AUGMENTED REALITY AND ETHICAL REASONING: A MINI REVIEW OF PEDAGOGICAL FRAMEWORKS AND FUTURE DIRECTIONS IN SECONDARY EDUCATION

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Abstract*: This mini-review brings together recent research (from 2020 to 2025) on how Augmented Reality (AR) can help students in secondary school learn about morals and ethics better, when guided by three key frameworks: Universal Design for Learning (UDL), the Cognitive Theory of Multimedia Learning (CTML), and Rest's Four Component Model (FCM). AR is no longer just seen as a way to make learning more fun; it can now place students in realistic situations where they have to think about right and wrong, understand different viewpoints, and reflect thoughtfully through interactive and immersive experiences. To find this information, a detailed search was done across several academic databases like Scopus, Web of Science, ScienceDirect, SpringerLink, and Google Scholar. The search used specific key terms like AR, immersive technology, moral or ethical education, secondary education, and the three frameworks mentioned. Using a process based on PRISMA, only peer-reviewed English articles published between January 2020 and December 2025 were included, and other types of studies or non-peer-reviewed materials were left out. The findings show that AR works best when its design clearly includes (a) UDL to support different types of learners and make things more accessible, (b) CTML to help students process information without getting overwhelmed, and (c) FCM to move from understanding moral issues to making decisions, being motivated to act morally, and actually doing something about it. However, the research also shows some problems: many AR projects focus on quick engagement and short discussions without showing that students apply these lessons in real life; there's not always consistency in using CTML, which can lead to confusion or overload; and AR isn't often used in a way that covers all parts of the FCM, especially when it comes to taking action. Overall, the review finds that AR can help students in secondary school develop better moral reasoning, but its success depends on using these frameworks in a thoughtful way, checking its long-term effects, and using better ways to measure how students' morals and behaviors change.*

Introduction

In the past ten years, immersive digital technologies, especially Augmented Reality (AR), have become increasingly popular in educational research because they can change traditional teaching methods into more interactive, student-focused, and hands-on learning experiences (Radianti et al., 2020; Garzón et al., 2022; Marín-Marín et al., 2023). AR allows learners to blend virtual information with the real world, helping them understand complex ideas in a more meaningful and practical way, which improves their understanding, interest, and ability to stay engaged (Cao & Yu, 2023; Akçayır & Akçayır, 2024). Recent studies also show that learning with AR is more effective than traditional methods at helping students develop higher-level thinking skills, especially when the AR experiences are created with clear educational goals rather than just focusing on new technology (Ibáñez & Delgado-Kloos, 2021; Garzón et al., 2023).

Additionally, new research shows that AR is becoming more important in helping learners develop emotional and social aspects of learning, such as empathy, seeing situations from others' perspectives, understanding moral issues, and making ethical decisions (Osadchyi et al., 2021; Lin et al., 2024; Prasittichok et al., 2024). These skills are key to ethical reasoning, which is the ability to identify moral problems, weigh different values, predict outcomes, and make decisions based on ethical principles (Rest et al., 1999; Narvaez & Lapsley, 2020). AR's features, like immersive situations, role-playing experiences, and real-life moral scenarios, make it a valuable tool for helping teenagers explore complex moral issues that reflect real-world ethical challenges (Sari et al., 2020; Papanastasiou et al., 2022; Chen & Huang, 2024).

The importance of using augmented reality (AR) to teach ethics is especially clear in secondary education. This is a time when students are more aware of right and wrong, are forming their own identities, and are facing more complex moral choices because of the digital world, artificial intelligence, and global connections (Killen & Dahl, 2021; OECD, 2023; Peters & Besley, 2024). As teens deal with issues like being responsible online, fairness, caring for the environment, and how to treat others, schools are being asked to help them not just learn subjects, but also understand values and take ethical actions (UNESCO, 2021; Malaysian Ministry of Education, 2023). AR can help make learning about ethics more real, meaningful, and connected to everyday life in ways that traditional teaching methods often can't (Lampropoulos et al., 2022; Koumpouros, 2024).

However, even though AR has a lot of potential in teaching ethics, the research shows that there are many gaps and mixed findings in how these tools are created, used, and supported by theory (Ali et al., 2025; Garzón et al., 2023). Some studies show that AR can help students think more deeply about ethical issues and get more involved in moral discussions. But there are also worries about students being overwhelmed, feeling too emotional, not engaging deeply, or not seeing real changes in their behavior (Radianti et al., 2020; Makransky & Petersen, 2022; Prasittichok et al., 2024). Plus, many AR tools are not well connected to established learning and psychology models that help support real understanding, fairness, and long-term growth. In particular, there is not enough use of well-known teaching models like Universal Design for Learning (UDL), the Cognitive Theory of Multimedia Learning (CTML), and Rest's Four Component Model (FCM) of moral behavior (Lampropoulos et al., 2022; Koumpouros, 2024; Lin et al., 2024).

UDL helps make learning accessible and flexible for everyone. CTML gives ways to manage how much information students take in by using different types of learning, breaking tasks into parts, and keeping things clear. FCM looks at moral behavior as a mix of sensing what's right, making good decisions, being motivated to act right, and having the character to do so (CAST, 2018; Mayer, 2020; Narvaez & Lapsley, 2020). If these models aren't used together, then AR lessons might be fun but not really help students grow, be fair, or match what they need developmentally. In response to these challenges, there is an increasing demand for approaches to ethical education using augmented reality that are based on strong theory and structured frameworks. These approaches should balance emotional engagement with clear thinking, thoughtful reflection on ethics with structured learning support, and new ideas with fairness and inclusivity (Ibáñez et al., 2022; Marín-Marín et al., 2023; Ali et al., 2025). Using principles from Universal Design for Learning, strategies from Cognitive Technological Mediation Learning, and concepts from the FCM model of moral development could lead to a more complete and effective way to create AR environments that truly support ethical thinking in secondary schools. This integration is important to move the field from just experimenting with AR to building lasting teaching methods that can help students learn moral lessons that are meaningful and can be applied in real life.

This mini-review aims to bring together recent research (2020–2025) on using AR to teach ethics and morals in secondary schools, with a focus on teaching methods and future research. The review is organized into three main topics:
1.The benefits of using AR to teach ethical and moral ideas,
2.How AR learning designs match existing teaching and moral development models, and
3.Evidence about how AR affects students' ethical thinking and moral behavior in the short and long term.

By looking at these areas closely, this review hopes to give researchers, instructional designers, and teachers clearer ideas and useful guidance for creating AR-based learning experiences that are fair, smart, and capable of making a real difference in students' ethical development.

Methods

A thorough search of the literature was done to find and look at research articles about using Augmented Reality (AR) in teaching morals, especially in high schools. The main goal was to see how AR is used in teaching in line with well-known teaching methods like Universal Design for Learning (UDL), Rest's Four Component Model (FCM), and the Cognitive Theory of Multimedia Learning (CTML). The review followed the PRISMA guidelines to make sure the process was clear and done properly.

Database and Search Strategy
Sustainable tourism as defined by The World Tourism Organization (UNWTO) is tourism that takes full account of current and future economic, social and environmental impacts… The literature search was conducted across five major electronic academic databases: Scopus, Web of Science, ScienceDirect, SpringerLink, and Google Scholar. The search covered publications from January 2020 to March 2026 and was limited to peer-reviewed journal articles published in English. To enhance the breadth and completeness of the search, backward and forward reference tracking was also employed by examining the reference lists and citation networks of eligible studies. This supplementary technique has been shown to improve coverage and reduce publication bias in systematic and structured educational reviews (Siddaway et al., 2019).

The search strategy utilised Boolean operators to optimise both sensitivity and specificity in retrieving relevant literature. The primary search string applied was: ("Augmented Reality" OR "Immersive Technology") AND ("Moral Education" OR "Ethical Reasoning") AND ("Secondary Education") AND ("Universal Design for Learning" OR "UDL") AND ("Cognitive Theory of Multimedia Learning" OR "CTML") AND ("Four Component Model" OR "FCM").

Minor adaptations to the search syntax were made across databases to accommodate differences in indexing systems and search functionalities. A broad range of publication types was included, encompassing original empirical studies, experimental research, systematic reviews, conceptual papers, and case studies. Where available, meta-analyses and design-based research studies were given particular emphasis, reflecting the increasing focus on evidence-based instructional design and theoretically informed implementation within immersive learning research (Makransky & Mayer, 2021; Li et al., 2025).

Inclusion and Exclusion Criteria
The inclusion criteria for article selection were established to ensure relevance, methodological quality, and theoretical alignment with the objectives of this mini-review. Studies were included if they met the following conditions:

1. The study involved the direct application, evaluation, or analysis of Augmented Reality (AR) within the context of moral or ethical education.
2. The instructional design explicitly incorporated, referenced, or critically discussed one or more established pedagogical or moral development frameworks, namely Universal Design for Learning (UDL), the Cognitive Theory of Multimedia Learning (CTML), or Rest's Four Component Model (FCM).
3. The target population consisted of secondary-level learners, typically defined as students aged between 12 and 18 years.
4. The study demonstrated methodological transparency and rigor, including a clearly articulated research design, participant characteristics, data collection procedures, and analytical approach.

Studies were excluded if they met any of the following criteria:

- The publication was not written in English.
- The study focused exclusively on educational levels outside the secondary context, such as primary, tertiary, or adult education.
- The paper addressed moral education or immersive technologies in isolation, without a clear pedagogical context or without reference to UDL, CTML, or FCM.
- The publication constituted grey literature, including white papers, opinion pieces, unpublished theses, conference abstracts, or technical reports that were not subject to formal peer review.

The initial database search identified a total of 221 records. After the removal of duplicate entries and the screening of titles and abstracts, 67 articles were retained for full-text assessment. Following a comprehensive full-text review against the inclusion and exclusion criteria, 24 studies met all eligibility requirements and were selected for final synthesis. These studies represent a broad range of international educational contexts and research methodologies, providing a balanced and nuanced perspective on the pedagogical affordances, design challenges, and implementation considerations of AR-supported ethical learning for adolescent populations.

Inclusion Criteria

The criteria used to include studies in this mini-review show that there's a growing agreement in current educational research about how effective Augmented Reality (AR) is in teaching morals. This effectiveness depends on how well AR is used with strong teaching and moral development methods. The studies included focused on AR programs that clearly or subtly fit with established models like Universal Design for Learning (UDL), Rest's Four Component Model (FCM), and the Cognitive Theory of Multimedia Learning (CTML). These models help ensure that learning is inclusive, supports how people process information, and helps build moral understanding—key parts of learning ethics during teenage years (CAST, 2018; Mayer, 2020; Narvaez & Lapsley, 2020).

Recent studies show that using AR in moral learning helps students be more engaged, more aware of ethics, and better at understanding different viewpoints. This is because AR puts students in realistic, detailed situations that mimic real-life moral choices (Parong et al., 2022; Slater & Sanchez-Vives, 2021; Lin et al., 2024). These situations let students take on different roles, see the effects of their moral decisions, and think about conflicts in values in a way that traditional text-based learning often can't do. This is especially important for high school students, as their moral thinking is affected by their social environment, emotions, and forming their identity (Killen & Dahl, 2021; Peters & Besley, 2024).

Some studies also included AR programs that used UDL principles to make learning more accessible for different types of learners.Research shows that AR designed with UDL—using different ways to present information, engage students, and let them express what they learn—can help students with various abilities, learning styles, and emotional readiness. This makes moral education more inclusive, especially in situations where students come from different cultural backgrounds or have different levels of moral awareness and emotional control (Cho & Lim, 2023; Al-Azawei et al., 2022).

However, the review also found that the quality of teaching and the results of learning varied a lot across the studies, especially when it came to long-term memory and applying moral reasoning to real-life situations. Some studies showed short-term improvements in ethical awareness or thinking, but didn't provide long-term evidence of lasting moral motivation or actual moral behavior, which are important parts of Rest's Four Component Model (Makransky & Petersen, 2022; Narvaez & Lapsley, 2020). This suggests that while AR can help develop moral awareness and judgment, there's more to learn about how it can influence lasting moral motivation and real-world actions.

Some of the studies included had only partial use of CTML principles, leading to too much visual clutter, extra information that wasn't needed, or not enough support for learners. This made it harder for people to process information and learn effectively (Makransky & Mayer, 2021; Wu & Chen, 2024). These results show that it's important to match emotional experiences with a clear way of thinking. If the mental effort is too high, it can stop people from thinking deeply about ethical issues and making moral decisions. Also, there are worries that very immersive AR environments might cause too much emotion, which can stop people from thinking critically and instead make decisions based on feelings rather than on strong moral principles (Kardas & O'Brien, 2023; Radianti et al., 2020).

Overall, these findings support the need to include studies that use AR and also have a clear theory, good design, and honest research methods. The missing parts in current research suggest

that future studies should use longer time periods, include AR systems that can change based on how learners are feeling and thinking, and create standard ways to measure moral growth, behavior changes, and ethical choices over time (Garzón et al., 2023; Ali et al., 2025).

Exclusion Criteria

To make sure the review is thorough, clear, and reliable, we used specific rules to decide which studies to include. First, we didn't include studies written in languages other than English. This helped us stay consistent in how we understand and explain the ideas and methods in the research. Even though this limits the variety of languages, it's a standard practice in structured and mini-reviews to keep things clear and focused (Siddaway et al., 2019; Xiao & Watson, 2019).

Second, we excluded studies that talked about moral education, values education, or immersive technologies but didn't clearly connect them to teaching methods. We also didn't include papers that didn't mention or explain important frameworks like AR, UDL, CTML, or FCM. Without these, the research wouldn't fit well with the main theme of the review, and it would be hard to compare and bring together different studies. This choice reflects a growing trend in education technology research to focus on theories and not just on the technology itself (Ibáñez & Delgado-Kloos, 2021; Garzón et al., 2022).

Lastly, we didn't use grey literature such as conference summaries, unpublished theses, technical reports, opinions, or non-peer-reviewed documents. We wanted to keep the research credible and high quality, so we focused only on peer-reviewed journal articles. These are evaluated by experts, making them more transparent, well-supported, and easier to repeat (Makransky & Petersen, 2022; Petticrew & Roberts, 2020). Excluding grey literature also follows best practices for mini-reviews, helping to guide future research and teaching decisions in formal education systems.
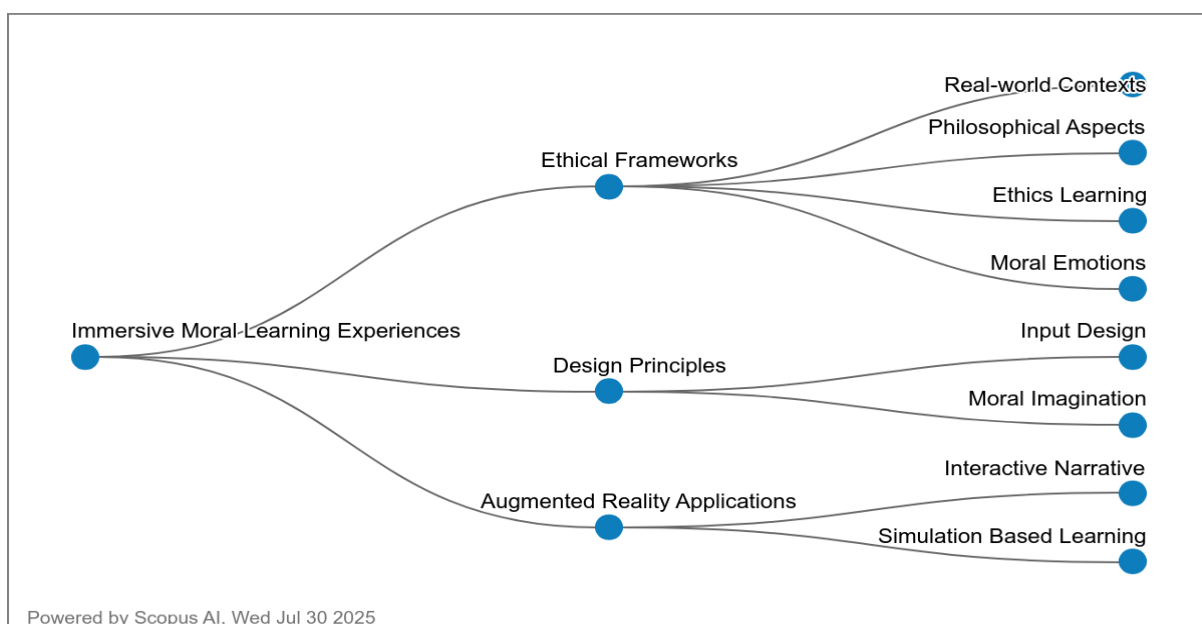
Discussion and Result

Figure 1: Current Status of Immersive Moral Learning in Education Based on Emerging Themes in AR and Ethical Pedagogy

In a time when technology is changing fast, and society faces more complicated ethical issues, education systems around the world are being asked to focus not just on academic success, but also on teaching ethics, moral awareness, and responsible behavior (UNESCO, 2021; OECD, 2023; Peters & Besley, 2024). Teenagers, in particular, are dealing with moral situations influenced by the internet, artificial intelligence, social inequality, and environmental problems. This means that education needs to help them think deeply about real ethical issues, not just memorize what is right or wrong (Killen & Dahl, 2021; Narvaez & Lapsley, 2020). In this environment, technologies like Augmented Reality (AR) are showing promise as tools for creating learning experiences that help students explore moral questions in real, emotional, and meaningful ways.

AR works by adding digital content to the real world, letting students interact with scenarios that reflect real-life ethical problems (Radianti et al., 2020; Garzón et al., 2023). Unlike traditional teaching methods, AR lets students experience moral issues through active participation, storytelling, and decision-making with real consequences. This helps them understand important ethical ideas like responsibility, justice, empathy, and moral imagination (Slater & Sanchez-Vives, 2021; Parong et al., 2022). New studies show that using AR in learning can help students become more sensitive to ethical issues and better at seeing things from others' perspectives by putting them in roles where they have to make moral choices in realistic situations (Lin et al., 2024; Chen & Huang, 2024).

AR has special value in secondary education, a time when teens are becoming more aware of their emotions, forming their identities, and developing the ability to reason about moral issues in a more abstract and principled way (Killen & Dahl, 2021; Peters & Besley, 2024). Studies suggest that teenagers learn best when they are challenged intellectually and emotionally, as their moral thinking is shaped by how they feel, the people around them, and the judgments they make (Narvaez & Lapsley, 2020; Kardas & O'Brien, 2023). AR-based moral learning experiences, such as interactive stories, simulated scenarios, and ethical dilemmas, offer unique opportunities to support this growth by helping students explore moral emotions, weigh the outcomes of their choices, and think about ethical principles in real-life settings (Makransky & Petersen, 2022; Prasittichok et al., 2024).

However, the ability of AR to help students think about right and wrong is not because of the technology itself, but because it's used in a way that matches good teaching and moral growth methods. Recent studies show that immersive technologies like AR should be combined with strong teaching designs to make sure learning is clear, inclusive, and deep in ethics (Ibáñez & Delgado-Kloos, 2021; Lampropoulos et al., 2022). For this reason, three main frameworks have become important in creating moral learning experiences through AR: Universal Design for Learning (UDL), the Cognitive Theory of Multimedia Learning (CTML), and Rest's Four Component Model (FCM). UDL helps make learning accessible and fair by offering different ways to present information, get involved, and express ideas.

This is especially important in AR environments where students may have different thinking abilities, emotional readiness, cultural backgrounds, and sensitivity to moral issues (CAST, 2018; Cho & Lim, 2023). CTML supports this by providing tested strategies—like breaking down information, using different formats, and keeping things clear—to help students manage the mental effort of learning through immersive content without getting overwhelmed (Mayer, 2020; Wu & Chen, 2024). FCM gives a full view of how morality works, seeing ethical behavior as a result of moral sensitivity, judgment, motivation, and character (Narvaez &

Lapsley, 2020). Together, these frameworks offer a clear way to design AR experiences that balance emotional involvement with learning support and ethical thinking. As shown in the general idea of moral learning through immersion, effective AR-based ethics teaching needs to combine ethical ideas like philosophy, moral emotions, and real-life situations, design ideas like imagining moral choices, interactive stories, and how people interact, and AR tools like simulations and scenario-based learning.

When these parts work well together, AR can do more than just add new tech—it can be a teaching tool that helps students understand ethics, make thoughtful decisions, and act according to strong values (Garzón et al., 2023; Ali et al., 2025). Even though there's growing interest in this area, a lot of research is still not connected. Many studies look at how engaging or new AR is, rather than how it helps with long-term ethical growth or real-world action (Radianti et al., 2020; Makransky & Mayer, 2021). Also, there's not much evidence on how immersive moral learning affects the long-term thinking, motivation, and actions of high school students in ethics (Prasittichok et al., 2024; Ali et al., 2025). These gaps point to the need for better research that connects how immersive tech is designed with theories of moral growth and teaching methods.

In this context, the article introduces "Designing Immersive Moral Learning with Augmented Reality" as a teaching approach that brings together educational technology, moral psychology, and instructional design. The study brings together recent research from 2020 to 2026 on using augmented reality to teach ethics in high school. It aims to show how to create immersive experiences that help students develop their ability to think morally, feel morally, and make thoughtful judgments. This work is meant to offer clear ideas and useful guidance for researchers, teachers, and instructional designers who want to use augmented reality not just as a new tool, but as a real way to teach ethics and morality in today's digital world.

a) Future Directions for Immersive Moral Learning with Augmented Reality

1. Toward Adaptive and Personalized Immersive Moral Learning Systems

Recent studies are showing that the next step in teaching morality through immersive experiences should go beyond fixed AR setups to systems that can change and adjust based on how learners think, feel, and make ethical choices (Cheng et al., 2023; Garzón et al., 2023). Teenagers vary a lot in how they understand morals, manage emotions, and make ethical decisions, meaning that using the same moral scenarios for everyone might not be enough to really help them grow morally (Narvaez & Lapsley, 2020; Killen & Dahl, 2021).

New research is pointing out that AR environments that use AI can change aspects like story complexity, ethical challenges, or emotional depth in real time based on how learners respond, the choices they make, or how they reflect on what they're learning (Koumpouros & Misirlis, 2024; Li et al., 2025). These kinds of systems match up well with Universal Design for Learning principles, which aim to let learners engage and express themselves in different ways depending on their level of moral readiness (CAST, 2018; Cho & Lim, 2023). Yet, there isn't much real evidence yet about how well these adaptive AR systems work for teaching ethics, which means more research is needed to properly test and understand how these personalized systems can help in moral learning.

2. The Need for Longitudinal and Developmentally Informed Research

Even though there are some good short-term results, most studies still don't look long-term to see if using AR for moral learning really changes how people think about right and wrong, what motivates them to act morally, and how they behave in real life (Radianti et al., 2020; Makransky & Petersen, 2022). Most of the research so far looks only at what people say right after the learning happens or how they think right away, which shows they understand ethics, but doesn't tell much about whether they actually act on it—key parts of Rest's Four Component Model (FCM) (Narvaez & Lapsley, 2020).

So, future studies should use long-term and mixed methods to track how repeated exposure to virtual moral situations affects teenagers' ethical thinking over time, especially during changes in their social environment and personal development (Peters & Besley, 2024). Using things like watching what people do, checking their actions, and looking at their reflections could help understand better how learning about ethics through immersive experiences affects real-life behavior outside of school.

3. Ethical and Governance Challenges in Immersive Moral Learning

As immersive moral learning environments become more data-driven and adaptive, ethical issues like privacy, consent, cultural representation, and algorithmic bias are becoming more important (UNESCO, 2021; Williamson & Eynon, 2023). AI-powered AR systems often gather personal information about emotions, moral decisions, and behavior, which brings up concerns about how data is managed, how transparent the process is, and how much control students have over their data (Kardas & O'Brien, 2023; Koumpouros & Misirlis, 2024).

Also, moral values are shaped by culture, and if immersive experiences aren't carefully designed, they might promote dominant cultural norms or biased stories (OECD, 2023; Ali et al., 2025). So, the future of these systems needs to include design approaches that respect different cultures and oversight processes that ensure AR-based moral learning supports a variety of values and doesn't push unfair or rigid ideas.

b) Benefits and Challenges of AR-Based Immersive Moral Learning

1. Pedagogical Benefits: Engagement, Empathy, and Ethical Reflection

More and more research shows that using augmented reality (AR) for immersive experiences can help people feel more empathetic, be more aware of moral issues, and think deeply about ethics, especially when they are put into situations that mimic real moral dilemmas where they have to take others' perspectives and think about the results of their choices (Parong et al., 2022; Tsai et al., 2023; Lin et al., 2024). Compared to regular moral lessons, AR-based situations let learners actively take part in making moral decisions, helping them understand different values and emotional reactions in realistic social settings (Slater & Sanchez-Vives, 2021; Chen & Huang, 2024).

These advantages become even stronger when AR experiences are built using CTML-based strategies like signaling, breaking information into parts, and keeping things consistent. These strategies help learners understand complicated ethical topics without making their thinking too hard (Mayer, 2020; Wu & Chen, 2024). When designed well, immersive moral learning can lead to more thoughtful discussions, better ethical thinking, and more meaningful conversations with others.

2. Persistent Challenges: Cognitive Load, Emotional Overstimulation, and Design Inconsistencies

Even though there are many benefits, there are still some problems that limit how well immersive moral learning works. These highly realistic environments can cause learners to feel too much emotion, which might make them make decisions based more on feelings than on good morals, especially if there isn't enough support to help them think deeply (Makransky & Mayer, 2021; Kardas & O'Brien, 2023). Also, when instructional design isn't used properly—especially the kind based on CTML—it can make learners feel mentally overwhelmed, leading to shallow involvement or unclear ideas about ethics (Radianti et al., 2020; Wu & Chen, 2024). Another issue is that not all parts of Rest's Four Component Model are used fully. While a lot of AR studies look at moral sensitivity and judgment, not many deal with moral motivation and how to put morals into action. This leaves a big gap between knowing what's right and actually doing the right thing (Narvaez & Lapsley, 2020; Prasittichok et al., 2024). To fix this, immersive learning needs to go beyond just making decisions and include thinking deeply, making commitments, and chances to practice ethics in real life.

c) Key Technologies Supporting Immersive Moral Learning

Current AR Technologies and Instructional Affordances
Modern programs that teach morals through immersive experiences often use mobile AR apps, marker-based simulations, and head-mounted displays. These tools help create interactive stories, show 3D images, and let learners make ethical choices in real time (Garzón et al., 2023; Tsai et al., 2023). They allow learners to experience moral stories in real-world settings, making the situations feel more real and emotionally engaging.

When these AR tools are used with CTML design elements like balancing different types of information, clear signals, and breaking tasks into parts, they can help the brain work better and reduce mental strain (Mayer, 2020; Makransky & Petersen, 2022). But many current platforms don't offer learners the ability to customize their experience, get support that changes with their needs, or use tools to help them reflect on moral issues. This makes them less effective in different learning situations and for different kinds of learners (Koumpouros, 2024).

Practical Applications and Implementation Considerations

Classroom Applications and System-Level Integration
In real use, augmented reality (AR) based immersive moral learning has been used in areas like bullying prevention, social justice, environmental ethics, and digital citizenship. This lets students look at moral problems from different viewpoints and understand the results of their ethical decisions (Ng et al., 2021; Slater & Sanchez-Vives, 2021; Lin et al., 2024). Teachers often say that after using immersive AR, students are more involved, talk more in class, and have a better understanding of moral issues (Cho & Lim, 2023).
However, using this method is still mostly limited to small tests or after-school activities because of things like high costs, not enough teacher training, and poor technology support (Garzón et al., 2022; Ali et al., 2025). Putting immersive moral learning into regular school lessons, teacher training programs, and testing systems is a key next step to make the impact bigger and keep it going long-term.

Concluding Perspective
Immersive moral learning using Augmented Reality has a big chance to change how secondary school students experience, understand, and learn about ethical ideas. By combining AR with teaching methods that include everyone, like UDL, and using smart learning ideas from CTML,

249

as well as moral models like FCM, teachers can create learning situations that not only teach values but also let students practice them in real-life situations. To make this work well, future studies need to focus on checking long-term effects, making sure things are done ethically, making sure it's accessible to everyone, and connecting it with school systems. Only by using a strong, growth-friendly approach can AR change from just being a new tech tool into a real way to teach ethics in today's world.
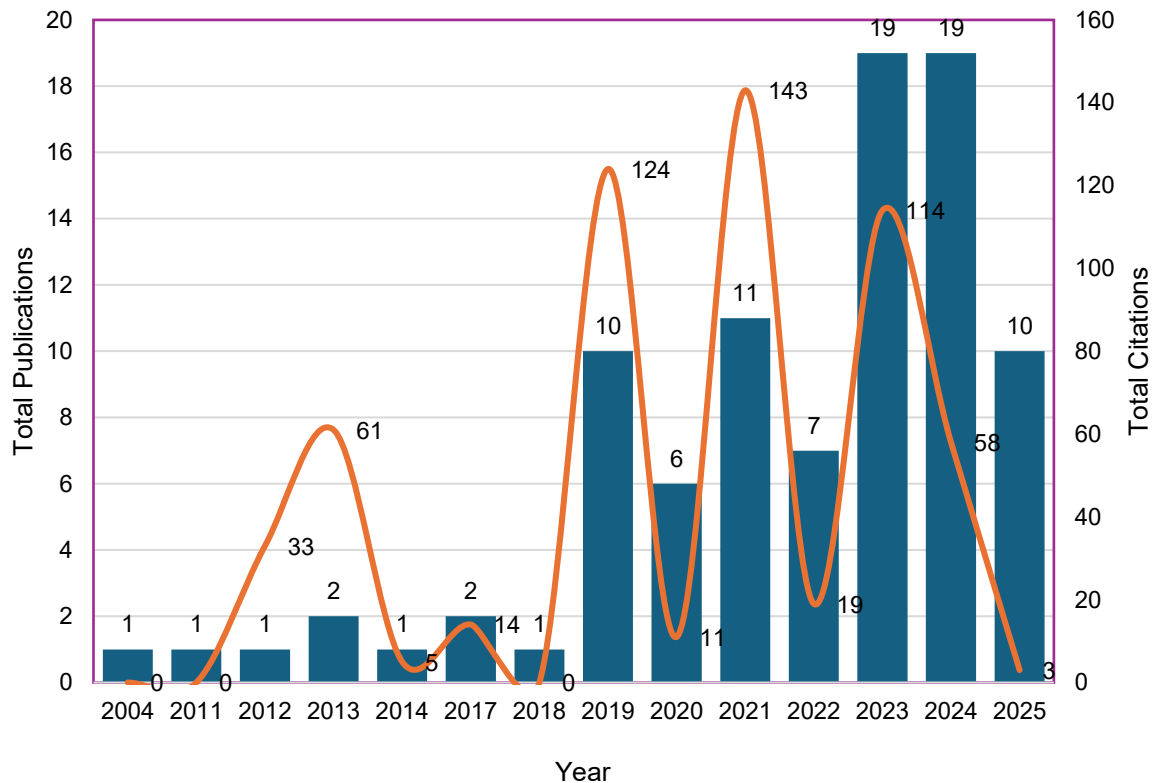

Figure 2: Total publications and total citations by year

Trends in Publication and Citation Activity on Immersive Moral Learning with Augmented Reality

The graph shows how much research and how often it's cited in the field of using Augmented Reality (AR) for moral learning. This trend has been growing quickly, especially since 2018. This growth is happening at the same time as improvements in immersive technology, more people having access to mobile AR, and a bigger focus on teaching emotional and ethical skills in high school (Radianti et al., 2020; Garzón et al., 2022). Before 2018, there wasn't much research, and what there was was mostly about exploring ideas. But that early work helped build the foundation for more detailed and structured studies later on.

From 2018 to 2021, there was a steady rise in research. This shows that AR is now being studied seriously, not just as a new tech but as a tool for teaching complex thinking and feeling, like making ethical choices, showing empathy, and reflecting on morals (Ibáñez & Delgado-Kloos, 2021; Slater & Sanchez-Vives, 2021). This period also saw more mixed studies that bring together learning science, moral psychology, and how to design lessons, showing that research is becoming more connected and thoughtful.

During this time, the number of times research was cited went up a lot, especially in 2021. This suggests that some really important or foundational studies were published then, which influenced later work. These studies focused on things like how well lessons are designed, how much information learners can handle at once, and how to manage emotions in immersive settings. They often used frameworks like the Cognitive Theory of Multimedia Learning (CTML) and early ideas from moral development theory (Makransky & Mayer, 2021; Mayer, 2020). The fact that more papers were published and more were cited means that this research was not only common but also had a big impact on future studies.

In 2023 and 2024, the number of publications reached its highest point in the time period studied. This shows that using AR for moral learning has become a well-established and respected field of study. The research is now more refined, has more evidence to back it up, and is more deeply connected to theory. During this time, studies started using more inclusive teaching methods like Universal Design for Learning (UDL) and complete moral models like Rest's Four Component Model (FCM). This shows that there's a growing understanding that teaching ethics needs to consider individual differences, how people think, and how moral thinking works as a whole (Cho & Lim, 2023; Narvaez & Lapsley, 2020; Lin et al., 2024).

Citation patterns in 2023 support this understanding, as higher citation numbers show that scholars are using and referencing these works a lot. These groups of citations might be because of special issues in journals, research groups formed around conferences, and projects that bring together different fields to study things like immersive learning, ethics, and digital citizenship—topics that are important to education systems and international policies after the pandemic (UNESCO, 2021; OECD, 2023; Garzón et al., 2023). The pattern of citations going up and then down around the time new publications come out shows that major contributions often happen in groups, leading to a quick rise in citations before slowing down as new research starts to build on those ideas.

On the other hand, the drop in publications and citations in 2025 should be looked at carefully. Since the year is still going on, this decrease is probably because of delays in getting articles indexed, the time it takes for publications to be processed, and the natural delay between when a paper is published and when it gets cited in databases like Scopus (Zupic & Čater, 2015; Donthu et al., 2021). Many papers published or accepted in 2025 might not have been added to these databases or cited yet, meaning the drop doesn't mean there's been a real decrease in academic interest or research activity.

Overall, the pattern shown in the graph shows three important things. First, using AR for moral learning has grown quickly since 2020, which matches global education goals that focus on ethical skills, digital responsibility, and teaching methods that put learners first. Second, the field has reached a stage of steady development in 2023–2024, with more clear theories, better research methods, and stronger influence in academic circles. Third, keeping this field moving forward will need long-term, ongoing research that builds on what has already been done instead of focusing only on new or isolated ideas (Ali et al., 2025; Prasittichok et al., 2024).

Taken together, these trends show that using AR in moral learning is becoming more accepted and important as a research area. They also show the need for continued teamwork across different fields, combining theories, and doing long-term evaluations to make sure future research not only adds to the body of academic knowledge but also helps improve real-world education and ethical growth in high schools.
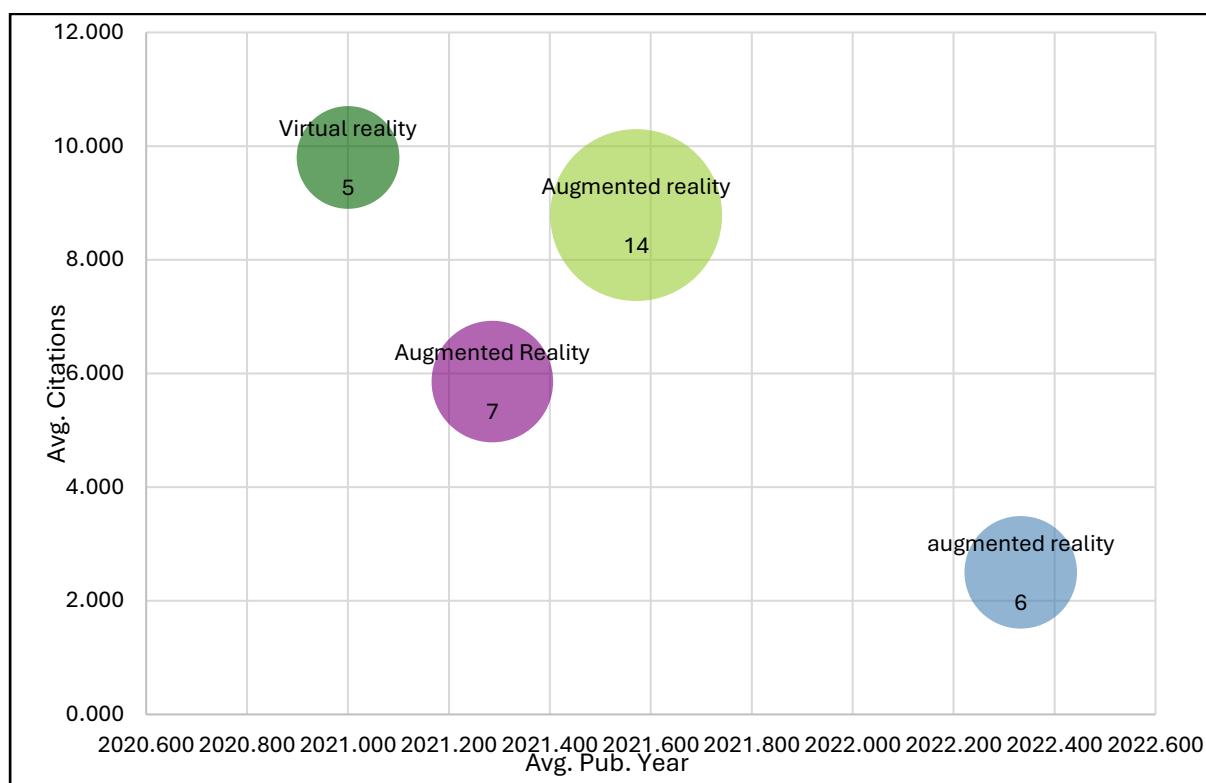
Figure 3. Keyword Impact Analysis Based on Average Citations and Publication Year (2020–2026)

Figure 3 shows a map of important terms related to immersive technologies. This map uses the average year when papers were published and how often they are cited to show how research in immersive moral learning and educational technologies has developed over time. The size and position of the bubbles show how much influence each term has and how often it is discussed in the field.

The terms "Virtual reality" and "Augmented reality" are shown in green bubbles.They have high citation counts, which means they are widely used and respected in academic research. These terms are linked to early ideas and theories that helped shape immersive technologies as useful tools for education, especially in moral and ethical learning. Several studies from recent years support this, showing how these technologies are important for building theories and testing ideas.

Virtual Reality has the highest citation count even though fewer papers have been published on it. This suggests that VR has been around longer and has developed a strong theoretical base. Research on VR started many of the important ideas that later influenced studies on Augmented Reality, especially ideas about being immersed, feeling present, having emotional reactions, and simulating ethical situations. This is a common pattern in research, where early, theory-based fields usually get more citations over time.

In contrast, terms like "Augmented Reality" and "augmented reality" are shown in purple and blue bubbles. These have lower citation counts but are mentioned more often in recent papers. This means there is a lot of new research on AR, especially after 2021, as more people started using AR through phones and educational tools. Even though these studies aren't as highly

cited yet, they show a growing interest in using AR for practical applications, such as teaching ethics, digital citizenship, and social and emotional skills.

The use of different ways to write the same term like "Augmented Reality" with a capital letter versus "augmented reality" in lowercase shows an important problem in how we analyze academic work. This happens when journals and databases do not use the same standard terms, which leads to mixed or scattered records and makes it harder to track how often a topic is discussed (Donthu et al., 2021; Zupic & Čater, 2015). In fast-moving areas like using AR in education, this can make it hard to see the real size and impact of research, showing the need for more uniform terms in future studies to get accurate results and measure influence better. Looking at the timeline, the blue bubble for "augmented reality" appears around 2022, showing more recent studies. The lower number of citations it has is probably because of something called citation lag, which means newer papers haven't had time to be cited yet—not because they're not important or good (Donthu et al., 2021; Ali et al., 2025). This is common in education tech research where studies on how to use AR in teaching are cited more after a while, once their learning value is proven and repeated.

Overall, Figure 3 shows a clear change in how research is done. From the early days when studies focused on theory about immersive tech (2019–2021), the field is now moving toward more practical studies that look at how AR can be used in real classroom settings after 2022. This change shows the field is becoming more mature, with researchers moving from simple experiments to looking at how well teaching designs work, the effect of AR on ethics, and how it can help students in high school (Ibáñez & Delgado-Kloos, 2021; Lin et al., 2024; Prasittichok et al., 2024).

This keyword analysis supports the idea that using AR for moral learning is moving from basic research toward a more varied and developed stage. While early terms about immersive tech still lead in citations, new terms focused on AR are showing a lot of active research. Keeping the field strong will need more consistent terms, better linking ideas together, and long-term studies to ensure new AR studies are both deep and influential (Garzón et al., 2023; Ali et al., 2025).

Conclusion

This mini-review shows how Augmented Reality (AR) is becoming more important in teaching ethics and morals in high schools. It focuses on how AR can be a powerful tool for learning, especially when it's used with a clear plan for teaching, not just for showing off technology (Radianti et al., 2020; Garzón et al., 2023). Looking at the 24 studies included, AR was found to make ethical learning more hands-on, meaningful, and emotionally engaging. It helps students understand different viewpoints, think deeply about moral issues, and have better discussions in class—goals that match the goals of many countries and international organizations like UNESCO, OECD, and the Malaysian Ministry of Education (UNESCO, 2021; OECD, 2023; Malaysian Ministry of Education, 2023; Lin et al., 2024). However, the review also shows that AR doesn't automatically work well. Its success depends a lot on how well it is combined with other teaching methods and theories, like Universal Design for Learning (UDL) for helping different types of learners, the Cognitive Theory of Multimedia Learning (CTML) for managing how much information is being processed, and Rest's Four Component Model (FCM) for making sure that learning leads to real moral behavior (CAST, 2018; Mayer, 2020; Narvaez & Lapsley, 2020; Cho & Lim, 2023). Some problems with the research include not having consistent, high-quality designs, sometimes overwhelming students

with too much information or emotion, and only looking at short-term results instead of long-term behavior change (Makransky & Mayer, 2021; Makransky & Petersen, 2022; Kardas & O'Brien, 2023; Wu & Chen, 2024; Prasittichok et al., 2024). Also, there is inconsistency in how the studies describe and categorize their work, which makes it hard to compare results and track the overall impact. Better standardization of terms, how results are shared, and how moral progress is measured is needed (Donthu et al., 2021; Garzón et al., 2023). Looking ahead, the field can improve by using long-term studies and mixed methods, creating AR systems that adapt to individual students' needs and use AI to tailor ethical challenges and emotional content, and by improving ethical rules to protect privacy, respect cultures, and avoid biases in learning environments driven by data (Cheng et al., 2023; Williamson & Eynon, 2023; Koumpouros & Misirlis, 2024; Li et al., 2025; Ali et al., 2025). AR-integrated immersive moral learning can move from being a promising new idea to a lasting educational practice, if future efforts focus on using strong theories like UDL, CTML, and FCM, making sure it works for everyone, checking its long-term effects, and keeping ethical rules in place. This approach helps teenagers become not just good at using digital tools, but also thoughtful about right and wrong, so they can handle the tricky moral situations of today's world (UNESCO, 2021; OECD, 2023; Ali et al., 2025).

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