

The most common social learning gain was found to be improvement collaboration and cooperation. This finding is also encountered in the literature. For instance, Chittaro and Ranon (2007) revealed that chances of collaboration with peers were one of the opportunities that using VR platforms provides. Hoang, McAlinden and Johnson (2023) also stated that the use of virtual reality platforms supports collaborative learning.

Another social learning gain from VR and MV platforms in ELT was the development of intercultural communication. This finding was seen especially in studies that involved students from different countries or required communication with native or foreign people

on virtual platforms. Likewise, the study of Sekiguchi et al. (2006), which brought students from Japan and Australia together and had them work in groups, revealed that the use of VR improved their intercultural learning. The study conducted by Parmaxi (2020) also showed that cultural learning opportunity was one of the positive effects of using VR and MV platforms.

Scaffolding was also a social learning gain that VR and MV platforms bring. From the data collected, it can be concluded that students' working in pairs, sharing tasks, helping each other and peer learning provided opportunities for scaffolding. Additionally, visuals and interactivity of the virtual environment on VR and MV platforms were found to be some elements for scaffolding. This finding is in partial agreement with the findings of some studies in the literature. For example, Chittaro and Ranon (2007) mentioned that VR and MV platforms provides students with simple interactions with their classmates and virtual characters during the virtual tasks creates chances of collaboration among students. Similarly, Hoang's et. al. (2023) finding about the existence of various interaction patterns on VR and MV platforms can be inferred as students can be scaffolded from different resources like their classmates, teachers or the virtual characters.

Another social learning gain from VR and MV platforms was enhancement of the social constructivist skills. This might be attributed to the audial, visual and avatar-related elements on the VR and MV platforms as they support the social interactions among students. Likewise, Can (2009) found that enhanced resources on VR platforms create opportunities for practising and constructing foreign languages. Putra, Santosa and Saputra (2020) agreed that learning through exploration of the resources on VR platforms assist students to develop knowledge. In light of the existing literature, it can also be concluded that VR and MV platforms facilitate knowledge construction since they provide students with chances to take part in meaningful activities through life-like social interactions with their classmates, teachers and native or foreign English speakers (Chittaro & Ranon, 2007; Cooke-Plagwitz, 2008; Zheng et al., 2009).

The ways of using VR and MV platforms in ELT were examined regarding the basic components found in a lesson plan. The data was organized as (1) lesson objectives, (2)

lesson procedures, (3) materials, (4) duration and (5) types of assessment. At this point, it must be noted that since there were not any studies that presented such data in a similar and detailed way in the literature, the inferences in this part was based on the findings of the current study. The common findings from the included studies were synthesized with each other with the purpose of making inferences.

First of all, the included studies were examined to find out the lesson objectives in the intervention lessons. This analysis showed that the most common lesson objectives were related to the speaking skill. The majority of the studies stated that students would be able to make a conversation in English on a VR or MV platform. These conversations were aimed to be made with certain types of interlocutors such as native or foreign speakers of English randomly met on the platform, computer-generated virtual characters and foreign students learning the native language of the English language learners. Considering these findings, it can be inferred that a lesson with the objective of speaking production on VR or MV platforms is better performed with the interlocutors other than students' classmates. This may be due to the fact that when students interact with foreign people or native-like virtual characters, they have to speak in English authentically. This also provides students with meaningful tasks compared to the interactions with their classmates since they can normally speak in their mother tongue or switch to it any time they face a communication problem. This viewpoint is also consistent with the findings of Zheng et. al. (2009) who stated that students showed an interest in the VR experience thanks to the verbal interactions in English with people from different countries on the VR platform.

The second common lesson objectives were related to the writing skill. The data from the included studies showed that all the lessons focusing on writing skill had students complete certain tasks on VR or MV platforms before they write a paragraph or an essay. Accordingly, it can be inferred that the use of VR or MV platforms for writing skill works better when the virtual activities precede the writing activities. Additionally, it was seen that the pre-writing VR tasks included exploration of certain places, interaction with virtual objects or watching 3D videos via VR headsets. Therefore, the use of VR or MV platforms in the pre-writing stage might be attributed to the rich input and active exploration provided by virtual environments. As students gain some knowledge about

the writing topics via audial, visual and interactive resources, it might also be concluded that VR or MV platforms facilitate students' writing production. Similarly, as stated by Von der Emde et al. (2001), the virtual environment itself becomes an object of analysis for students and provides them with a meaningful purpose to produce a written work.

The third common focus area in the lesson objectives was vocabulary learning. Using VR or MV platforms to teach vocabulary was mostly applied by immersing students in the relevant context for the target vocabulary. This may be due to the fact that students were exposed to three-dimensional environments in which they could be assisted by visual, written and audial stimuli. In agreement with this view, Peterson (2011) indicated that the multichannel exposure added with the interactions with the virtual environment helps students to conceptualize the meanings of the words. Similarly, Hoang, McAlinden, and Johnson (2023) stated "*the multimodal and multi-sensory language resources from the VR application also changed the way students engaged with the meaning and form of vocabulary input*" (p. 497).

Though it was not very common, teaching of grammar as a lesson objective was also encountered in the included studies. These lessons aimed to teach certain grammar points via integration of VR platforms; however, the virtual environments were utilized only to practice or reinforce the grammar points that were taught by a teacher in the real classroom environment. It was also seen that the VR platforms were used either to perform communicative tasks or to play a grammar game. Regarding these findings, it may be concluded that in a present-practice-produce model grammar lesson, the use of VR or MV tasks fits better to the practice or produce stages instead of the presentation phase. This may be due to the interactive and engaging nature of VR and MV platforms. Since students are relatively passive during the presentation phase of a grammar focused lesson, it may be unnecessary to be in a virtual environment. Instead, students can benefit from the game-like features of VR platforms to practise the language structures, or they can work on production activities by interacting in English with the other users in the virtual environment (Can, 2009; Zheng et al., 2009).

In regard to the lesson procedures for the integration of VR and MV platforms in the English language classroom, it must be noted that each lesson followed different steps.

Therefore, the analysis in the findings chapter of the current study can be helpful to have a detailed understanding of the lesson procedures for the integration of VR and MV platforms. However, when the findings about the lesson procedures were synthesized, certain inferences were drawn.

First of all, it was seen that some lessons started with a training in how to use VR or MV platforms and necessary technological devices. This implies that students need to be familiar with these VR and MV technologies in order to make the most of their learning experience on the VR or MV platforms.

Secondly, it was discovered that if a commercial VR or MV platform is used, the existing lesson procedures can be followed. Since these platforms already have their own lesson plans or learning scenarios, there is no need for preparing procedures for the VR activities.

Third, it was found that most lessons started in the real classroom environment. The topics related to the lesson objectives were first introduced, practised or revised, and then the VR tasks were completed in the virtual environment. This may be attributed to certain challenges of using VR or MV platforms, which will be explained later. As an example, since the use of VR headsets for a long time may cause motion sickness, covering all stages of a VR-integrated lesson in real classroom setting may create problems among students.

One last finding about the lesson procedures was the completion of the VR or MV tasks after class time. This was encountered in the lessons with a speaking-based objective. Therefore, it may be concluded that when the VR tasks required students only to make conversations with speakers of English or virtual characters on the platforms, this production stage of the lesson can be completed outside of class.

When the lesson materials used during the integration of VR and MV platforms were considered, it was seen that common types of materials were worksheets and tests. Worksheets were used for grammar, vocabulary and writing practices. It was also found that worksheets were mostly used before and/or after VR activities. When VR headsets

or goggles are used, worksheets can be benefited from before and/or after VR tasks. However, it is also possible to use during VR activities if students access virtual environment via a non-immersive VR system and without VR headsets or goggles. When the tests used in VR-integrated lessons were analysed, it was revealed that tests were mostly used to assess vocabulary comprehension after the completion of VR tasks. This was probably due to the practicality of applying a test as a formative assessment of vocabulary.

Less common materials used in VR-integrated lessons were multimedia presentations, songs, picture cards and word cards, and online activities. Multimedia presentations and online activities were used while teaching grammar. Accordingly, it may be inferred that multimedia presentations can be used while introducing new grammar points and online activities can be utilized to practise what is learned. Following these, students can complete productive activities on VR or MV platforms. Similarly, as songs and picture/word cards were used to teach vocabulary, it can be concluded that the audio and visual elements of these materials can facilitate vocabulary learning.

The duration of the activities for the VR and MV integration in ELT was examined according to how many minutes were spent for the tasks on VR and MV platforms. Regarding the findings, the activities with a duration between 25 and 35 minutes were the most common. These activities included communicative, vocabulary and listening tasks, and they were completed on commercial VR platforms. The lessons with 15-minute or 60-minute VR activities were the second common. In one of the lessons with 15-minute VR activity, students completed some communicative VR tasks, and the other one required students to do a writing task after the VR experience. 60-minute VR activities were preferred for communicative tasks.

In one study, VR activities for vocabulary learning lasted for 40 minutes. Three VR activities were completed on a non-immersive VR platform on computers, and they took 20, 12 and eight minutes respectively. One study conducted a 10-minute VR activity, and the lesson objective was writing a paragraph. One last study with a 5-minute VR activity also focused on writing.

When the duration of the VR activities is considered, it can be concluded that there is not a common pattern to be followed. However, a few inferences can be made. First, the data on the duration of activities implies that allocating shorter time for using VR or MV in a writing lesson may be reasonable. As previously mentioned, VR activities for writing were mostly preferred in the pre-writing stages, and they included interaction with virtual objects, exploration of certain places or watching 3D videos. Since the main objective in a writing lesson is usually on students' writing production, it may not be necessary to allocate a long time for VR or MV tasks. Considering the variations in the duration of VR and MV activities, it can also be inferred that circumstances such as the type of VR and MV systems, the number of the available devices and the content to be taught may be the determinant factors for the duration of VR activities.

As for the types of assessment for the integration of VR and MV platforms, five different types of assessment were identified. It was revealed that (1) technology-mediated feedback, (2) teacher feedback, (3) peer feedback, (4) students' self-reflection and (5) tests were used in the included studies.

Technology-mediated feedback and teacher feedback were the most common types of assessment. This may be due to the fact that most VR and MV platforms assess students' performance automatically, so students are provided with technology-mediated feedback. If this feature is not available on the platform, teachers usually assess students considering the video recordings of students' performances or the written records like chat logs.

In addition, peer feedback was also commonly encountered as a type of assessment. As stated by Von der Emde, et al. (2001), "*the community-based structure of MOOs also naturally leads to peer teaching, since students begin to learn from and teach each other*" (p. 215). Therefore, the use of peer feedback in VR-integrated lessons may be because of the interactive nature VR and MV platforms.

Student reflection and tests were also encountered in the included studies with the same frequency. Student reflection as an assessment tool was encountered in the lessons that focused on speaking skill. This can be attributed to the autonomous nature of VR and MV

platforms, which allow students to work independently in virtual environment. It may also be due to the fact that students have access to recordings of their performance on VR and MV platforms, and they have chance to revisit and assess their own learning. In addition, tests were used for assessing reading and vocabulary comprehension in the included studies. The preference of tests might be due to the language skills or structures that were aimed to be taught. Because reading and vocabulary are not productive skills, tests may be an easy and fast way of assessing student learning.

The data from the included studies also showed that there are some challenges that may occur when VR and MV platforms are used in English language teaching. When the related findings from the included studies were synthesized, eight main challenges were identified as (1) pedagogical issues, (2) unfamiliarity, (3) technical problems, (4) VR headset problems, (5) social issues, (6) health issues, (7) lack of academic studies, and (8) lack of institutional support.

The most common challenges were pedagogical issues. In a general sense, the difficulties in the classroom management that may be faced during the application of VR or MV activities were mentioned as pedagogical challenges. For instance, big student numbers and different proficiency levels of students and students' time management during VR and MV tasks were found to be some of the reasons of these challenges. This may be due to the fact that dealing with these issues requires teachers' extra effort to manage the classrooms. Similarly, Putra, Santosa, & Saputra (2020) agreed that concerns about classroom management and achieving the lesson objectives are some of the challenges of VR-integrated lessons. Lack of a detailed educational operation plan for using MV platforms and the existing design of the digital resources on MV platforms were also found as some other pedagogical challenges. This implies that since MV platforms were not created only for educational use, teachers need to devise their own ways to use it and spend a lot of time to prepare a lesson that involves VR or MV tasks.

Unfamiliarity with VR and MV platforms is another challenge that was encountered in the included studies. One of the reasons for the unfamiliarity problem was attributed to the students' need for practice before using VR and MV platforms. This may be because

a prior training in how to use VR platforms or devices may take a lot of time and require extra effort of teachers. It can also be inferred that students' unfamiliarity with VR and MV platforms may cause them experience some technical problems, which may hinder the progress of the lesson.

The technical issues that may occur during VR or MV activities include the lack of facial and bodily expressions of the avatars on certain VR platforms, the integration of MV with the existing learning management systems (LMS) and maintaining the sustainability of metaverse platforms. The problem with avatars implies that the lack of facial and bodily expressions, which support communication in real life, may be confusing for the students during speaking tasks. The integration of MV with the learning management systems (LMS) may cause problems since it cannot be achieved by individual teachers. The sustainability of metaverse platforms refers to the number of users active on these platforms. Therefore, it may be assumed that if there are not enough users on a platform, students may not be able to complete certain collaborative or communicative tasks.

Some virtual reality headset-related problems were also faced during the use of immersive VR and MV platforms. These included the size, weight, cost and the discomfort caused by VR headsets. It was seen that some participants in the VR activities complained about the size and weight of the VR goggles. This may be because the development of these devices are still in progress and the ones already in use are not very small. The cost of virtual reality headsets was also identified as another challenge. This may also be attributed to the novelty of VR and MV devices. In addition, implementing VR headsets in classroom use requires educational institutions may add up to the cost since adapting the existing infrastructure and technical equipment to these new technologies may create expenses.

Some social issues that may occur during the use of MV platforms included a sense of separation, security problems and digital violence. It was found that the use of the Metaverse for learning a foreign language may not be secure especially for teenagers and young learners. These possibility of facing these social problems may be attributed to the anonymity of users on MV platforms. The novelty of MV platforms may also be

considered as a reason for such risks. As metaverse is a new concept, there may be a lack of rules, procedures and security regulations.

The less common problems mentioned in the included studies were about health issues, lack of academic studies and lack of institutional support. Health issues such as headaches, eye strain and dizziness were the problems uttered by some participants. While headaches and eye strain may be experienced due to long-time use of virtual reality headset, dizziness may occur during the VR activities that require learners to fly, teleport or stand at a high place.

As for the lack of academic studies as challenge, it was found that there were not many studies on the integration of VR and MV technologies into English language classrooms. Especially, since the studies on MV platforms were mostly literature reviews or theoretical works, teachers and researchers may not obtain sufficient information on the integration of MV into English language teaching.

One last challenge encountered in the included studies was lack of institutional support. This may be a big challenge for educators since the integration of these technologies may require technical and infrastructural support that teachers cannot find or afford by themselves.

CHAPTER 5. CONCLUSION AND SUGGESTIONS

The current study aimed to discover the characteristics of VR and MV platforms in educational contexts, what learning gains they produce and how they are used in English Language Teaching. In order to achieve this aim, the meta-synthesis method was adopted, and the relevant studies between the years of 2012 and 2022 were examined. 41 studies that answered the research questions were selected according to the inclusion and exclusion criteria. These studies were read and analysed in detail, and then the findings were compared, synthesized and interpreted. Since there are not many studies on the use of VR and MV platforms in ELT, the researcher aspired to find out and present the key points that can be helpful in integrating these platforms into ELT settings.

Regarding the first research question, it has been revealed that the most common characteristics of VR and MV platforms are their being authentic, enjoyable, interactive, engaging and immersive. Authenticity of VR and MV platforms is based on realistic learning settings, activities, authentic materials and conversations with native speakers. Since a realistic learning environment provides more meaningful tasks, learners feel motivated to achieve the tasks. Game elements, the use of customizable avatars, large number of visuals and the informal nature in virtual environments make VR and MV platforms enjoyable. VR and MV platforms are also highly interactive as they offer chances to interact with other people, virtual characters and the objects. This interactivity and various communicative tasks keep students active during the VR tasks. Therefore, VR and MV platforms are also found to be engaging. Additionally, VR and MV platforms are immersive as they provide a lot of realistic stimuli to the users. This makes learners feel present in the learning environment and help them focus on activities better. As a result, all these characteristics show that VR and MV platforms offer many benefits to English language learners as these qualities enhance foreign language learning.

In relation to the second research question about the learning gains from using VR and MV platforms, the results have shown that there are cognitive, affective and social gains

from using these platforms. The most common cognitive learning gain is better retention. Interactive nature and rich content on VR and MV platforms are some elements that improve retention of information. As students can interact with their peers, foreign people, virtual characters or virtual environment itself, they participate in the activities more actively. There are also various means of interaction such as written, spoken or visual options. In addition to interactivity, rich content on the VR and MV platforms assists students' learning via multiple input and strengthen their memory. VR and MV platforms also enhance of learner autonomy since they allow students to work independently and take the responsibility of their learning. For example, assigning a task that requires students to create their own content on the VR platform or to speak to native English speakers increase autonomy.

Using VR and MV platforms also creates some affective learning gains, which can facilitate language learning. First, VR and MV platforms improve motivation as they provide learners with engaging, interactive and communicative activities. While working on such activities, learners become active and experience real use of language. Secondly, the use of VR and MV platforms reduce foreign language anxiety. Students especially find it easier to perform speaking activities in virtual environments. This can be useful when English language learners need to practice giving presentations or participate in discussions in English. Third, avatars create positive effects on English language learners. Customizable avatars on VR and MV platforms let students make their own decisions and express themselves leading to a more individualized learning experience. The anonymity the avatars provide is also beneficial since it eliminates the problems related to social, ethnical or racial status.

Additionally, some social learning gains from VR and MV platforms are collaboration and cooperation, improvement in intercultural communication, scaffolding and enhancement of the social constructivist skills. These learning gains are in accordance with social constructivist views that underline the importance of foreign language learners' constructing knowledge through interaction, working together and helping each other while communicating. Therefore, the use of VR and MV platforms supports social constructivist ways of teaching and learning English language.

With regard to the last research question about the ways of using VR and MV platforms in ELT, the intervention lessons in the included studies were investigated. The data on the lesson objectives, lesson procedures, the materials used, duration of the VR or MV activities and types of assessment were analysed and synthesised. First, it has been revealed that the use of VR or MV platforms is the convenient for the lessons with an objective related to speaking skill. Secondly, while various lesson procedures can be formed for using VR or MV platforms in ELT, four main points can be considered. VR or MV platforms are mostly used (1) after a training in how to use them, (2) by following the existing procedures on the VR or MV platforms, (3) by starting the lessons in the real classroom before doing the VR activities and (4) by assigning students the VR or MV tasks after class time. As for the lesson materials, VR-integrated lessons are mostly supplemented with worksheets. Worksheets can be used before, during, and/or after VR and MV tasks. Regarding the duration of VR and MV activities, a period of time between 25 and 35 minutes can be allocated to the activities in virtual environments. Last of all, the assessment of the VR and MV activities can be carried out via technology or by teachers.

In addition to the data provided in accordance with the research questions, it must be noted that there are also some challenges of using VR and MV platforms in ELT. The most common challenges include pedagogical issues and unfamiliarity with VR or MV. As the most common pedagogical problem, teachers should plan how to achieve classroom management during the VR or MV activities. In addition, since the unfamiliarity with VR and MV platforms may cause technical or timing problems, spending some time to introduce these platforms and related devices to students can be considered.

Overall, the current study shows that VR and MV platforms offer many benefits to the field of ELT. The characteristics of these platforms correspond with the needs of English language learners. The learning gains from using VR platforms support foreign language learners cognitively, affectively and socially. Moreover, VR and MV platforms can be used in ELT in many different ways. Therefore, it can be concluded that VR and MV

platforms are suitable to be used in ELT and can provide educational opportunities for learning English.

This current study provides a summary of the research on using VR and MV platforms in the ELT field. It also presents some implications for the future research on the use of VR and MV in ELT. These implications may assist researchers to determine or strengthen their research topic more specifically to illuminate the teachers and researchers that aim to integrate VR and MV in their classes.

First of all, as confirmed in the current study, most of the studies on VR and MV in ELT were conducted with university level students. However, there may be different needs of students depending on their levels. While university students may not need much help on the virtual platforms, young and teenage students may need more careful supervision from their teachers during VR and MV activities. Therefore, more studies with primary and secondary school students can be carried out.

Secondly, more studies on the use of VR and MV platforms for ELT professional development can be carried out. Teachers from different cities and countries can easily come together on these platforms. They can share their experiences or perform collaborative tasks like creating VR content. This may provide ELT teachers with valuable experience and various insights into the use of VR and MV platforms. The results of such teacher meetings and collaboration can produce useful findings and broaden the understanding of VR and MV platforms in ELT.

Thirdly, as confirmed in this current study, most of the previous studies on VR and MV in ELT were carried out on the Second Life VR platform. Therefore, most of the data depends on the affordances of Second Life. However, at the present time, this platform may be considered as an outdated one since the it is not an educational and fully immersive platform. Today there may be better educational opportunities provided by the newer VR and MV platforms such as EduVenture, Immerse, ImmerseMe and Mondly. Since these VR and MV platforms were created for educational use, some specifically focusing on foreign language learning, and they are fully immersive, they may be more

compatible with the expectations of modern times. As a result, more future research may be conducted by using the existing commercial VR and MV platforms, and findings from such studies may better help English language teachers and researchers to gain insights on this topic.

Another topic for further research may be the sustainability of VR and MV platforms in terms of educational use. While social learning gains from VR and MV are frequently encountered in the literature, the sustainability of VR and MV platforms is considered as a challenge. As there may not be a lot of users in the same virtual environment and at the same time, foreign language learners may not find people to interact with to practise communicative activities. Accordingly, it can be investigated if VR and MV platforms bring benefits to English language learners in terms of intrapersonal skills via individual activities such as content creation in target language, interaction with virtual characters or game-like individual tasks.

Unfamiliarity with VR and MV platforms is one of the challenges of integrating these technologies into English language classroom. When students are not familiar with VR platforms or devices, it may cause classroom or time management problems. Therefore, the impact of prior training on the effectiveness of VR and MV activities can be examined. A study in which the treatment group receives training but the control group do not may be conducted. Similarly, the time allocated for training can be investigated. The effects of short and long training before VR and MV integration may be explored. If similar studies are conducted with different VR and MV platforms, this may also reveal what VR platforms require more or less preparation time.

Last of all, as encountered as a challenge of using VR and MV platforms in the current study, lack of institutional support may pose problems for teachers. Since teachers need to follow a certain curriculum and meet institutional standards, the use of a VR or MV platform in an individual classroom may not be supported. Therefore, the attitudes of administrators towards using VR or MV may also be investigated. Or, from a bigger perspective, it can be explored if educational institutions have sufficient facilities to

provide the technical, monetary or workforce support required for an effective integration of these technologies in schools as a whole.

REFERENCES

Aküzüm, C. (2012). *Türkiye'de ilköğretim okullarında eğitim denetimi: bir meta-sentez çalışması* (Publication No. 185441) [Doctoral dissertation, Fırat University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Aküzüm, C., & Özmen, F. (2014). Eğitim denetmenlerinin mesleki gelişim, tükenmişlik ve iş doyumuna ilişkin bir meta-sentez çalışması. *Elektronik Sosyal Bilimler Dergisi, 13*(49), 31-54. Retrieved October 20, 2023, from https://dergipark.org.tr/tr/pub/esosder/issue/6163/82861

Alizadeh, M. (2019). Augmented/virtual reality promises for ELT practitioners. In P. Clements, A. Krause, & P. Bennett (Eds.), *Diversity and inclusion,* (pp. 360-368*).* Tokyo: JALT.

Altınışık Akgöz, A. (2022). *A meta-synthesis study on the problems experienced in education of foreign students* (Publication No. 736568) [Master's thesis, Akdeniz University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Ameen, N., Cheah, J-H., & Kumar, S. (2022). It's all part of the customer journey: The impact of augmented reality, chatbots, and social media on the body image and self-esteem of Generation Z female consumers. *Psychology & Marketing, 39*(11), 2110-2129. https://doi.org/10.1002/mar.21715

Anderson, L., & Krathwohl, D. (2001). *A taxonomy for learning, teaching and assessing: A revision of Bloom's taxonomy of educational objectives.* New York: Longman.

Annetta, L. A., Folta, E., & Klesath, M. (2010). *V-Learning: Distance education in the 21st century through 3D virtual learning environments.* Dordrecht: Springer. doi:10.1007/978-90-481-3627-8_7

Antonacci, D., DiBartolo, S., Edwards, N., Fritch, K., McMullen, B., & Murch-Shafer, R. (2008). *The power of virtual worlds in education.* ANGEL Learning White Paper. Retrieved December 6, 2023, from http://edtc6325group2coopproject.pbworks.com/w/file/fetch/78728054/The%20Power%20of%20Virtual%20Worlds%20in%20Education.pdf

Apaydın, Ç., & Kaya, F. (2020). An analysis of the preschool teachers' views on alpha generation. *European Journal of Education Studies, 6*(11), 123-140. doi: 10.5281/zenodo.3627158

Aranyossy, M. (2022). Technology adoption in the digital entertainment industry during the covid-19 pandemic: An extended UTAUT2 model for online theater streaming. *Informatics, 9*(3), 71. https://doi.org/10.3390/informatics9030071

Aslan, Y. (Interviewer) & Tarhan N. (Interviewee). (2020). Doğru bir politika üretemezsek z kuşağı kayıp kuşak olacak [Interview transcript]. Retrieved September 10, 2023, from https://uskudar.edu.tr/tr/icerik/5664/dogru-bir-politika-uretemezsek-z-kusagi-kayip-kusak-olacak

Atak, M. C. (2022). *The impact of Metaverse on work life: A Delphi study* (Publication No. 741250) [Master's thesis, Başkent University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Ausburn, L. J., & Ausburn, F. B. (2004). Desktop Virtual Reality: A Powerful New Technology for Teaching and Research in Industrial Teacher Education. *Journal of Industrial Teacher Education, 41*(4), 1-16. Retrieved March 30, 2023, from https://www.learntechlib.org/p/100511/

Avatar. (n.d.). In *Longman Dictionary of Contemporary English Online*. Retrieved May 18, 2023, from https://www.ldoceonline.com/dictionary/avatar

Awada, G., & Diab, H. B. (2018). The effect of Google Earth and Wiki models on oral presentation skills of university EFL learners. *International Journal of Teaching and Learning in Higher Education, 30*(1), 36-46. Retrieved September 2, 2023, from https://eric.ed.gov/?id=EJ1169829

Aydın, S. (2013). Second Life As A Foreign Language Learning Environment: A review of research. *Turkish Online Journal of Distance Education, 14*(1), 53-63. Retrieved from September 19, 2022, from https://dergipark.org.tr/en/pub/tojde/issue/16895/176013#article_cite

Bair, C. R. (1999). Meta-synthesis. In *Paper presented at the annual meeting of the Association for the Study of Higher Education (ASHE),* San Antonio, Texas. Retrieved February 21, 2023, from https://files.eric.ed.gov/fulltext/ED437866.pdf

Bargh, J. A., & McKenna, K. Y. A. (2004). The internet and social life. *Annual Review of Psychology, 55*(1), 573–590. doi: 10.1146/annurev.psych.55.090902.141922

Barry, D. M., Kanematsu, H., & Fukumura, Y. (2010). Problem Based Learning in Metaverse. Retrieved September 9, 2023, from https://eric.ed.gov/?id=ED512315

Biliş, Ş. (2022). *A meta-synthesis study on the researches of Gazi Tömer 'Yabancılar için Türkçe'* (Publication No. 721926) [Master's thesis, Ondokuz Mayıs University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Boas, Y. A. (2012). Overview of Virtual Reality Technologies. Retrieved November 27, 2023, from https://www.semanticscholar.org/paper/Overview-of-Virtual-Reality-Technologies-Boas/4214cb09e29795f5363e5e3b545750dce027b668

Bondas, T., & Hall, E. O. (2007). Challenges in approaching metasynthesis research. *Qualitative Health Research, 17*(1), 113-121. doi:10.1177/1049732306295879

Bob Cooney. (2020). What We Can Learn from the First VR Device [Photograph]. Retrieved October 20, 2023, from https://bobcooney.com/what-we-can-learn-from-the-first-vr-device/

Boulos, M. N. K., & Burden, D. (2007). Web GIS in practice V: 3-D interactive and real-time mapping in Second Life. *International Journal of Health Geographics, 6*(51), 1–16. https://doi.org/10.1186/1476-072X-6-51

Bozak, A. (2021). Instructional reverse mentoring: A practice proposal for teachers' understanding the "Z" and "Alpha" generations' learning perspectives. *International Journal of Eurasia Social Sciences (IJOESS), 12*(43), 114-142. http://dx.doi.org/10.35826/ijoess.2877

Brooks, F. P. (1999). What's Real About Virtual Reality. *IEEE Computer Graphics and Applications, 19*(6), 16-27. doi: 10.1109/38.799723

Burdea, G. C., & Coiffet, P. (2003). *Virtual Reality Technology*. New Jersey: John Wiley & Sons Inc.

Çalık, M., & Sözbilir, M. (2014). Parameters of content analysis. *Education and Science, 39*(174), 33-38. doi: 10.15390/EB.2014.3412

Cambridge Dictionary. (n.d.). Metaverse. Retrieved May 12, 2023, from from https://dictionary.cambridge.org/dictionary/english/metaverse

Cambridge Dictionary (n.d.). Holistic. Retrieved September 8, 2023, from https://dictionary.cambridge.org/dictionary/english/holistic?q=Holistic

Cambridge Dictionary. (n.d.). Virtual Reality. Retrieved May 6, 2023, from https://dictionary.cambridge.org/dictionary/english/virtual-reality?q=Virtual+Reality

Can, T. (2009). Learning and teaching languages online: A constructivist approach. *Novitas-ROYAL (Research on Youth and Language), 3*(1), 60-74. Retrieved September 6, 2023, from https://dergipark.org.tr/en/download/article-file/111879

Can, T., & Simsek, İ. (2015). The use of 3d virtual learning environments in training foreign language pre-service teachers. *Turkish Online Journal of Distance Education, 16*(4), 114-124. https://doi.org/10.17718/tojde.53012

Çengel, M., & Yildiz, E. P. (2022). Teachers' attitude scale towards metaverse use: A scale development study. *Education Quarterly Reviews, 5*(4), 520-531. Retrieved August 4, 2023, from https://ssrn.com/abstract=4314357

Chen, C.H., Hung, H. T., Yeh, H.C. (2021) Virtual reality in problem-based learning contexts: Effects on the problem-solving performance, vocabulary acquisition and motivation of English language learners. *Journal of Computer Assisted Learning, 37*(3), 851-860. https://doi.org/10.1111/jcal.12528

Chen, J. C. C. (2016). The crossroads of English language learners, task-based instruction, and 3D multi-user virtual learning in Second Life. *Computers Education, 102,* 152-171. https://doi.org/10.1016/J.COMPEDU.2016.08.004

Chen M. R. A. & Hwang G. J. (2022). Effects of experiencing authentic contexts on English speaking performances, anxiety and motivation of EFL students with different cognitive styles. *Interactive Learning Environments, 30*(9), 1619-1639. doi:10.1080/10494820.2020.1734626

Chen, X., & Chen, M. (2016). The application of virtual reality technology in EFL learning environment in China. *Proceedings of the 2016 International Conference on Sensor Network and Computer Engineering*. Atlantis Press. Retrieved March 5, 2023, from https://www.atlantis-press.com/proceedings/icsnce-16/25859611

Chittaro, L., & Ranon, R. (2007). Web3D technologies in learning, education and training: Motivations, issues, opportunities. *Computers & Education, 49*(1), 3-18. https://doi.org/10.1016/j.compedu.2005.06.002

Clegg, N. (2023, September 12). *Metaverse technologies are creating new opportunities for teachers to inspire students*. Meta. Retrieved November 19, 2023, from https://about.fb.com/news/2023/09/metaverse-technologies-education-opportunities/

Cooke-Plagwitz, J. (2008). New directions in CALL: An objective introduction to Second Life. *CALICO Journal 25*(3), 547-557. https://doi.org/10.1558/cj.v25i3.547-557

Cooper, H., Hedges, L. V., & Valentine J. C. (2009). *The handbook of research synthesis and meta-analysis.* New York, NY: Russell Sage Foundation.

Corrales-Serrano, M., Sánchez-Martín, J., Moreno-Losada, J., & Zamora-Polo, F. (2019). GIS in the history classroom: Displaying the walls of Elvas and Badajoz through the use of Google Earth. *Multidisciplinary Digital Publishing Institute Proceedings, 38*(1), 2. doi: 10.3390/proceedings2019038002

Craddock, I. M., (2018). Immersive virtual reality, Google Expeditions, and English language learning. *Accessibility, Technology, and Librarianship. 54*(4) 7-9. Retrieved September 27, 2023, from https://journals.ala.org/index.php/ltr/article/view/6669/8958

Cruz-Neira, C., Fernández, M., & Portalés, C. (2018). Virtual Reality and Games. *Multimodal Technologies and Interaction, 2*(1) doi:10.3390/mti2010008

Damar, M. (2021). Metaverse Shape of Your Life for Future: A bibliometric snapshot. *Journal of Metaverse, 1*(1), 1-8. Retrieved June 20, 2023, from https://dergipark.org.tr/tr/pub/jmv/issue/67581/1051371

Davis, A., Murphy, J., Owens, D., Khazanchi, D., & Zigurs, I. (2009). Avatars, people, and virtual worlds: Foundations for research in metaverses. *Journal of the Association for Information Systems,* 10(2), 90-117. doi: 10.17705/1jais.00183

Day, K., Dong, Q., & DeCoste, T. (2009). Virtual Worlds and the Transformation of the Web to 3D. *MG 2009 Proceedings.* 3. Retrieved September 27, 2023, from http://aisel.aisnet.org/mg2009/3

Dede, C. (2009). Immersive interfaces for engagement and learning. *Science, 323*(5910), 66-69. https://doi.org/10.1126/science.1167311

Demir, B., & Sönmez, G. (2021). Generation Z students' expectations from English language instruction. *Journal of Language and Linguistic Studies, 17*(Special Issue 1), 683-701. doi: 10.17263/jlls.903536

Demir, S. K. (2021, April). Change of public sphere and forms of communication with virtual reality: The case of vtime from Turkey. *Communication and Technology*

Congress. 205-212. Retrieved September 4, 2023, from https://www.researchgate.net/publication/353596104_Change_of_Public_Sphere_and_Forms_of_Communication_with_Virtual_Reality_The_Case_of_Vtime_From_Turkey/references

Demiray Akbulut, F. (2020). 30 years of EFL studies in Turkey: A bibliometric analysis of research articles. *RumeliDE Dil ve Edebiyat Araştırmaları Dergisi, (Ö8),* 667-677. https://doi.org/10.29000/rumelide.816674

Deryakulu, D. (1998). Çoklu ortamlar. In B. Özer (Ed.), *Çağdaş eğitimde yeni teknolojiler* (pp. 67-86). Eskişehir: Anadolu Üniversitesi Açıköğretim Fakültesi Yayınları.

DeWitt-Brinks, D., & Rhodes, S. C. (1992). *Listening instruction: A qualitative meta-analysis of twenty-four selected studies,* US, Michigan. Retrieved June 1, 2023, from https://files.eric.ed.gov/fulltext/ED351721.pdf

Dhiman, B. (2023). Games as tools for social change communication: A critical review. *Global Media Journal, 21*(61). Retrieved August 4, 2023, from https://ssrn.com/abstract=4401202

Dictionary.com. (n.d.). Metaverse. Retrieved May 12, 2023, from https://www.dictionary.com/browse/metaverse

Dilman, H. (2019). Alfa kuşağı ile yabancı dil öğretimini yeniden düşünmek. *Ad-Hoc, 1*(5), 96-97. Retrieved September 2, 2023 from https://acikerisim.maltepe.edu.tr/xmlui/handle/20.500.12415/9690

Dinçer, S. (2018). Content Analysis in Scientific Research: Meta-Analysis, Meta-Synthesis, and Descriptive Content Analysis. *Bartın University Journal of Faculty of Education, 7*(1), 176-190. https://doi.org/10.14686/buefad.363159

Dionisio, J. D. N., Burns III, W. G., & Gilbert, R. (2013). 3D virtual worlds and the metaverse: Current status and future possibilities. *ACM Computing Surveys 45*(3), 34:1-34:38. doi: http://dx.doi.org/10.1145/2480741.2480751

Dixon, S. (2006). A history of virtual reality in performance. *International Journal of Performance Arts and Digital Media, 2*(1), 23-54. Retrieved November 27, 2023, fromhttps://www.researchgate.net/publication/228625222_A_history_of_virtual_reality_in_performance

Dominguez-Noriega, S. & Agudo, J. E., Ferreira, P., & Rico, M. (2011). Language learning resources and developments in the Second Life metaverse. *International Journal of Technology Enhanced Learning, 3*(5), 496-509. doi: 10.1504/IJTEL.2011.042101

Edwards, C. (2006). Another world. *Engineering and Technology, 1*(9), 28-32. https://doi.org/10.1049/et:20060904

EF English Proficiency Index. (2018). *A Ranking of 100 Countries and Regions by English Skills.* Retrieved August 3, 2023, from https://www.ef.com/assetscdn/WIBIwq6RdJvcD9bc8RMd/cefcom-epi-site/reports/2018/ef-epi-2018-english.pdf

EF English Proficiency Index. (2023). *A Ranking of 100 Countries and Regions by English Skills.* Retrieved August 3, 2023, from https://www.ef.com/wwen/epi/reports/epi-s/

Ekici Uysal, V. (2022). *Recreative in high schools social activities: A meta-synthesis study* (Publication No. 751692) [Master's thesis, Batman University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

El Shazly, R. (2021). Effects of artificial intelligence on English speaking anxiety and speaking performance: A case study. *Expert Systems, 38*(3), https://doi.org/10.1111/exsy.12667

Erdem, H. A. (2013). *Utilization of virtual reality environment as an interactive visual learning tool in primary school education system* (Publication No. 343046) [Master's thesis, Dokuz Eylül University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Erwin, E. J., Brotherson, M. J., & Summers, J. A. (2011). Understanding qualitative metasynthesis: Issues and opportunities in early childhood intervention research. *Journal of Early Intervention*, *33*(3), 186-200. https://doi.org/10.1177/1053815111425493

Failes, I. (2017, June 12). *The lawnmower man at 25: The groundbreaking VR film*. VFX Voice Magazine. Retrieved September 20, 2022, from https://www.vfxvoice.com/the-lawnmower-man-at-25-the-groundbreaking-vr-film/

Farjami, S., Taguchi, R., Nakahira, K. T., Fukumura, Y., & Kanematsu, H. (2011). W-02 Problem Based Learning for Materials Science Education in Metaverse. *Proceedings of 2011 JSEE Annual Conference*, 20-23. https://doi.org/10.20549/jseeen.2011.0_20

Flavián, C., Ibáñez-Sánchez, S., & Orús, C. (2019). The impact of virtual, augmented and mixed reality technologies on the customer experience. *Journal of Business Research, 100,* 547–560. doi: 10.1016/j.jbusres.2018.10.050

Ghanbarzadeh, R., & Ghapanchi, A. (2016). Investigating various application areas of three-dimensional virtual worlds for higher education. British Journal of Educational Technology. 49(3). doi:10.1111/bjet.12538

Gibbs, M. (2008). Yoowalk around the web. Retrieved September 27, 2023, from https://www.networkworld.com/article/800560/applications-yoowalk-around-the-web.html

Google Trends (n.d.). "Metaverse". Retrieved November 12, 2023, from https://trends.google.com/trends/explore?date=2012-01-01%202022-12-31&q=Metaverse&hl=en-GB

Grant, S. J., Huang, H., & Pasfield-Neofitou, S. E. (2013). Language learning in virtual worlds: The role of foreign language and technical anxiety. *Journal of Virtual Worlds Research*, *6*(1), 36-40. Retrieved August 12, 2023, from

https://www.researchgate.net/publication/272139752_Language_Learning_in_Virtual_Worlds_The_Role_of_FLA_and_Technical_Anxiety

Gülen, S., Dönmez, İ., & İdin, Ş. (2022). STEM education in metaverse environment: Challenges and opportunities. *Journal of STEAM Education*, *5*(2), 100–103. https://doi.org/10.55290/steam.1139543

Güney Demirdöken, G. (2022). *The analysis of distance education studies conducted during COVID-19 pandemic in Turkey: A meta-synthesis* (Publication No. 724513) [Master's thesis, Bahçeşehir University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Hatton, J. (2022). Immerse: The future of live vr language learning is here. Retrieved September 6, 2023, from https://metaverseinsider.tech/2022/10/14/immerse-the-future-of-live-vr-language-learning-is-here/

He, L., & Smith, J. (2019). ImmerseMe [Review]. In J. Levis, C. Nagle, & E. Todey (Eds.), *Proceedings of the 10th Pronunciation in Second Language Learning and Teaching Conference,* ISSN 2380-9566, Ames, IA, September 2018 (pp. 461-466). Ames, IA: Iowa State University.

Hoang, D. T. N., McAlinden, M., & Johnson, N. F. (2023). Extending a learning ecology with virtual reality mobile technology: oral proficiency outcomes and students' perceptions. Innovation in Language Learning and Teaching, 17(3), 491-504. https://doi.org/10.1080/17501229.2022.2070626

Hwang G. J., & Chien S. Y. (2022). Definition, roles, and potential research issues of the metaverse in education: An artificial intelligence perspective. *Computers and Education: Artificial Intelligence, 3*(3). https://doi.org/10.1016/j.caeai.2022.100082

ImmerseMe. (n.d.). How do I use 'Pronunciation' mode? [Photograph]. Retrieved October 21, 2023, from https://immerseme.zendesk.com/hc/en-gb/articles/900000422086-How-do-I-use-Pronunciation-mode-

Innocenti, E.D., Geronazzo, M., Vescovi, D., Nordahl, R., Serafin, S., Ludovico, L.A., et al. (2019). Mobile virtual reality for musical genre learning in primary education. *Computers & Education, 139*, 102-117. doi: 10.1016/j.compedu.2019.04.010

Jee, Min-Jung. (2010). ESL Students' attitudes toward tasks in Second Life. *STEM Journal, 11*(2), 183-205. doi: 10.16875/stem.2010.11.2.183

Jovanović, A., & Milosavljević, A. (2022). Vortex metaverse platform for gamified collaborative learning. *Electronics, 11*(3), 317. doi:10.3390/electronics11030317

Kanematsu, H., Kobayashi, T., Barry, D. M., Fukumura, Y., Dharmawansa, A., & Ogawa, N. (2014). Virtual STEM Class for Nuclear Safety Education in Metaverse. *Procedia Computer Science, 35*, 1255-1261. https://doi.org/10.1016/j.procs.2014.08.224

Kaplan-Rakowski, R., & Gruber. A. (2023). The impact of high-immersion virtual reality on foreign language anxiety when speaking in public. Smart Learning Environments, 10. https://doi.org/10.1186/s40561-023-00263-9

Karakoç, S. (2022). *Examination of number senses studies: A meta-synthesis study* (Publication No. 749932) [Master's thesis, Recep Tayyip Erdoğan University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Kelton, A. J. (2007). Second Life: Reaching into the virtual world of real-world learning. *EDUCAUSE Center for Applied Research Bulletin* (Volume 2007, Issue 17). Retrieved July 20, 2023, from https://library.educause.edu/resources/2007/8/second-life-reaching-into-the-virtual-world-for-realworld-learning

Kemp, J. (2006, July 12). *Second Life - Heart Murmur Sim* [Video file]. Retrieved from https://www.youtube.com/watch?v=xJY2Iwbzop4

Kemp, J., & Livingstone, D. (2006). Putting a Second Life "metaverse" skin on learning management systems. In D. Livingstone & J. Kemp (Eds.), Proceedings of the

Second Life Education Workshop at SLCC (pp. 13-18). San Francisco. Retrieved November 30, 2023, from https://files.eric.ed.gov/fulltext/ED493670.pdf

Khatoony, S. (2019, December). An innovative teaching with serious games through virtual reality assisted language learning. *2019 International Serious Games Symposium (ISGS)*, Tehran, Iran. doi: 10.1109/ISGS49501.2019.9047018.

Kıncal, R., & Beypınar, D. (2015). Ders araştırması uygulamasının matematik öğretmenlerinin mesleki gelişimlerine ve öğrenme sürecinin geliştirilmesine etkisi. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi, 1*(33), 186-210. Retrieved May 22, 2023, from https://dergipark.org.tr/tr/pub/maeuefd/issue/19406/206353

KirkwoodSLGroup. (2009, February 4). *07 of 10 Nutrition Game, Ohio University SL Tour* [Video file]. https://youtu.be/feqW9GFdfBA?si=yLUDi0vp0iSSO6uS

Kirner, C., Cerqueira, C. S., and Kirner, T. G. (2012). Using augmented reality artifacts in education and cognitive rehabilitation. In C. Eichenberg (Ed.), *Virtual Reality in Psychological, Medical and Pedagogical Applications* (pp. 247-270). InTech. doi: 10.5772/46416

Kocabay-Şener, N. (2021). Facebook Nasıl "Meta"laştı?. *Yeni Medya,* 11, 174-179. Retrieved January 6, 2023, from https://dergipark.org.tr/tr/pub/yenimedya/issue/67044/1038310#article_cite

Kondratiuk, L., Musiichuk, S., Zuienko, N., Sobkov, Y., Trebyk, O., & Yefimov, D. (2022). Distance Learning of Foreign Languages through Virtual Reality. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience, 13*(2), 22-38. https://doi.org/10.18662/brain/13.2/329

Korkmaz, E. (2022). *The use of augmented reality in mathematics education: A meta-synthesis study* (Publication No. 697136) [Master's thesis, Dokuz Eylül University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Koyuncu, İ. (2022). *Investigations on culture in Turkish as a second/foreign language textbooks: A meta-synthesis study* (Publication No. 741476) [Master's thesis, Hacettepe University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Kung, F. (2017). Teaching and Learning English as a Foreign Language in Taiwan: A Socio-Cultural Analysis. Retrieved August 7, 2023, from https://files.eric.ed.gov/fulltext/EJ1153833.pdf

Kuruüzümcü, R. (2007). Bir dijital ortam ve sanat formu olarak sanal gerçeklik. *Sanat Dergisi, 1*(12), 93-96. Retrieved September 29, 2023, from https://dergipark.org.tr/en/pub/ataunigsfd/issue/2600/33460

Lanier, J. (2001). Virtually there. *Scientific American, 284*(4), 66-75. Retrieved September 29, 2023, from https://www.jstor.org/stable/10.2307/26059170

Le, Q.T., Pedro, A., & Park, C. (2015). A Social Virtual Reality Based Construction Safety Education System for Experiential Learning. *Journal of Intelligent & Robotic Systems, 79,* 487-506. https://doi.org/10.1007/s10846-014-0112-z

Lee, E. A. L., & Wong, K. W. (2008). A review of using virtual reality for learning. In Z. Pan, A.D. Cheok, W. Müller, & A. El Rhalibi (Eds.), *Transactions on edutainment I,* (pp. 231-241). Berlin: Springer Science & Business Media. https://doi.org/10.1007/978-3-540-69744-2_18

Lee, S.H., Sergueeva, K., Catangui, M., & Kandaurova, M. (2017). Assessing Google Cardboard virtual reality as a content delivery system in business classrooms. *Journal of Education for Business, 92*(4), 153-160. Retrieved September 27, 2023, from doi: 10.1080/08832323.2017.1308308

Longman Dictionary of Contemporary English Online. (n.d.). Virtual Reality. Retrieved May 6, 2023, from https://www.ldoceonline.com/dictionary/virtual-reality

Ma, M., & Zheng, H. (2011). Virtual reality and serious games in healthcare. In S. Brahnam & L.C. Jain (Eds.), *Advanced Computational Intelligence Paradigms in*

Healthcare 6. Virtual Reality in Psychotherapy, Rehabilitation, and Assessment (169-192). Berlin: Springer. doi:10.1007/978-3-642-17824-5_9

Martín-Páez, T., Aguilera, D., Perales-Palacios, F. J., & Vílchez-González, J. M. (2019). What are we talking about when we talk about STEM education? A review of literature. *Science Education, 103*(4), 799-822. doi: 10.1002/sce.21522

McGovern, E., Moreira, G. & Luna-Nevarez, C. (2020) An application of virtual reality in education: Can this technology enhance the quality of students' learning experience?. *Journal of Education for Business, 95*(7), 490-496, https://doi.org/10.1080/08832323.2019.1703096

Mehrabov, I. (2015). Immersive Televisual Environments: Spectatorship, Stereoscopic Vision and the Future of 3DTV. VIEW Journal of European Television History and Culture, 4(7), 99-109. doi:10.18146/2213-0969.2015.jethc084

Melchor-Couto, S. (2016). Foreign language anxiety levels in Second Life oral interaction. *ReCALL, 29*(1), 99-119. https://doi.org/10.1017/S0958344016000185

Meta. (n.d.). Compare your Meta Quest [Photograph]. Retrieved October 20, 2023, from https://www.meta.com/quest/compare/

Milgram, P., Takemura, H., Utsumi, A. and Kishino, F. (1994) Augmented reality: A class of displays on the reality-virtuality continuum. Telemanipulator and Telepresence Technologies, SPIE, 2351, 282-292. http://dx.doi.org/10.1117/12.197321

Minogue, J., Jones, G., M., Broadwell, B., & Oppewall, T. (2006). The impact of haptic augmentation on middle school students' conceptions of the animal cell. *Virtual Reality, 10,* 293-305. https://doi.org/10.1007/s10055-006-0052-4

Moreira, G. J., Luna-Nevarez, C., & McGovern, E. (2022). It's about enjoying the virtual experience: The role of enjoyment and engagement in the adoption of virtual reality in marketing education. *Marketing Education Review, 32*(3), 224-239. doi:10.1080/10528008.2021.1965486

Mystakidis, S. (2020). Metaverse. *Encyclopedia, 2*(1), 486–497. https://doi.org/10.3390/encyclopedia2010031

Nemtinov, V. A. & Borisenko, A., & Morozov, V. V. & Nemtinova, Y. V., & Nemtinov, K. V. (2022). Visualization of Digital Transformation of Industrial Production into the Educational Process. *Scientific Visualization, 14*(3). doi: 10.26583/sv.14.3.04

Nigam, A. (2022). Online gaming and OTT consumption: An exploratory study of generation z. *Journal of Promotion Management, 28*(4), 420-442. https://doi.org/10.1080/10496491.2021.2008576

Noblit, G. W., & Hare, R. D. (1988). Meta-Ethnography: Synthesizing qualitative studies. *Counterpoints, 44,* 93-123. Retrieved May 29, 2023, from http://www.jstor.org/stable/42975557

Ortega-Rodríguez, P. J. (2021). From broad reality to the Metaverse: Critical reflection on the contribution of education. *Metaverse, 2*(2), 12. doi: 10.54517/m.v2i2.1784

Oyar, İ. (2021). *A meta-synthesis study for the problems experienced by international students in teaching Turkish as a foreign language* (Publication No. 656886) [Master's thesis, Hacettepe University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Park, S. M., & Kim, Y. G. (2022). A metaverse: Taxonomy, components, applications, and open challenges. *IEEE Access, 10,* 4209-4251. doi: 10.1109/ACCESS.2021.3140175

Parmaxi, A. (2020). Virtual reality in language learning: A systematic review and implications for research and practice. *Interactive learning environments*, 31(1), 172-184. https://doi.org/10.1080/10494820.2020.1765392

Peterson, M. (2011). Towards a research agenda for the use of three-dimensional virtual worlds in language learning. *CALICO Journal, 29*(1), 67-80. https://doi.org/10.11139/cj.29.1.67-80

Pimentel, K., & Teixeira, K. (1995). *Virtual reality: Through the new looking glass.* New York: McGraw-Hill Inc.

Polat, S., & Ay, O. (2016). Meta-sentez: Kavramsal bir çözümleme. *Eğitimde Nitel Araştırmalar Dergisi, 4*(1), 52-64. https://doi.org/10.14689/issn.2148-2624.1.4c2s3m

Pre-cinema instruments. (n.d.). Brewster's Stereoscope [Photograph]. Retrieved October 20, 2023, from http://virtualtours.musei.unipd.it/itinerary/museo-di-storia-della-fisica/68/relic/brewster-stereoscope

Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the horizon, 9*(5), 1-6. https://doi.org/10.1108/10748120110424816

Proshkova, Z. V. (2020). Advantages of studying at online schools in assessments of students' families. *Proceedings of the International Scientific Conference "Digitalization of Education: History, Trends and Prospects" (DETP 2020).* Atlantis Press. https://doi.org/10.2991/assehr.k.200509.150

Putra, P. W. A. A., Santosa, M. H., & Saputra, I. (2020). ELT teacher perception on the use of virtual reality as learning media. *Lingua Scientia, 27*(2), 77-87. doi:10.23887/ls.v27i2.26075

Rheingold, H. (1991). *Virtual reality*. New York: Summit Books.

Rothman, D. (2016). *A Tsunami of learners called Generation Z.* Retrieved August 8, 2021, from http://www.mdle.net/Journal/A_Tsunami_of_Learners_Called_Generation_Z.pdf

Roush, W. (2007, June 18). *Second earth.* Technology review. Retrieved June 20, 2023, from https://www.technologyreview.com/2007/06/18/272040/second-earth/

Rysuľová, A. (2021). Application of the virtual environment in the educational process. In Ľ. Čábyová, Z. Bezáková, & A. Madleňák (Eds.), *Marketing identity: New changes, new challenges,* (pp.571-579). Trnava: Združenie MASS MEDIA

SCIENCE. Retrieved August 10, 2022, from https://www.ceeol.com/search/article-detail?id=1021979

Sadiku, M. N.O., Shadare, A. E., & Musa, S. M. (2017). Digital entertainment. *International Journals of Advanced Research in Computer Science and Software Engineering, 7*(8), 62–63. doi: 10.23956/ijarcsse/V7I7/01710

Saka, E. (2019). *Educational purpose for virtual reality games investigation of researches: A meta-synthesis study* (Publication No. 546392) [Master's thesis, Trabzon University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Sanchez-Vives, M. V, Spanlang, B., Frisoli, A., Bergamasco, M., Slater, M. (2020). Virtual Hand Illusion Induced by Visuomotor Corelations. PLoS ONE, 5(4). doi:10.1371/journal.pone.0010381

Sandelowski, M., Barroso, J., & Voils, C. I. (2007). Using qualitative metasummary to synthesize qualitative and quantitative descriptive findings. *Research in nursing & health, 30*(1), 99-111. https://doi.org/10.1002/nur.20176

Saraçoğlu, M. (2015). *Türkiye'de geometrik düşünme üzerine yapılan araştırmalara ilişkin bir meta-sentez.* (Publication No. 391857) [Doctoral dissertation, Dicle University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Sarigoz, O. (2019). Augmented reality, virtual reality and digital games: A research on teacher candidates. *Educational Policy Analysis and Strategic Research, 14*(3), 41-63. doi: 10.29329/epasr.2019.208.3

Satake, Y., Yamamoto, S., & Obari, H. (2022). The effects of English conversation lessons in virtual reality on the confidence of Japanese learners of English. *15th annual International Conference of Education, Research and Innovation,* 6737-6744. doi: 10.21125/iceri.2022.1700

Scott, H., Griffin, C., Coggins, W., Elberson, B., Abd-Eldayem, M., Virmani, T., … & Petersen, E. (2022). Virtual reality in the neurosciences: current practice and future directions. *Frontiers in Surgery, 8*. doi:10.3389/fsurg.2021.807195

Scruggs, T. E., Mastropieri, M. A., and McDuffie, K. A. (2006). Summarizing qualitative research in special education: Purposes and procedures. *Applications of Research Methodology* (pp. 315-335). Emerald Group Publishing Limited

Sekiguchi, S., Gruba, P., & Al-Asmari, A. R. (2006). Integrating culture in the second language curriculum through a three-dimensional virtual reality environment. *Proceedings of the 23rd annual ascilite conference: Who's learning? Whose technology?*, 747-751. Retrieved September 10, 2023, from https://www.ascilite.org/conferences/sydney06/proceeding/pdf_papers/p56.pdf

Shapovalov, Y. B., Bilyk, Z. I., Atamas, A. I., & Shapovalov, V. B. (2018). The Potential of Using Google Expeditions and Google Lens Tools under STEM-education in Ukraine. *International Workshop on Augmented Reality in Education*. doi:10.31812/123456789/2665

Sığnaktekin, C. (2022). *A research on articles made in history teaching in the field of social studies education in Turkey: Meta synthesis study* (Publication No. 746513) [Master's thesis, Ordu University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Sjölie, D., Eriksson, T., Samuelsson-Gamboa, M., Wideström, J. (2020) practıcal use of off-the-shelf virtual reality for distance education - a look at the feasibility of non-expert use. *EDULEARN20 Proceedings*, 4277-4285. doi: 10.21125/edulearn.2020.1139

Stanley, G., & Mawer, K. (2008). language learners & computer games: From space invaders to Second Life. *TESL-EJ, 11*(4). Retrieved May 17, 2023, from https://files.eric.ed.gov/fulltext/EJ898143.pdf

Stephenson, N. (1992). *Snow crash*. London: Penguin Books

Stevens, V. (2006). Second life in education and language learning. *TESL-EJ, 10*(3). Retrieved March 24, 2023, from https://tesl-ej.org/pdf/ej39/int.pdf

StudyCorgi. (2023). Virtual Environments in Social Context. Retrieved May 11, 2023, from https://studycorgi.com/virtual-environments-in-social-context/

Sun, Y. & Gheisari, M. (2021). Potentials of Virtual Social Spaces for Construction Education. *Proceedings of the 57th Annual Associated Schools of Construction (ASC) International Conference*, 2, 469-477. doi: 10.29007/sdsj

Surviving VR Winter. (2023). Retrieved October 20, 2023, from https://medium.com/@generativereality/surviving-vr-winter-12503c1ce308

Szita, K., Moss-Wellington, W., Sun, X., & Ch'ng, E. (2023). Going to the movies in VR: Virtual reality cinemas as alternatives to in-person co-viewing. *International Journal of Human-Computer Studies, 181.* , doi:10.1016/j.ijhcs.2023.103150

Şimşek, E. (2021). *A meta-synthesis on the effects of gamification applications in online learning environments* (Publication No. 675112) [Master's thesis, Atatürk University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Tawfik, G. M., Dila, K. A. S., Mohamed, M. Y. F., Tam, D. N. H., Kien, N. D., Ahmed, A. M., Huy, N. T. (2019). A step by step guide for conducting a systematic review and meta-analysis with simulation data. *Trop Med Health, 47*(46). https://doi.org/10.1186/s41182-019-0165-6

Teaching a Class in Second Life (n.d.). Retrieved October 17, 2023, from https://vorticism.wordpress.com/the-instructor-view/teaching-a-class/

TechTerms.com. (n.d.). Virtual reality. In *Tech Terms Computer Dictionary*. Retrieved October 23, 2023, from https://techterms.com/definition/virtualreality

Tooth, S. (2015). Google Earth as a resource. *Geography, 100*(1), 51-56. doi: 10.1080/00167487.2015.12093954

Tunç, S. (2018). *Determining people's interaction and audience anxieties in virtual reality environments* (Publication No. 542379) [Master's thesis, Kırşehir Ahi Evran University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Turkish Language Association Dictionary. (n.d.). Virtual Reality. Retrieved May 8, 2023, from https://sozluk.gov.tr/

Tutgun-Ünal, A. (2022). Sosyal medya kuşağından metaverse kuşağına dijital oyunlar. In A. Tutgun-Ünal, , & N. Tarhan (Eds.), *Metaverse dijital oyun psikolojisi* (pp. p.7-18). İstanbul: Der Yayınları.

Tutgun-Ünal, A., & Tarhan**,** N. (2022). Metaverse awareness and generation to transform education. *International Journal of Academic Research in Education, 8*(1), 64-74. doi:10.17985/ijare.1153663

Tüzün, H., Yılmaz-Soylu, M., Karakuş, T., İnal, Y., & Kızılkaya, G. (2009). The effects of computer games on primary school students' achievement and motivation in geography learning. *Computers & Education,* 68-77. https://doi.org/10.1016/j.compedu.2008.06.008

Ünver, G. (2022). *Reasons for school absenteeism and dropout: A meta-synthesis investigation* (Publication No. 729999) [Master's thesis, Istanbul Medeniyet University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Van Ginkel, S., Gulikers, J., Biemans, H., Noroozi, O., Roozen, M., Bos, T., et al (2019). Fostering oral presentation competence through a virtual reality-based task for delivering feedback. *Computers & Education, 134,* 78-97. https://doi.org/10.1016/j.compedu.2019.02.006

Virtual Reality Society (n.d.). History of virtual reality. Retrieved June 12, 2022, from https://www.vrs.org.uk/virtual-reality/history.html

Virtual Reality Times. (2015). Google Cardboard: Everything You Need To Know [Photograph]. Retrieved October 20, 2023, https://virtualrealitytimes.com/2015/02/04/google-cardboard-everything-you-need-to-know/

Voinea, G. D., Boboc, R. G., & Antonya, C. (2022). Mixed reality tools for education in the metaverse. *Education and New Development, 12*(4), 249-251. https://doi.org/10.36315/2022v2end056

Von der Emde, S., Schneider, J., & Kötter, M. (2001). Technically speaking: Transforming language learning through virtual learning environments (MOOs).

The Modern Language Journal, *85*(2), 210-225. https://doi.org/10.1111/0026-7902.00105

vTime. (2015). vTime Early Access is Live! Download Now from the Oculus Store [Photograph]. Retrieved October 20, 2023, from https://vtime.net/news/2015/vtime-is-live-download-now-from-the-oculus-store

Walsh, D., & Downe, S. (2005). Meta-synthesis method for qualitative research: A literature review. *Journal of Advanced Nursing*, *50*(2), 204-211. https://doi.org/10.1111/j.1365-2648.2005.03380.x

Wang, C. X., Song, H., Xia, F., & Yan, Q. (2009) Integrating Second Life into an EFL program: Students' perspectives. *Journal of Educational Technology Development and Exchange (JETDE), 2*(1). doi: 10.18785/jetde.0201.01

Wang, Z. (2014). An analysis on the use of video materials in college English teaching in China. *International Journal of English Language Teaching*, *2*(1), 23-28. https://doi.org/10.5430/ijelt.v2n1p23

Won, S. G. L., Evans, M. A., Carey, C., & Schnittka, C. G. (2015). Youth appropriation of social media for collaborative and facilitated design-based learning. *Computers in Human Behavior*, *50*, 385-391. https://doi.org/10.1016/j.chb.2015.04.017

Wu, J., & Gao, G. (2022). Edu-Metaverse: Internet Education Form with Fusion of Virtual and Reality. *Proceedings of the 2022 8th International Conference on Humanities and Social Science Research (ICHSSR 2022), 664*, 1082–1085. Atlantis Press. Retrieved June 21, 2022, from https://doi.org/10.2991/assehr.k.220504.197

Xu, Q. (2014). Should I trust him? The effects of reviewer profile characteristics on eWOM credibility. *Computers in Human Behavior*, 33, 136–144. https://doi.org/10.1016/j.chb.2014.01.027

Yaman, H. (2019). *The use of virtual reality laboratories in education and a graphic analysis study* (Publication No. 591625) [Master's thesis, Yaşar University]. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

Yang, J. C., Chen, C. H., & Jeng, M. C. (2010). Integrating video-capture virtual reality technology into a physically interactive learning environment for English learning. Computers & Education, 55(3), 1346-1356. https://doi.org/10.1016/j.compedu.2010.06.005

Zhang, Ruiqi. (2023). Research on the Progress of VR in Game. Highlights in Science, Engineering and Technology. 39, 103-110. doi:10.54097/hset.v39i.6507

Zheng, D., Young, M. F., Brewer, R. A., & Wagner, M. (2009). Attitude and self-efficacy change: English language learning in virtual worlds. *CALICO Journal*, *27*(1), 205–231. Retrieved August 22, 2023, from http://www.jstor.org/stable/calicojournal.27.1.205

Zhong, Z., Hu, J., Tan, G., & Sun, C. (2009). The Application of Google Earth in Education. *2009 First International Workshop on Education Technology and Computer Science, 1*, 10-13. doi:10.1109/ETCS.2009.10

APPENDIX

Appendix 1: The studies included in this meta synthesis study

A1 Satake, Y.& Yamamoto, S. & Obari, H. (2021). Effects of virtual reality use on Japanese English learners' foreign language anxiety. *ICERI2021 Proceedings*, 1234-1240. doi:10.21125/iceri.2021.0358

A2 Godefridi, I. & Suner, F. & Leblanc, C. & Meunier, F. (2021). Using virtual reality and peer feedback to reduce L2 speaking anxiety: an exploratory study. *CALL and professionalisation: short papers from EUROCALL 2021*. doi: 10.14705/rpnet.2021.54.1316

A3 Alemi, M., & Khatoony, S. (2020). Virtual reality assisted pronunciation training (vrapt) for young efl learners. *Teaching English with Technology*, *20*(4), 59-81. Retrieved from https://files.eric.ed.gov/fulltext/EJ1271706.pdf

A4 Muradlı, T. H. (2021) Improving Azeri EFL secondary school students' pronunciation through a virtual reality game managed by a humanoid robot. *Elmi iş Scientific Work International Scientific Journal, 15*(4), 195-204. doi:10.36719/2663-4619/65/195-204

A5 Kruk, M. (2014). The use of internet resources and browser-based virtual worlds in teaching grammar. *Teaching English with Technology, 14* (2), 52-67. Retrieved from https://files.eric.ed.gov/fulltext/EJ1143399.pdf

A6 Sato, K., Hamamoto, K., Wright, D., & Nakagawa H. (2019). A virtual reality-based language learning environment to teach sentence word order. *Journal of Advances in Humanities and Social Sciences, 5*(5), 196-206. doi: 10.20474/jahss-5.5.1

A7 Acar, A., & Cavas, B. (2020). The effect of virtual reality enhanced learning environment on the 7th-grade students' reading and writing skills in English. *Malaysian Online Journal of Educational Sciences, 8*(4), 22-33. Retrieved from https://eric.ed.gov/?id=EJ1271886

A8 Khodabandeh, F. (2022). Exploring the applicability of virtual reality- enhanced education on extrovert and introvert EFL learners' paragraph writing. *International*

Journal of Educational Technology in Higher Education volume 19, 27. Retrieved from https://doi.org/10.1186/s41239-022-00334-w

A9 Dolgunsöz, E., Yıldırım, G., & Yıldırım, S. (2018). The effect of virtual reality on EFL writing performance. *Journal of Language and Linguistic Studies, 14*(1), 278-292.

A10 Chen, Y., Smith, T. J., Cindy S. York & Hayley J. Mayall (2020) Google Earth Virtual Reality and expository writing for young English Learners from a Funds of Knowledge perspective. *Computer Assisted Language Learning, 33*(1-2), 1-25, https://doi.org/10.1080/09588221.2018.1544151

A11 Tai, T. Y., Chen, H. H., & Todd, Graeme (2022). The impact of a virtual reality app on adolescent EFL learners' vocabulary learning. *Computer Assisted Language Learning, 35*(4), 892-917, doi: 10.1080/09588221.2020.1752735

A12 Tseng, W., & Liou, H., & Chu, H. J. (2020). Vocabulary learning in virtual environments: Learner autonomy and collaboration. *System, 88.* https://doi.org/10.1016/j.system.2019.102190

A13 Kurniawati, N., Sofarini, A., Maolida, E. H., & Jatmika, R. T. D. (2022). The praxis of integrating virtual reality into vocabulary teaching to young learners. *English Review: Journal of English Education, 10*(2), 371-380. https://doi.org/10.25134/erjee.v10i2.6238

A14 Soto, J. H. B., Ocampo, D. C. T., Beltrán Colon, L. del C., & Oropesa, A. V. (2020). Perceptions of ImmerseMe Virtual Reality Platform to Improve English Communicative Skills in Higher Education. *International Journal of Interactive Mobile Technologies (iJIM), 14*(07), pp. 4–19. https://doi.org/10.3991/ijim.v14i07.12181

A15 Yang, F.-C. O., Lo, F.-Y. R., Hsieh, J. C., & Wu, W.-C. V. (2020). Facilitating Communicative Ability of EFL Learners via High-Immersion Virtual Reality. *Journal of Educational Technology & Society, 23*(1), 30–49. Retrieved from https://www.jstor.org/stable/26915405

A16 Liaw, M. L. (2019). EFL learners' intercultural communication in an open social virtual environment. *Educational Technology & Society, 22*(2), 38–55. Retrieved from https://www.jstor.org/stable/26819616

A17 Jauregi Ondarra, K., Gruber, A., & Canto, S. (2020). When international avatars meet – intercultural language learning in virtual reality exchange. In K. M. Frederiksen, S. Larsen, L. Bradley & S. Thouësny (Eds), *CALL for widening participation: short papers from EUROCALL 2020* (pp. 138-142). Research-publishing.net. https://doi.org/10.14705/rpnet.2020.48.1178

A18 Sadiku, A. (2018). The effects of virtual worlds on improving students' communication and collaboration skills. *International Journal of Sciences: Basic and Applied Research (IJSBAR), 42*(1), 202–211. Retrieved from https://gssrr.org/index.php/JournalOfBasicAndApplied/article/view/9406

A19 Kassim, S., Witkin, N., & Stone, A. (2019). Student perceptions of virtual reality use in a speaking activity. In F. Meunier, J. Van de Vyver, L. Bradley & S. Thouësny (Eds), *CALL and complexity – short papers from EUROCALL 2019* (pp. 223-228). Research-publishing.net. https://doi.org/10.14705/rpnet.2019.38.1013

A20 Alwafi, G. A., Almalki, S., Alrougi, M., Meccawy, M., & Meccawy, Z. (2022). A Social Virtual Reality Mobile Application for Learning and Practicing English. *International Journal of Interactive Mobile Technologies (iJIM)*, *16*(09), pp. 55–75. https://doi.org/10.3991/ijim.v16i09.28289

A21 Hui-Chin Yeh, Sheng-Shiang Tseng & Leechin Heng (2020): Enhancing EFL students' intracultural learning through virtual reality. Interactive Learning Environments, 30(2). https://doi.org/10.1080/10494820.2020.1734625

A22 Tai, T. Y. (2022). Impact of mobile virtual reality on EFL learners' listening comprehension. *Language Learning & Technology, 26*(1), 1–23. Retrieved from https://hdl.handle.net/10125/73491

A23 Utami, L.& Suwastini, N. & Dantes, G., Suprihatin, C. & Adnyani, K. (2021). Virtual reality for supporting authentic learning in 21st century language classroom. *Jurnal Pendidikan Teknologi dan Kejuruan. 18.* 132-141 doi: 10.23887/jptk-undiksha.v18i1.32376

A24 Ozkan, B. (2017). The reflections of English as a foreign language teachers' on the use of virtual reality in classroom practice (International Black Sea University Case).

Journal of Education in Black Sea Region, 2(2), 34-43. https://doi.org/10.31578/jebs.v2i2.40

A25 Demirbilek, M., & Koç, D. (2021). In their own words: Teachers experiences and activities in 3d virtual worlds for foreign language teaching. *ICTERI* (pp. 217-225). Retrieved from https://ceur-ws.org/Vol-3013/20210217.pdf

A26 Zhang, Y. (2021). Virtual reality in ESL teacher training: Practical ideas. *International Journal of Technology in Teaching and Learning, 16*(1), 20-36. doi:10.37120/ijttl.2020.16.1.03

A27 Şimşek, İ. & Can, T. (2015). The use of 3d virtual learning environments in training foreign language pre-service teachers. *Turkish Online Journal of Distance Education, 16*(4), 114-124. doi: 10.17718/tojde.53012

A28 Han, D. (2022). Exploration for educational application of metaverse: focusing on implication for use in English education. *Robotics & AI Ethics, 7*(1), 10-21. doi:10.22471/ai.2022.7.1.10

A29 Christoforou, M. (2022). Enhancing the ESP lesson with immerse: A pedagogical example of a metaverse language learning platform. *14th International Conference Innovation in Language Learning 2022,* https://conference.pixel-online.net/library_scheda.php?id_abs=5768

A30 Akkaya, N., & Şengül, L. (2022). Metaverse ve dil eğitimi. *International Journal of Education and New Approaches, 5*(2), 314-326. https://doi.org/10.52974/jena.1194504

A31 Syafrony, A., & Kusuma, V. A. (2022). A universal language translator: Is this the future or the doom of language learning?. *Humaya Journal: Journal of Law, Humanities, Society and Culture, 2*(2), 92-100. https://doi.org/10.33830/humayafhisip.v2i2.4107

A32 Sarı, Y. E. (2022). Authentic language learning in metaverse: A big step in the technological revolution or a buzzword? *HAYEF: Journal of Education, 19*(3), 255-259. doi:10.5152/hayef.2022.28

A33 Mustafa, B. (2022). Analyzing education based on Metaverse Technology. *Technium Social Sciences Journal, 32,* 278-295. https://doi.org/10.47577/tssj.v32i1.6742

A34 Aydin, S. (2022). The metaverse in foreign language learning: A theoretical framework. *Innovational Research in ELT, 3*(2), 12-19. https://doi.org/10.29329/irelt.2022.505.2

A35 Suh, W., & Ahn, S. (2022). Utilizing the metaverse for learner-centered constructivist education in the post-pandemic era: An analysis of elementary school students. *Journal of Intelligence, 10*(1), 17. https://doi.org/10.3390/jintelligence10010017

A36 Tlili, A., Huang, R., Shehata, B., Liu, D., Zhao, J., Saleh, A. H., … Burgos, D. (2022). Is Metaverse in education a blessing or a curse: a combined content and bibliometric analysis. *Smart Learning Environments, 9*(24), 1-31. doi:10.1186/s40561-022-00205-x

A37 Artsın M., & Bağcı Sezer A., (2022). Açık ve uzaktan öğrenmede metaverse: Bir SWOT analizi. *Yükseköğretim ve Bilim Dergisi/Journal of Higher Education and Science, 12*(3), 497-507. https://doi.org/10.5961/higheredusci.1107335

A38 Hismanoglu, M. (2012). Integrating Second Life into an EFL classroom: A new dimension in foreign language learning and teaching. *International Journal on New Trends in Education and Their Implications, 3*(4), 100-111. Retrieved from http://ijonte.org/FileUpload/ks63207/File/09.hismanoglu.pdf

A39 Balcıkanlı, C. (2012). Language learning in Second Life: American and Turkish students' experiences. *Turkish Online Journal of Distance Education , 13* (2) , 131-146. Retrieved from https://dergipark.org.tr/en/pub/tojde/issue/16900/176149

A40 Chen, Y.-L. (2016). The effects of virtual reality learning environment on student cognitive and linguistic development. *The Asia-Pacific Education Researcher, 25*(4), 637-646. https://doi.org/10.1007/s40299-016-0293-2

A41 Aydin, S. (2013). Second Life as a foreign language learning environment: A review of research. *Turkish Online Journal of Distance Education, 14*(1), 53-63. Retrieved from https://dergipark.org.tr/en/pub/tojde/issue/16895/176013#article_cite

CURRICULUM VITAE

Sevda AMAÇ

Education

Degree	*Year*	*University, Institute, Department*
MA	2024	Maltepe University, Graduate School, Department of Foreign Language Education
BA	2010	Istanbul University, Faculty of Letters, Department of English Language and Literature,
High School	2006	Üsküdar Burhan Felek Foreign Language Intensive High School

Work/Employment

Year	*Job*
Sep 2015 - …	English Instructor, Piri Reis University, English Preparatory School
Jul 2013 - Sep 2015	English Teacher, American Culture Language School
May 2012 - Jul 2013	Global Customer Representative, HSBC
Sep 2011 - May 2012	Education Coordinator, Elit-iz Private Teaching Institution
Apr 2011 - Sep 2011	Assistant Editor, Yds Publishing
Jul 2010 - Apr 2011	English Teacher, English Campus