Systematic review of multiliteracies skills, multimodal tools to facilitate learning in early childhood classroom

Francis Moodu Yakubu¹* ID, Kayode Ezechael Obafemi²
¹University of Alabama, Tuscaloosa, USA.
²Kwara State University, Malete, Nigeria.
* Corresponding Author. E-mail: francismoodu@gmail.com

ARTICLE INFO

ABSTRACT

This systematic review of literature investigates the use of multimodal tools and acquisition of multiliteracies skills to facilitate effective learning in early childhood educational settings. The review covered a total of 15 relevant articles obtained from databases such as ERIC, Education Full Text, PsycINFO, and Web of Science. Having analyzed and synthesized the current evidence, the review provides a significant and valuable insight into the use and acquisition of multiliteracies skills and tools to facilitate learning in early childhood settings. The sole purpose of this review is to add to the body of existing literature in multiliteracies. The study also provides answer to the only research question of the review which was what are the most effective ways to implement multiliteracies and multimodal techniques in the classroom and how early childhood education can benefit from the systematic application of multiliteracies and multimodal learning. The result of the review revealed that, teachers are facing greater challenges than ever in choosing and designing a pedagogy that can engage students in meaningful literacy practices due to the changing literacy needs in the multimedia environment, the changing lifeworld's of the learners, and the changing dimensions of school literacies. Therefore, the review recommended that policymakers must work to incorporate all multimodal tools and technology into the curriculum, especially for early childhood education. Also, schools and learning centers should provide limitless opportunities in early childhood classrooms and environment to assist, direct, and motivate students to learn.

INTRODUCTION

Giving students the reading skills, they need to participate fully in social and cultural events in the contemporary world is a key purpose of learning and teaching literacy. The New London Group (1996) notes that the traditional definition of literacy is limited to the capacity for "page-bound, standard and official forms of the national language." To put it another way, literacy is understood to mean forms of language that are written down, formalized, standardized, and which only reflect the primary dialect of the society. However, the language abilities required to comprehend the world are likewise evolving at the same time that social life and technology are.

Since the drastic changes in pupils' lives, the tremendous changes in students' lives have profoundly altered the educational landscape. The student experience has changed as a result of technological development, the worldwide pandemic's effects, shifting societal dynamics, and changing educational perspectives. Despite the difficulties these changes have brought, they have also given rise to fresh chances for growth and learning. In order to develop a resilient and forward-thinking educational system that equips students for the opportunities and challenges of the future, it is critical for students, instructors, and educational institutions to adapt to and embrace these transformations.

There are now new specifications for learning to read and write that are far more complex and varied than before. Scholars work to enlarge the conventional definition of literacy because it is inadequate to meet demands for full participation in social and cultural activities. This broadened definition of literacy will better support research, teaching, and learning.

As a result of the world's rapid transition to the new global capitalism from outdated (Fordism) capitalism, Fordism was an obsolete kind of capitalism that has evolved into modern global capitalism as a result of elements including globalization, technical developments, adaptability, and innovation. Businesses now work differently thanks to global capitalism, which emphasizes flexibility, customization, and cross-border supply chains. The New Literacies theory evolved pertaining to education. (Gee, 2004; Hall, 1996). Due to technological advancement and innovation, the modern industry is very distinct from the previous one, which is distinguished by "centralized mass production, top-down organization, and steady employment structure" and focuses more on "rapidly information that is always changing, distributed management, unpredictability, and project-oriented employment." (Tang, 2015).

Since the economy's drastic transformation, educators contend that traditional literacy instruction may possibly be insufficient to prepare children for the difficulties of today's work and social life environments. (Gee, 2004; Lave & Wenger, 1991; Luke, 1998). The idea of literacy ought to be expanded in light of how the globe has changed. Such an endeavor to enlarge the notion of what constitutes literacy is the New Literacies theory. The emphasis on "the revolution in everyday technology and its corresponding cultural practices" is the key characteristic that sets New Literacies apart from other literacy paradigms (Coiro et al., 2008). It goes beyond the traditional definition of literacy as reading and writing texts to encompass meaning-making activities involving digital technologies (such as mobile messages, video games, weblogs, etc.), and it investigates how attitudes toward literacy change as practices change. There are disagreements over what qualifies as "new" in terms of the definition of new literacies. The new "technical stuff" and the new "ethos stuff," which were defined by Lankshear and Knobel in 2007, are two concepts that scholars generally agree define the "new" in New Literacies.

The "new ethos" material, which refers to new values of participation, cooperation, interaction, the diffusion of expertise, and relatedness, may help people learn new technology quickly. The "new technical stuff" (name any of the kinds of programs or websites that we use to produce meaning) can only have a little impact on education if the "new ethos stuff" is there. Greater explanations of "new ethos stuff" and "new technical stuff" are as follows: Knowledge of the technological tools that enable creating, exchanging, and negotiating encoded meanings is what is meant by "new technical stuff." Comparatively, to what is called conventional literacies, the technical aspects of digital meanings considerably expand the methods of generating encoded meanings that are available to humans. Someone who would readily admit they are incapable of producing any artistically or otherwise noteworthy drawings, paintings, or photographs can, in a relatively short period of time, put together a collage of images and words to contribute to a well-known online meme...This type of encoded text creation necessitates the use of image-editing software. Considerable familiarity with the fundamental 'moves' in image editing, knowing how to paste the cropped image onto a new background, using an image search engine to choose an appropriate replacement background image...a sequence of mouse clicks is used to upload the finished image to a shared web location. All in the course of around ten minutes. (Lankshear & Knobel, 2011).

The modern society's technological advancements and innovations are included in the new "technical stuff." Since the beginning of the 20th century, technology has been used in classroom

instruction, including movies, television, radio, and computers. The "technical stuff" is in New Literacies "new" in contrast to "old technologies" owing to two notably different characters. First, the new "technical stuff" is a "hybridization of multimodal media," which combines words, pictures, music, and videos to develop flexible, linked, and interactive modes of production that are easily retrieved. The "old technologies" mainly consist of basic varieties of production (Lankshear & Knobel, 2007). People can now access the internet on their smartphones and obtain information using a variety of presentation methods. Second, distributed media production is now possible because of new "technical stuff." (Lankshear & Knobel, 2007).

In today's society, the vast majority of internet material, such as YouTube videos, is created by regular people who just have digital cameras or mobile devices with internet access. The New Literacies' practices and beliefs, on the other hand, make up the new "ethos stuff." Instead of using new instruments to perform the same tasks in more "technologized ways," It alludes to a fresh perspective that the globe has fundamentally altered as a result of the use of novel technology (Lankshear & Knobel, 2007). In contrast to the "published, distinct, author-centered, and expert-dominated" types of traditional literacies because they emphasize greater "participatory, collaborative, and distributed" in character. (Lankshear & Knobel, 2007). In conclusion, the viewpoint of the New Literacies sees literacy as engaging in group activities to develop scattered expertise and knowledge.

The use of many semiotic systems by humans to represent or create meanings, such as language, depiction, gesture, and music, is known as multimodality (Jewitt, 2008; Martinec, 2005). The change in the new media age from the dominance of writing in printed materials to the relatively new dominance of visuals on the digital screen was the catalyst for the increased attention to multimodality in educational research (Kress, 2003). Halliday's (1978) social semiotic approach to language served as the early theoretical underpinning for studies in multimodality. Halliday initially focused on creating a linguistic framework (i.e., SFL), but in the 1990s, a number of theorists started to expand his theory to include other semiotic systems of meaning, such as images (Kress & van Leeuwen, 1996), music (van Leeuwen, 1998), movement and gesture (Martinec, 2000), and mathematical symbolism (O'Halloran, 2000).

A unified language for analyzing how disciplinary knowledge is affected by the semiotic structure inside a given discourse or disciplinary domain is an important development in multimodality. The New London Group (1996) referred to this as a metalanguage, which consists of three aspects of meaning that are realized in any semiotic text (Halliday, 1978): (a) ideational meaning, which is used to create thematic content about the world, (b) interpersonal meaning, which is used to enact one's stance and relationship towards others, and (c) textual meaning, which is used to link unrelated elements into a larger coherent text or entity. These three categories of meaning can be applied to any semiotic system of representation, including language, an imaging system, or gestures. Additionally, this metalanguage can be used to analyze meanings in any subject matter, including science (Kress, Jewitt, Ogborn, & Tsatsarelis, 2001), visual arts (Duncum, 2004), music (Pramling & Wallerstedt, 2009), and English (Benson, 2008).

The term "multiliteracies" was first used by New London Group (1996) to broaden the definition of literacy in order to account for new practices in people's work, public, and private lives. The old "command-and-control" structure of work is being replaced by "horizontal relationships of teamwork," and employees are expected to be more "multiskilled" rather than "deskilled"; historically, the terms "monocultural" and "monolingual" are the identification that has been put in place (New London Group, 1996). New languages are created as a result of the application of new technology and the rise of new types of social relationships. People must acquire literacy in a variety of languages in order to communicate effectively in a variety of settings.

A key distinction between the multiliteracies perspective and the traditional one on literacy is that the multiliteracies perspective sees literacy as involving a variety of representational techniques, including gestures, music, and visuals (New London Group, 1996; Perry, 2012). Alternatively put, even while writing and reading are vital, only one type of literacy can convey meaning in a specific context. It is critical to understand that in order to effectively communicate

meaning, various situations call for various levels of literacy. The idea that "only one type of literacy can convey meaning in a specific context" emphasizes how crucial it is to comprehend the wide variety of literacies and how they each apply in different contexts. The assumption that "only one type of literacy can convey meaning in a specific context" admits that several forms of literacy are appropriate in various contexts for communication. The literacy abilities required to comprehend, express, and interact effectively can change depending on the setting. The ability to recognize and cultivate numerous forms of literacy enables people to interact meaningfully in a variety of contexts, improving communication, critical thinking, and engagement with various informational and media sources.

Among the qualities outlined by multiliteracies experts is the perception of literacy as multimodal. According to the theory of multiliteracies, literacy is located and serves a social function (Olthouse, 2013). Since literacy practices vary according to the setting, literacy is contextual. For instance, writing and sending an email to a buddy is different than writing and sending an email to the boss, not to mention many cultural groups use English differently in different nations. Additionally, the theory of multiliteracies asserts that one goal of literacy is to prepare pupils to "design social futures" (Olthouse, 2013). The phrase "social futures" speaks of the accomplishment of fulfilling the demands in both moral and useful issues of the new period, which encompasses engaging in significant employment and civic engagement, together with individuals from different backgrounds (New London Group, 1996).

Given that being literate is multimodal, and it serves a societal purpose, it is necessary to comprehend the idea of design so as to acquire multiliteracies abilities, according to the multiliteracies framework. According to Kalantzis and Cope (2008), design is "a dynamic interaction between personal interests and transformation," and it consists of three parts: Designed, Designing, and Redesigning. The resources that have applications to create meaning in particular cultural and social contexts are known as the Designed (Kalantzis & Cope, 2008). These are resources that individuals are accustomed to, such as written language discourses, academic argumentation writing's lexical choices, grammatical patterns, and organizational structure. However, designed resources include components from other modalities, like auditory, gestural, visual, etc. Second, according to Kalantzis and Cope (2008), designing is "the process of shaping emergent meaning which involves representation and recontextualization."

The New London Group (1996) offered practical pedagogical solutions to aid teachers in helping students develop abilities within the multiliteracies framework, in addition to acknowledging the rapidly changing nature of society and broadening the definition of literacy. The New London Group (1996) suggested that there should be four elements to teaching and learning literacy: critical framing, situated practice, overt instruction, and transformed practice.

Students engage in learning exercises that are based on personal encounters, connected to relationships located in social lives. (Kalantzis & Cope, 2008; Westby, 2010). To resolve important issues, students utilize the resources for meaning-making that are accessible and ingrained in life experience. Successful situated practice speeds up the transfer of information from one social situation to another.

Overt Instruction incorporates both teacher involvement and systemic student awareness and understanding among the intended resources. Students build metalanguage to explain the resources accessible, as well as understand, and comprehend various multiliteracies with the assistance of experts and scaffolded support. Overt Instruction seeks to empower students with metacognition so they may take charge of their own learning (Westby, 2010).

Students must "take a step back from the material they are learning and evaluate it critically in light of its context" to be able to practice critical framing (Kalantzis & Cope, 2008; Westby, 2010). Students should learn that no one, obvious fact is both universal and applicable in all circumstances. Instead, students must be aware of how social settings affect the choice and exploration of the resources on hand and make key resource selections for various jobs. Students can comprehend the purpose, function, and justification of the layout thanks to the critical framing (Kalantzis & Cope, 2008; Westby, 2010).

Undertakings that are part of transformed practice allow students to use what they have learned in new situations. Students may be required to apply a proven design in a different setting,

modify a specific plan so that it functions in a fresh setting, or develop new designs that are appropriate for novel conditions, depending on the activities' requirements. (Kalantzis & Cope, 2008).

Additionally, video games and computer games, which are popular among young learners, are seen to be the best way to communicate with them and understand what and how they view the world. Playing video games is evolving into a new literary activity among young teenagers. Outside of school, young people frequently spend time playing challenging games. It is important to note that, from an educational standpoint, interest in digital learning games is mostly driven by the need to employ motivating power to urge young learners to learn (Butler, 2019; Williams, 2017). Games are frequently seen as being quite helpful for learning functional skills, improving perceptions, encouraging and developing abilities in problem-solving, strategic evaluation, media, and resources, in addition to motivating people (Boyle et al., 2016; Butler, 2019; Tan & Tan, 2020). Simulators are regarded as the game mode with the most instructional potential out of all those that are now accessible.

It is indisputable that adolescents and children bring mostly digital and online literacies into the classrooms, along with certain foundational print literacies. The way we communicate has significantly been altered: the keyboard and touch screen are quickly displacing the days of the pencil and paper. New technologies have made it possible to develop novel forms of communication as well as fresh perspectives on the world. In addition, according to Mills (2015), young people have transformed the sequential reading of the written word into non-linear and discontinuous digital text browsing. Their literacy habits are naturally carried into the classroom environment as a result of their comfort with immediate access to and dissemination of digital texts in cyberspace and the digital world. All of these have a big impact on the teachers' pedagogical innovations and the literacy expectations of the students. The above-mentioned multiliteracies of the teens and children could be gained or discovered through routine online activities and interactions. These interactions have a substantial impact on how young people think and, to a greater extent, how they interact with and produce various types of texts, including tempo and mode, as well as how they construct and portray their identities. (Coman et al., 2020).

In this review, the investigation is built on analyzing research on the use of multiliteracies and multimodal learning in early childhood classrooms. Early childhood education has historically been a pillar of multimodality in that it promotes and provides spaces for play-based learning that is multisensory and multi semiotic. It is transformative to include multimodal literacy projects in elementary school settings: multiliteracy initiatives promote group inquiry and give learners more agency of learning using a variety of modes. While multimodality is not a new concept in elementary education, it has historically been contained in early childhood education, with kindergarten serving as the pinnacle of play. More and more people are praising kindergarten's emphasis on play as a model for learning in general (De Castell & Jenson, 2003).

In this present review, the researcher wants to establish the significance of multiliteracies and multimodal tools usage in early childhood classes and other educational environments for young children. The literature already published has explored the various modes and elements of multiliteracies in teaching and learning across all levels of education. However, there is still a paucity of research findings documenting the use of multiliteracies and multimodality in early childhood education settings. It is on that existing note that this review offers answers to the study's goal of what are the most effective ways to implement multiliteracies and multimodal techniques in the classroom and how early childhood education can benefit from the systematic application of multiliteracies and multimodal learning.

METHOD

This review was conducted to gain an overview of the application of multiliteracies and multimodality in early childhood classrooms. A systematic review adds to the corpus of information and offers a strong foundation for developing knowledge in the specific area of study. It answers queries that are challenging to answer using isolated qualitative research findings or

quantitative methodologies (Finfgeld-Connett, 2014; Hainey et al., 2016). This investigation also used the qualitative content analysis concept, which is more adaptable than purely qualitative analysis methods, in addition to the systematic review. This review reported and discussed the most recent multiliteracies practices and multimodal components in early childhood settings.

The information used in the present review came from earlier studies that focused on the application of multiliteracies and multimodal learning in early childhood schools. The peer-reviewed research articles that were published between 2010 and 2022 were systematically reviewed for the current investigation, which is shown in Figure 1. Keywords such as "multiliteracies", "multimodal learning", "early childhood", "preschool", "kindergarten", and "primary education", were used in a thorough search of pertinent databases, including ERIC, Education Full Text, PsycINFO, and Web of Science. The researcher reviewed 15 publications that matched the inclusion criteria. The search was restricted to English-language articles that discussed how multiliteracies and multimodal learning are used in early childhood settings and how they affect the learning outcomes of young learners.
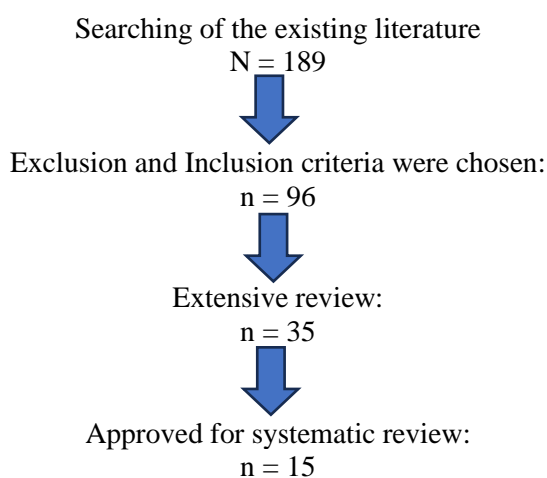
Searching of the existing literature
N = 189

⬇

Exclusion and Inclusion criteria were chosen:
n = 96

⬇

Extensive review:
n = 35

⬇

Approved for systematic review:
n = 15

Figure 1. Showing diagram of the systematic review of the literature

RESULTS AND DISCUSSION

To answer the sole goal of this review, the researcher showed the following results: that teachers are facing greater challenges than ever in choosing and designing a pedagogy that can engage students in meaningful literacy practices due to the changing literacy needs in the multimedia environment, the changing lifeworld's of the learners, and the changing dimensions of school literacies (Scherer, Siddiq, & Tondeur, 2019). Researchers have recommended educators implement gamified learning that can engage both educators and students. For instance, Mohd et al. (2020) recommend that language teachers use gamified learning to improve the learning experiences of their students. The idea of gamification was first introduced by Pelling (2011), and many interactive programs like Kahoot!, Quizzes, Plickers, Quizlet, and Socrative followed. These programs have been helpful for students because learning in a fun environment improves the memory of the lessons taught in the classroom.

While some teachers are eager to digitize teaching and learning, others are still sentimental about the old-fashioned literacy based on paper. Researchers have noted that this is the most difficult period for literacy pedagogy, where teachers battle the transitional contradictions between the advancement of modern digital literacy and the retrograde influence of traditional literacy (e.g. Chandler, 2017; Liang & Lim, 2020; Pishol & Kaur, 2015; Santori & Smith, 2018; Zhang et al., 2019). The monomodal and solitary conception of literacy that instructors and teachers of literacy continue to promote will always be in conflict with the multimodal literacy that today's adolescents and children value. They can no longer be motivated only by reading and writing on the page since they are accustomed to the variety of forms and modes of communication literacy activities on the

screen. It will significantly affect how students are taught to read in the classroom. For that reason, all the multimodal and multiliteracies elements of meaning-making must be explored and exploited by the early childhood educator and teacher to bring about the systemic use of different modes of learning by the child.

Furthermore, the findings imply that the caliber of teacher preparation and instructional design determines how well multiliteracies and multimodal learning are implemented in early childhood education. According to studies, teachers who have received training in the application of these methods and who scaffold children's learning can produce higher learning outcomes than those who do not.

The systematic review of the use of multiliteracies and multimodal tools in learning in early childhood classrooms was investigated in this review. The findings of the review showed that teacher preparation and instructional designs determine how well multiliteracies and multimodal learning are implemented in early childhood education. Early childhood teachers and educators need to receive training in the application of methods and techniques of using various modes of multiliteracies and multimodal in early childhood classrooms. (Mirra et al., 2018) suggest that educators and students accept the critical multiliteracies theory, which integrates four modes of digital interaction, in order to deal with the rapidly changing trends in multiliteracies pedagogy implementation in the classroom. This covers important digital usage, critical digital creation, critical digital sharing, and critical digital invention.

According to Mirra et al. (2018), classroom pedagogy demands a fundamental overhaul and calls for both teachers and students to have a grasp of the concept of criticality. In particular, the New London Group's (2000) long-standing multiliteracies pedagogy is extended by the criticality of media literacy. In order to be internationally competitive, students need to learn how to create digital multimedia material in addition to utilizing the multimodal learning resources that are already available, according to the important digital consuming factor. Learners must comprehend, utilize, and deconstruct the tropes of the existing multimodal resources before they can accomplish this. This is possible if teachers and students are exposed to the critical traditions and theories that are currently prevalent in the pertinent field of education. To enable students to critically analyze multimodal information, exposure is crucial.

CONCLUSION

The systematic review shows that previous research frequently takes into account the multimodality of meaning-making and meaning-recreation as well as the numerous multiliteracies abilities students bring to the classroom, particularly in early childhood classrooms and environments. This concurs with the New London Group's (2000) suggestion that educators and teachers should address the multiliteracies skills that learners possess. The study of classroom multiliteracies has drawn a lot of interest and has continued to grow as new technological advancements have made teaching and learning more convenient in the twenty-first century. Students should advance in this direction to communicate and compete with one another locally and worldwide, according to the critical theory of multiliteracies offered by Mirra et al. (2018).

Additionally, the systematic review of the literature suggests that teachers should negotiate multiliteracies in the classroom across a wide range of multimodal pedagogical experiences, especially in the early childhood classroom and environment, as these components support effective learning outcomes. There is growing interest in how multimodal digital texts and other technical tools can be used effectively in educational contexts as a result of the impact of multimedia technology on children's daily lives. As educators and teachers, we must recognize the widespread use of multimodal teaching and learning strategies in pedagogical situations in this cutting-edge technological era. As a result, policymakers must work to incorporate all multimodal tools and technology into the curriculum, especially for early childhood education.

Additionally, early childhood educators must use creativity to meet the learning requirements of their students by addressing the multimodal literacies they are using and, as a result, adapting their pedagogies to the virtual world and other contexts. This will allow the

students to hone their ability to interpret the various types of literature they encounter, helping them to establish their values, identities, and worldviews.

Conclusively, in order to improve learning utilizing all the senses, students must use, create, and share appropriate multimodal technologies in the classroom. Children explore to build their brains and create connections between real, tangible, and perceived actions by teachers and instructors in all contexts that support teaching and learning. Therefore, limitless opportunities must be provided in early childhood classrooms and environments to assist, direct, and motivate students to learn.

REFERENCES

Benson, S. (2008). A restart of what language arts is: Bringing multimodal assignments into secondary language arts. *Journal of Advanced Academics*, *19*, 634-674. https://doi.org/10.4219/jaa-2008-828

Boyle, E., Hainey, T., Connolly, T. M., Gray, G., Earp, J., Ott, M., Lim, T., Ninaus, M., Ribeiro, C., & Pereira, J. (2016). An update to the systematic literature review of empirical evidence of the impacts and outcome of computer games and serious games. *Computers & Education, 94,* 178-192. https://doi.org/10.1016/j.compedu.2015.11.003

Butler, Y. G. (2019). Gaming and young learners. In S. Garton & F. Copland (Eds.) *Hand-book of teaching English to young learners* (pp. 305-319). https://doi.org/10.4324/9781315623672-20

Chandler, P.D., (2017). To what extent are teachers well prepared to teach multimodal authoring? *Cogent Education*, *4*(1), 1-19. https://doi.org?10.1080/2331186x.2016.1266820.

Coiro, J., Knobel, M., Lankshear, C., & Leu, D. J. (2008). *Handbook of research on new literacies*. Lawrence Erlbaum Associates. https://researchonline.jcu.edu.au/27781/1/27781_Coiro_etal_2008.pdf

Coman, C., Țîru, L., G., Meseșan-Schmitz. L., Stanciu, C., Bularca, M., C. (2020). Online Teaching and Learning in Higher Education during the Coronavirus Pandemic: Students' Perspective. *Sustainability*. 12(24):10367. https://doi.org/10.3390/su122410367

Duncum, P. (2004). Visual culture isn't just visual: Multiliteracy, multimodality and meaning. *Studies in art education*, *45*, 252-264. https://doi.org/10.1080/00393541.2004.11651771

Finfgeld-Connett, D. (2014). Use of content analysis to conduct knowledge-building and theory-generating qualitative systematic reviews. Qualitative research, 14(3), 341-352. https://doi.org/10.1177/1468794113481790

Gee, J. P. (2004). New times and new literacies: Themes for a changing world. In A. F. Ball & S. W. Freeman (Eds.), *Bakhtinian perspectives on language, literacy, and learning* (pp. 279-306). Cambridge, UK: Cambridge University Press. https://doi.org/10.1017/CBO9780511755002.014

Hainey, T., Connolly, T. M., Boyle, E. A., Wilson, A., & Razak, A. (2016). A systematic literature review of games-based learning empirical evidence in primary education. *Computers & Education*, *102*, 202-223. https://doi.org/10.1016/j.compedu.2016.09.001

Hall, S. (1996). The meaning of new times. In A. Morley & K. H. Chen (Eds.), *Critical dialogues in cultural studies* (pp. 223-237). NY: Routledge. https://www.academia.edu/download/36977630/Critical_Dialogues_in_Cultural_Studies_Struart_Hall.pdf#page=234

Halliday, M. A. K. (1978). *Language as social semiotic: the social interpretation of language and meaning*. London: Edward Arnold. https://doi.org/10.1017/S004740450000782X

Jewitt, C. (2008). Multimodality and Literacy in School Classrooms. *Review of Research in Education, 32*, 241-267. https://doi.org/10.3102/0091732X07310586

Kalantzis, M., & Cope, B. (2008). Language education and multiliteracies. *Encyclopedia of language and education*, *1*, 195-211. https://doi.org/10.1007/978-0-387-30424-3_15

Kress, G. (2003). *Literacy in the new media age*. London: Routledge. https://doi.org/10.4324/9781003099857

Kress, G., Jewitt, C., Ogborn, J., & Tsatsarelis, C. (2001). *Multimodal teaching and learning: the rhetorics of the science classroom*: London: Continuum. https://www.bloomsbury.com/uk/multimodal-teaching-and-learning-9781441109965/

Kress, G., & Van Leeuwen, T. (1996). *Reading images: the grammar of visual design*. London: Routledge. https://doi.org/10.4324/9781003099857

Lankshear, C., & Knobel, M. (2007). Sampling "the New" in new literacies. In M. Knobel & C. Lankshear (Eds.), *A New Literacies Sampler* (pp.1-24). NY: Peter Lang. https://www.researchgate.net/publication/283968439_Sampling_the_new_in_new_literacies

Lankshear, C. & Knobel, M. 2011. *The New Literacies.* 3rd Edition. Mcgraw Hill. http://eprints.jcu.edu.au/18503/7/18503_Lankshear_&_Knobel_2011_Back_pages.pdf

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511815355

Liang, W. L. J., & Lim, F. V., (2020). A pedagogical framework for digital multimodal composing in the English Language classroom. *Innovation in Language Learning and Teaching,* 1-5. https://doi.org/10.1080/17501229.2020.1800709

Luke, A. (1998). Getting over method: Literacy teaching as work in "new times". *Language Arts*, *75*, 305-313. https://www.jstor.org/stable/41962065

Martinec, R. (2000). Types of process in action. *Semiotica, 130*, 243-268. https://www.degruyter.com/document/doi/10.1515/semi.2000.130.3-4.243/html

Martinec, R. (2005). Topics in Multimodality. In R. Hasan, C. Matthiessen & J. Webster (Eds.), *Continuing Discourse on Language* (Vol. 1). London: Equinox. https://scholars.cityu.edu.hk/en/publications/publication(3d83e73b-6fa5-4a94-8afb-aeff6d9e4eba).html

Mills, K. A. (2015). Doing digital composition on the social web: Knowledge processes in literacy learning. In B. Cope & M. Kalantzis (Eds.), *A Pedagogy of multiliteracies: Learning by design* (pp. 172-185). New York: Palgrave Macmillan. https://link.springer.com/chapter/10.1057/9781137539724_10

Mirra, N., Morrell, E., & Fillipiak, D. (2018). From digital consumption to digital invention: Toward a new critical theory and practice of multiliteracies, *Theory into Practice,* 57(1), 12-19. https://doi.org/10.1080/00405841.2017.1390336

Mohd, I.I., Nur, E.M.S., & Tan, K.H., (2020). Game-based learning platform and its effects on present tense mastery: Evidence from an ESL classroom. *International Journal of Learning, Teaching and Educational Research.* 19(5),13-26. https://doi.org/10.26803/ijlter.19.5.2

New London Group. (1996). A pedagogy of multiliteracies: Designing social futures. *Harvard Educational Review,* 66, 60-92. https://doi.org/10.17763/haer.66.1.17370n67v22j160u

O'Halloran, K. L. (2000). Classroom discourse in mathematics: A multisemiotic analysis. *Linguistics and Education, 10*, 359-388. https://doi.org/10.1016/S0898-5898(99)00013-3

Olthouse, J. M. (2013). Multiliteracies theory and gifted education: Creating "Smart Spaces" in the language arts classroom. *Gifted Child Today*, 36(4), 247-253. https://doi.org/10.1177/1076217513497575

Pelling, N., (2011). The (short) prehistory of "gamification" …. Funding Startups & otherimpossibilities. Retrieved from https://nanodome.wordpress.com/2011/08/09the-short-prehistory-of-gamification.

Perry, K. H. (2012). What is literacy? – A critical overview of sociocultural perspectives. *Journal of Language & Literacy Education*, 8(1), 50-71. https://files.eric.ed.gov/fulltext/EJ1008156.pdf

Pishol, S., & Kaur, S. (2015). Teacher and students perceptions of reading a graphic novel using the multiliteracies approach in an ESL classroom. *Malaysian Journal of Learning and Instruction*, *12*, 21-47. https://doi.org/10.32890/mjli2015.12.2

Pramling, N., & Wallerstedt, C. (2009). Making musical sense: The multimodal nature of clarifying musical listening. *Music Education Research*, *11*, 135-151. https://doi.org/10.1080/14613800902924433

Santori, D., & Smooth, C.A., (2018). Teaching and learning with iPads to support dialogic construction of multiliteracies, *Middle School Journal,* 49(1), 24-31. https://doi.org/10.1080/00940771.2018.1398944

Scherer, R., Siddiq, F., & Tondeur, J. (2019). The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. *Computers & Education,* 128, 13-35. https://doi.org/10.1016/j.compedu.2018.09.009

Tan, P.Q., & Tan, K.H. (2020). In-game instructions: The extent of their usefulness in enhancing the vocabulary acquisition of ESL learners. *International Journal of Emerging Technologies in Learning (iJET), 15*(4), 73-89. https://doi.org/10.3991/ijet.v15i04.11647

Tang, K. S. (2015). Reconceptualizing science education practices from new literacies research. *Science Education International, 26*(3), 307-324. https://eric.ed.gov/?id=EJ1074880

Van Leeuwen, T. (1998). Music and Ideology: Notes toward a Sociosemiotics of mass media music. *Popular Music and Society, 22*(4), 25-54. https://doi.org/10.1080/03007769808591717

Westby, C. (2010). Multiliteracies: The changing world of communication. *Topics in Language Disorders*, *30*(1), 64-71. *DOI:* 10.1097/TLD.0b013e3181d0a0ab

Williams, A. (2017). *History of digital games: Development in art, design and interaction.* Boca Raton, FL: Focal Press. https://doi.org/10.1201/9781315715377

Zhang, Z., Nagle, J., McKishnie, B., Lin, Z., & Li, W. (2019). Scientific strengths and reported effectiveness: a systematic review of multiliteracies studies. *Pedagogies: An International Journal*, *14*(1), 33-61. https://doi.org/10.1080/1554480X.2018.1537188