

Digital Andragogy: Wordwall-Based Gamified Assessment and Test Anxiety in Equivalency Education

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Abstract

Test anxiety can negatively affect learners' concentration, self-confidence, and performance during assessments. This issue may be particularly relevant to equivalency education in Indonesia, where learners, including many adults, come from varied educational backgrounds, life experiences, and learning needs. The integration of digital learning and gamified assessment has the potential to provide a more engaging and supportive assessment environment. This study explored the potential relevance of Wordwall-based gamified assessment to test anxiety within a digital andragogical perspective in equivalency education. A narrative thematic literature review was employed to examine studies related to digital andragogy, equivalency education, Wordwall-based assessment, gamified and game-based assessment, and test anxiety. Relevant sources were identified and thematically analyzed according to their contribution to the review focus. The findings suggest that Wordwall provides interactive features that can support learner engagement and offer greater variety in assessment formats, which may align with andragogical principles emphasizing relevance, participation, and flexibility. Previous research on gamified and game-based assessment also suggests that game elements may contribute to more supportive assessment experiences under appropriate assessment conditions. Nevertheless, empirical research specifically examining the relationship between Wordwall-based gamified assessment and test anxiety among equivalency learners remains limited. This review therefore provides a conceptual integration of digital andragogy, Wordwall-based gamified assessment, and test anxiety within the context of equivalency education. Further empirical research is needed to examine whether and under what conditions Wordwall-based gamified assessment may contribute to more supportive assessment experiences for equivalency learners.

Keywords: Digital andragogy; Wordwall; gamified assessment; test anxiety; equivalency education.

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1. INTRODUCTION

Assessment is an essential component of education because it provides information about learners' attainment of expected competencies. At the same time, evaluative activities may generate psychological pressure that can affect how learners respond to assessment. Test anxiety encompasses feelings of worry, tension, and emotional distress that arise in assessment situations and may interfere with learners' academic functioning (Vasiou & Vasilaki, 2025). Such anxiety can occur not only in examinations perceived as highly consequential but also during routine forms of assessment. For example, De Jonge et al. (2024) reported that test anxiety varied across low-stakes assessments, with these changes related to the extent to which learners experienced support for their needs for autonomy and competence. Taken together, these findings suggest that test anxiety is influenced by both the evaluative task and the conditions under which learners experience assessment.

The relevance of this issue becomes particularly evident in the context of equivalency education in Indonesia. Equivalency programs (Paket A, Paket B, and Paket C) are nonformal educational alternatives for individuals who are not participating in, or have discontinued, formal schooling, and they are delivered through institutions such as community learning centers (Pusat Kegiatan Belajar Masyarakat or PKBM) (Sucipto et al., 2021). The learner population is heterogeneous in age, educational history, and life experience, with adults representing an important part of it, which requires learning approaches that take learners' experiences and needs into consideration. Manurung et al. (2025) emphasized that learning for adults is more appropriately supported through andragogical principles than through

approaches primarily designed for children. At the institutional level, however, challenges remain, including tutor competence in curriculum implementation (Anggrayni, 2025) and readiness to conduct digital learning through E-PKBM (Saleha & Shofwan, 2025), while distance learning has become increasingly relevant to delivery (Arbarini et al., 2022). These circumstances indicate the need to consider not only how instruction is delivered but also how assessment is experienced by learners. Individuals who re-enter education after an interruption may encounter assessment differently from learners with continuous formal schooling, although this proposition still requires empirical investigation.

Andragogy offers a useful conceptual lens for examining assessment practices involving adult and nonformal learners. Knowles (1980) identified self-direction, the use of previous experience, readiness to learn, and the relevance of learning as important considerations in adult education. These principles suggest that assessment for adult learners should be connected to meaningful learning experiences and should provide opportunities for active involvement rather than relying exclusively on conventional evaluative procedures. Evidence from equivalency education supports the relevance of this perspective. Manurung et al. (2025) found that andragogical practices in a community learning center included the creation of a supportive learning environment, recognition of learners' experiences and identities, opportunities for new learning experiences, and flexibility in learning activities. Digital technologies may further facilitate these principles by enabling flexible forms of participation and interaction. Sari et al. (2024) examined e-learning implementation through an andragogical perspective, while Cherrstrom et al. (2024) highlighted the contribution of educational technology to andragogical program development, learner interaction, and adult online learning. Nevertheless, much of this discussion has concentrated on teaching and learning processes or broader program development, and the use of digital technology to support engaging and learner-responsive assessment among adult and nonformal learners has received comparatively less attention.

One approach that may address this issue is the incorporation of game elements into assessment. Game-based assessment and gamified assessment should not be treated as identical concepts because they represent different ways of connecting assessment activities with game mechanics and game environments (Landers & Sanchez, 2022). Su & Zou (2024), through a systematic review, identified the expanding use of games as assessment environments while also noting limitations in the theoretical grounding of some existing research. Of particular relevance to the present study is the emerging evidence concerning the relationship between game-based assessment and test anxiety. Mavridis & Tsiatsos (2017) compared a game-based assessment condition with conventional examination in a crossover design involving tertiary education students and found lower test anxiety in the game-based condition, together with improved examination performance. However, the study employed a three-dimensional educational game with higher education students rather than equivalency learners, so its findings provide a relevant conceptual and empirical basis but cannot be directly generalized to equivalency education.

Related evidence was reported by Bonefont et al. (2022) who explored game-based activities as an alternative to tests and evaluations in undergraduate biomedical engineering education. Their work proposed practical ways of incorporating academic games into assessment and reported generally positive initial student responses, while emphasizing cautious interpretation. More recently, Nugroho & Singh (2026) reported an association between gamified assessment using Quizizz, reduced test anxiety, and increased motivation among Indonesian EFL learners. Collectively, these studies indicate that game-based or gamified elements may contribute to a more engaging assessment experience, but the potential effect appears to depend on the assessment, the learners, and how the game elements are implemented. Game-based assessment should therefore not be assumed to reduce test anxiety automatically; its potential needs to be understood in relation to assessment design and learner context.

Within the broader development of digital assessment, Wordwall provides a practical web-based environment for developing interactive quizzes, games, and other forms of formative assessment. Its range of activity formats allows conventional question-and-answer procedures to be presented through

more interactive digital experiences. Anisah (2022) reported favorable student responses to Wordwall as an assessment medium, particularly regarding ease of use, visual presentation, and the availability of different question formats. Aprilia et al. (2024) investigated its use for assessment in a rural secondary education setting, while Indriyani et al. (2026) developed and validated a differentiated game-based formative assessment model using Wordwall. In higher education, Kartini & Syarifah (2025) examined learners' perceptions of Wordwall and emphasized appropriate implementation strategies and purposeful use of its features. These findings establish Wordwall as a potentially useful digital medium for interactive assessment; however, the existing studies do not provide sufficient evidence to conclude that Wordwall itself reduces test anxiety.

These research areas have largely developed separately: studies of game-based or gamified assessment have examined test anxiety (Bonefont et al., 2022; Mavridis & Tsiatsos, 2017; Nugroho & Singh, 2026), whereas studies of Wordwall have demonstrated its usefulness for interactive and varied assessment activities (Anisah, 2022; Aprilia et al., 2024; Indriyani et al., 2026). The research gap therefore concerns the limited integration of digital andragogy, Wordwall-based gamified assessment, and test anxiety in equivalency education, rather than the absence of research on these topics individually.

Accordingly, this study aims to synthesize the existing literature on digital andragogy, Wordwall-based gamified assessment, and test anxiety in equivalency education. Specifically, the review examines how andragogical principles can inform digital assessment practices, how Wordwall has been used as an interactive assessment medium, and what previous research indicates about the relationship between gamified or game-based assessment and test anxiety. Through a narrative-thematic literature review, it identifies converging evidence, contextual limitations, and remaining gaps, considering the potential relevance of Wordwall-based gamified assessment without assuming an established causal effect on test anxiety.

2. METHOD

A narrative-thematic literature review was adopted in this study to examine and integrate scholarly discussions related to digital andragogy, Wordwall-based gamified assessment, game-based assessment, test anxiety, and equivalency education. This approach enables findings from different but interconnected areas of research to be brought together, allowing recurring patterns, conceptual connections, and gaps in the existing literature to be identified (Snyder, 2019). Rather than aggregating effect sizes through statistical procedures, the review emphasized the interpretation and comparison of similarities, differences, and relationships identified across studies conducted in diverse educational settings. The review process consisted of four main stages: identification, screening, eligibility assessment, and inclusion.

The identification stage was carried out through four targeted search strings entered directly into Scopus, each corresponding to one of the core constructs examined in this review. The first string, "digital andragogy," retrieved 130 records; the second string, combining "gamified assessment" and "test anxiety," retrieved 29 records; the third string, "equivalency education," retrieved 708 records; and the fourth string, "Wordwall-based gamified assessment," retrieved 85 records. All four searches were conducted between 18 September 2026 and 23 September 2026, and only records published up to the search date were considered. These four searches jointly produced 952 records at the identification stage. To support bibliographic verification and reduce the risk of relying on a single indexing source, the retrieved records were cross-checked against SINTA, Google Scholar, and ERIC.

Scopus was selected as the principal search engine for three main methodological reasons. First, it applies editorial curation and peer-review verification prior to indexing, which provided a relatively high and consistent level of quality control across the four targeted search strings and reduced the risk of including predatory or non-peer-reviewed sources. Second, its structured metadata and advanced filtering functions allowed publication year, document type, and keyword combinations to be applied

precisely and reproducibly at the search stage itself, rather than relying solely on manual filtering after retrieval. Third, its broad interdisciplinary coverage across education, psychology, and educational technology allowed the four search strings to jointly capture literature relevant to digital andragogy, test anxiety, equivalency education, and Wordwall-based assessment within a single, consistently indexed database. This precision, however, means that some nationally relevant literature on equivalency and nonformal education in Indonesia, which is often published in SINTA-accredited journals not indexed in Scopus, could be underrepresented. This risk was addressed by cross-checking retrieved records against SINTA and Google Scholar, and, where relevant, ERIC, to verify bibliographic completeness and to identify additional nationally significant sources not captured by Scopus alone.

At the screening stage, records from each search string were filtered independently before being combined. For every string, filtering included restriction to the preceding five years, together with the string-specific keywords described below. Records retrieved through the "digital andragogy" string were filtered by publication year (the preceding five years), restricted to journal articles, and narrowed using the keywords andragogy, adult learning, and e-learning, yielding 21 records. The 29 records retrieved through the combined "gamified assessment and test anxiety" string were filtered by publication year (the preceding five years) and narrowed using the psychology, gamification, and anxiety filters, yielding 4 records. Records retrieved through the "equivalency education" string were filtered by publication year (the preceding five years) and narrowed using the keywords assessment, adult, and education, yielding 32 records. Records retrieved through the "Wordwall-based gamified assessment" string were filtered by publication year (the preceding five years) and narrowed using the keywords gamified, game-based, and digital assessment and evaluation, reducing the 85 records to 12. Titles and abstracts of the resulting records were then reviewed to exclude studies that lacked substantial relevance to the main areas of the review, namely digital andragogy, adult or nonformal education, equivalency education, digital assessment, Wordwall, gamified or game-based assessment, and test anxiety. Combined across the four search strings, 69 records were retained after screening.

Prior to full-text assessment, the 69 screened records were checked for duplication across the four search strings, using the Scopus record identifier (EID), DOI, and title, and no duplicate records were identified. All 69 screened records therefore proceeded to full-text eligibility assessment.

Explicit inclusion and exclusion criteria were applied at the screening and eligibility stages. Records were included if they were peer-reviewed journal articles or conference proceedings published in English or Indonesian; directly addressed at least one of the core constructs of digital andragogy, adult or nonformal education, equivalency education, Wordwall-based assessment, gamified or game-based assessment, or test anxiety; and were accessible in full text for eligibility review. Records were excluded if they were not peer-reviewed (for example, blog posts, non-indexed proceedings, or opinion pieces), addressed game-based or digital assessment outside an educational or psychological context, could not be accessed in full text, were duplicates of an already-retrieved record, or, upon full-text review, lacked sufficient scholarly traceability, substantive contribution, or contextual relevance to equivalency or nonformal education as defined in the eligibility assessment described above. Foundational books and methodological guidelines cited to frame the review (Knowles, 1980; Snyder, 2019) were not part of this selection procedure and are treated as background references rather than as part of the review corpus.

The credibility of the included studies was considered by prioritizing records published in peer-reviewed, indexed outlets (Scopus-indexed journals, SINTA-accredited national journals, or journals indexed in ERIC), giving preference to journal articles over non-peer-reviewed sources, and cross-checking bibliographic details against multiple databases as described above. Additional attention was given to the methodological clarity of each study, including whether the research design, sample, and measurement of test anxiety, engagement, or related constructs were reported with sufficient transparency to support inclusion in the thematic synthesis. Studies that met the eligibility criteria but

offered limited methodological detail were retained only when their conceptual or contextual contribution to the review could not be adequately substituted by more rigorous sources.

The 69 records that passed screening were then examined in full text at the eligibility stage. Eligibility was assessed based on scholarly traceability, substantive contribution, educational context, characteristics of the learners, assessment procedures, incorporation of digital or game-based elements, and findings associated with anxiety, engagement, autonomy, competence, or participation. Through this assessment, 51 full-text records were excluded for reasons including insufficient relevance to the core review themes, limited empirical or conceptual contribution, weak contextual fit to equivalency or nonformal education, or lack of scholarly traceability.

At the inclusion stage, 18 studies were retained for the final narrative thematic synthesis and are listed in Table 1. Knowles (1980) and Snyder (2019) were used as foundational and methodological references and are not counted among the included studies. The selected studies were examined based on their research focus, educational context, learner characteristics, assessment practices, main findings, and relevance to the objectives of the present study. The findings were subsequently organized around recurring concepts and related areas of evidence to develop a coherent synthesis. Four overarching themes emerged: digital andragogy within adult and nonformal education; assessment and test anxiety; gamified and game-based assessment; and Wordwall as an interactive medium for digital assessment.

Table 1. *Studies Included in the Thematic Synthesis (n = 18)*

No.	Study	Context and focus (as reviewed)	Theme and evidentiary role
1	Anggrayni (2025)	Teacher proficiency in implementing the emancipated curriculum in equivalency programs, West Java	Theme 1; contextual foundation
2	Anisah (2022)	Wordwall as an assessment tool for Indonesian junior high school students; student responses	Theme 4; evidence on Wordwall use
3	Aprilia et al. (2024)	Wordwall for assessment in a rural secondary education setting	Theme 4; evidence on Wordwall use
4	Arbarini et al. (2022)	Distance learning and its impact in equivalency education, Indonesia	Theme 1; contextual foundation
5	Bonefont et al. (2022)	Game-based activities as an alternative to conventional tests in undergraduate biomedical engineering education	Themes 2 and 3; evidence on game-based assessment and test anxiety
6	Cherrstrom et al. (2024)	Educational technology in adult online learning	Theme 1; conceptual foundation
7	De Jonge et al. (2024)	Test anxiety fluctuations during low-stakes secondary school assessments; needs for autonomy and competence	Theme 2; evidence on assessment conditions and test anxiety
8	Indriyani et al. (2026)	Development and validation of a differentiated game-based formative assessment model using Wordwall	Theme 4; evidence on Wordwall use
9	Kartini & Syarifah (2025)	Learners' perceptions of Wordwall in higher education (learning quality and satisfaction)	Theme 4; evidence on Wordwall use
10	Landers & Sanchez (2022)	Definitions and distinctions among game-based, gamified, and gamefully designed assessments (employee selection context)	Theme 3; conceptual clarification
11	Manurung et al. (2025)	Andragogical approach in a community learning center (PKBM)	Theme 1; contextual foundation
12	Mavridis & Tsiatsos (2017)	Game-based assessment versus conventional examination in a crossover design with tertiary students; test anxiety and exam performance	Themes 2 and 3; evidence on game-based assessment and test anxiety

No.	Study	Context and focus (as reviewed)	Theme and evidentiary role
13	Nugroho & Singh (2026)	Gamified assessment using Quizizz among Indonesian EFL learners; test anxiety and motivation	Themes 2 and 3; evidence on gamified assessment and test anxiety
14	Saleha & Shofwan (2025)	Tutor readiness for E-PKBM implementation in equivalency education	Theme 1; contextual foundation
15	Sari et al. (2024)	E-learning implementation in adult learning viewed through andragogy	Theme 1; conceptual foundation
16	Su & Zou (2024)	Systematic review of game-based assessment in education over the past decade	Theme 3; review evidence
17	Sucipto et al. (2021)	Manager characteristics and the success of equivalency programs at community learning centers, Indonesia	Theme 1; contextual foundation
18	Vasiou & Vasilaki (2025)	Definition, impacts, and implications of test anxiety	Theme 2; conceptual foundation

Note. Themes: 1 = digital andragogy within adult and nonformal education; 2 = assessment and test anxiety; 3 = gamified and game-based assessment; 4 = Wordwall as an interactive medium for digital assessment. Knowles (1980) and Snyder (2019) are background and methodological references and are not part of the included studies.

The synthesis further considered differences in the nature and evidentiary contribution of the selected studies. Research that directly investigated the relationship between gamified or game-based assessment and test anxiety was used to inform the discussion of possible psychological implications. In contrast, studies involving Wordwall primarily contributed evidence concerning learner engagement, interactivity, usability, and flexibility in assessment. Studies addressing digital andragogy and equivalency education were used to provide the conceptual and contextual foundation for interpreting the combined findings. Consequently, evidence of positive learner perceptions, usability, or engagement associated with Wordwall was not interpreted as direct empirical proof that the platform reduces test anxiety. Rather, its possible contribution was discussed cautiously by considering the convergence of evidence from the broader body of relevant literature.

The complete stages of literature selection, from identification through inclusion, together with the number of records retained at each stage for each of the four search strings, are presented in Figure 1. The flow diagram documents the selection procedure in a transparent and traceable manner and does not imply that the study constitutes a systematic review or a statistical meta-analysis. The thematic findings generated through this process subsequently formed the basis for examining Wordwall-based gamified assessment from a digital andragogical perspective and for discussing its potential relevance to test anxiety within equivalency education.

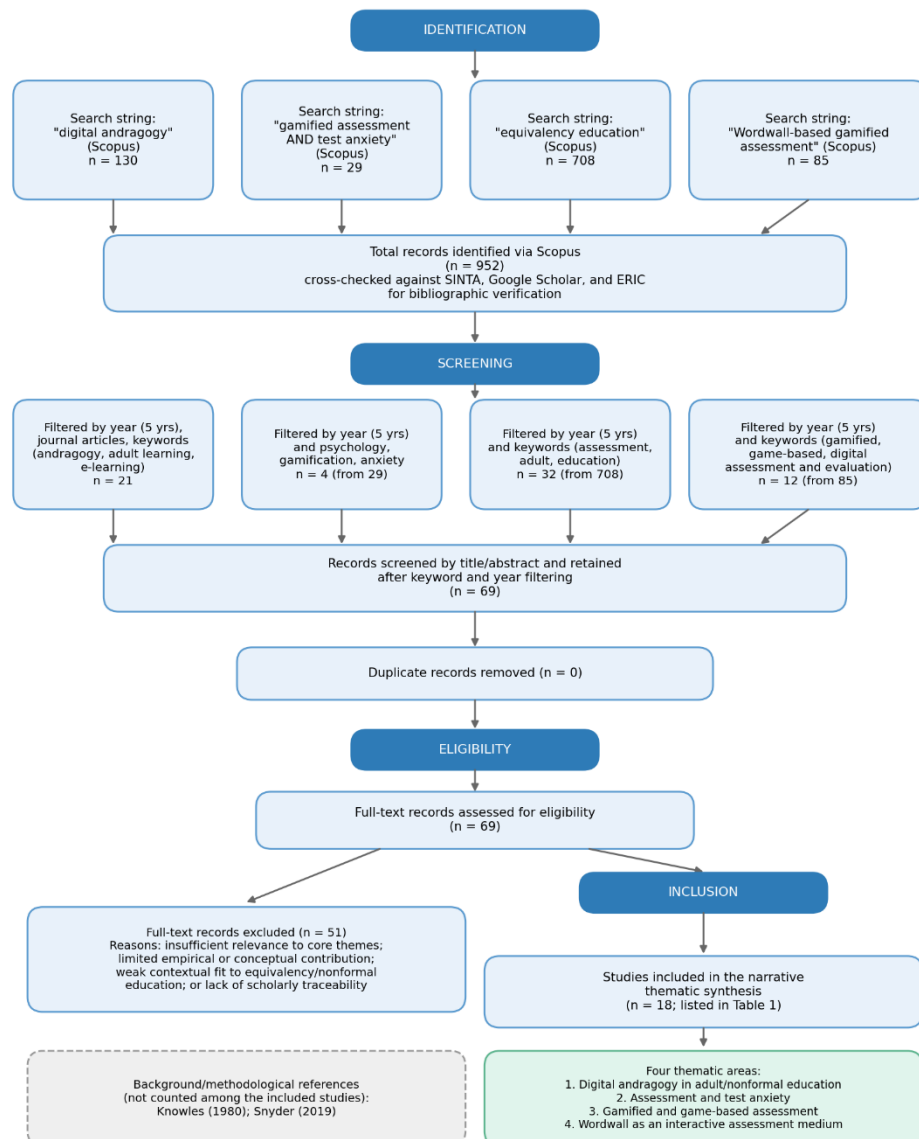


Figure 1. Flow Diagram of Literature Identification, Screening, Eligibility, and Inclusion

The selected literature was subsequently integrated around three central analytical dimensions: the applicability of digital andragogy to assessment practices within equivalency education, the potential use of Wordwall as a gamified digital assessment platform, and the association between gamified or game-based assessment and test anxiety. The synthesis did not treat Wordwall as an established intervention with demonstrated effectiveness in reducing test anxiety among equivalency learners. Rather, findings from comparable educational settings were critically examined to explore whether Wordwall's interactive, diverse, and game-oriented features can be theoretically aligned with andragogical principles and assessment environments that have been associated in previous research with reduced psychological pressure. This synthesis therefore served to clarify the conceptual potential of Wordwall-based gamified assessment while also identifying empirical limitations and areas requiring further investigation specifically within equivalency education.

3. RESULTS AND DISCUSSION

The thematic synthesis of the 20 included sources produced four themes, consistent with the analytical procedure described in the Method section: digital andragogy within adult and nonformal education; assessment and test anxiety; gamified and game-based assessment; and Wordwall as an

interactive medium for digital assessment. The sources contributed different kinds of evidence. Studies on andragogy, equivalency education, and educational technology provided the conceptual and contextual foundation. Studies on game-based and gamified assessment provided the evidence most closely related to test anxiety. Studies on Wordwall mainly addressed its use for assessment, usability, engagement, and learner perceptions. Because these strands have generally developed separately, and because the included sources did not provide sufficient direct evidence on Wordwall-based gamified assessment and test anxiety among equivalency learners, the findings below are presented as a conceptual integration rather than as a verified intervention effect. The relevance of Wordwall therefore lies not simply in replacing conventional tests with digital activities, but in how its interactive features may be incorporated into assessment practices that reflect adult learners' needs for autonomy, participation, relevance, and feedback (Cherrstrom et al., 2024; Manurung et al., 2025; Sari et al., 2024).

3.1 Digital Andragogy in Equivalency Education

Equivalency education (Paket A, Paket B, and Paket C) serves learners with diverse educational backgrounds, learning experiences, and individual needs, and adults represent an important part of this population. Its implementation may also involve flexible and technology-mediated learning arrangements (Anggrayni, 2025; Arbarini et al., 2022; Sucipto et al., 2021). These characteristics make andragogy relevant to the design of learning and assessment. In line with Knowles' (1980) emphasis on self-direction, prior experience, readiness to learn, and relevance, adult learners benefit from opportunities to participate actively, connect learning with practical needs, and draw upon prior experience (Cherrstrom et al., 2024; Manurung et al., 2025; Sari et al., 2024). In a community learning center, Manurung et al. (2025) found that andragogical practice included a supportive learning environment, recognition of learners' experiences, and flexibility in learning activities.

The literature further indicates that digital technology can support interaction and program development in adult learning when it is integrated with appropriate pedagogical or andragogical principles (Cherrstrom et al., 2024; Sari et al., 2024). In Indonesian equivalency education, however, digital implementation remains influenced by learner characteristics, access, learning conditions, and tutor readiness (Arbarini et al., 2022; Saleha & Shofwan, 2025). Digital assessment should therefore be understood as part of instructional design rather than merely as a technological replacement for conventional testing. It should also be noted that this body of work primarily concerns teaching, learning, and program development. Its implications for assessment are consequently interpretive, which is consistent with the limited attention to digital assessment for adult and nonformal learners identified in the Introduction.

3.2 Gamified Assessment and Test Anxiety

Test anxiety refers to worry, tension, and emotional distress in assessment situations that may interfere with learners' academic functioning (Vasiou & Vasilaki, 2025). Assessment is thus not solely a mechanism for measuring learning outcomes; its format and perceived conditions may also shape learners' psychological responses. De Jonge et al. (2024) showed that test anxiety varied across low-stakes assessments in secondary school, and that these changes were related to the extent to which learners experienced support for their needs for autonomy and competence.

Two implications follow. First, test anxiety appears to be influenced by both the evaluative task and the conditions under which learners experience it, which makes assessment design a relevant consideration. Second, this evidence comes from school-based settings. Whether equivalency learners, many of whom are adults returning to education after an interruption, experience assessment differently remains a proposition that requires empirical investigation. The emphasis of De Jonge et al. (2024) on autonomy and competence offers a conceptual point of connection with the andragogical emphasis on self-direction, relevance, and participation; this connection is interpretive and has not been tested in equivalency education.

Game-based and gamified assessment are related but not identical. Landers and Sanchez (2022) distinguish game-based, gamified, and gamefully designed assessment according to how game elements are incorporated into the assessment process, although their framework was developed in the context of employee selection and is used here for conceptual clarification. Su and Zou (2024) show that game-based assessment has expanded across diverse educational contexts, while noting limitations in the theoretical grounding of some existing research.

Three studies are most directly relevant to test anxiety. Using a crossover design with tertiary education students, Mavridis and Tsiatsos (2017) reported lower test anxiety and improved examination performance in a game-based assessment condition than in a conventional examination. Bonefont et al. (2022) explored game-based activities as an alternative to conventional tests in undergraduate biomedical engineering education and reported generally positive initial student responses, while emphasizing that the evidence should be interpreted cautiously. Nugroho and Singh (2026) reported that gamified assessment using Quizizz was associated with lower test anxiety and greater motivation among Indonesian EFL learners.

These studies point in a broadly similar direction, suggesting that game-based or gamified elements may contribute to a more approachable assessment experience. However, they differ in platform (a three-dimensional educational game, academic games, and Quizizz), subject area, educational level, and assessment design, and none involved equivalency learners. The literature therefore supports the relevance of gamified assessment to research on test anxiety, but it does not establish that gamified assessment automatically reduces anxiety, nor that findings from other settings can be transferred directly to equivalency education.

3.3 Wordwall as Digital Gamified Assessment Medium

Wordwall has been examined as an interactive tool for assessment and learning in several educational settings. Anisah (2022) reported favorable student responses to Wordwall as an assessment medium, particularly in relation to ease of use, visual presentation, and the availability of different question formats. Aprilia et al. (2024) investigated its use for assessment in a rural secondary education setting. In higher education, Kartini and Syarifah (2025) examined learners' perceptions of Wordwall in relation to learning quality and student satisfaction and emphasized the importance of appropriate implementation strategies. Indriyani et al. (2026) developed and validated a differentiated game-based formative assessment model using Wordwall.

Across these studies, Wordwall is characterized by interactive activities, varied task formats, learner participation, and digitally mediated feedback. Such features are relevant to andragogical assessment because they can create opportunities for active involvement and repeated practice rather than relying exclusively on a single formal testing event. However, these studies were conducted mostly in school and higher education contexts rather than in adult and nonformal education, and they primarily address assessment implementation, usability, engagement, satisfaction, and learner perceptions; test anxiety was not their primary outcome. Favorable perceptions or engagement cannot be interpreted as evidence that Wordwall reduces test anxiety. The distinction between evidence on Wordwall's assessment functions and evidence on gamified assessment and test anxiety is therefore maintained throughout this review.

To bring the three strands of evidence together, Table 2 presents a conceptual synthesis of Wordwall-based gamified assessment and conventional assessment. The table is derived from the reviewed literature and is not an empirical comparison conducted in this study.

Table 2. *Conceptual Synthesis of Wordwall-Based Gamified and Conventional Assessment*

Aspect	Wordwall-Based Gamified Assessment	Conventional Assessment
Assessment format	Digital, interactive, and game-oriented, with varied activity formats (Anisah, 2022; Aprilia et al., 2024; Indriyani et al., 2026)	Generally structured around predetermined tasks or formats
Learner engagement	Existing studies report favorable learner responses and participation, mainly in school and higher education settings (Anisah, 2022; Kartini & Syarifah, 2025)	Typically involves responding to assigned questions or tasks; engagement depends on how the assessment is designed
Andragogical relevance	Its features can be aligned with autonomy, active participation, practical relevance, and flexibility when the assessment is designed accordingly (Cherrstrom et al., 2024; Manurung et al., 2025; Sari et al., 2024)	Alignment with autonomy and individual learning needs depends on how flexible the assessment design is
Applicability to equivalency education	Potentially adaptable to diverse learners and flexible learning contexts, subject to technological access, tutor readiness, and learning conditions (Arbarini et al., 2022; Saleha & Shofwan, 2025)	May be less adaptable to learner diversity when assessment procedures are highly standardized
Potential relevance to test anxiety	Proposed as potentially relevant to how assessment is experienced, based on indirect support from studies of game-based and gamified assessment (Bonefont et al., 2022; Mavridis & Tsiatsos, 2017; Nugroho & Singh, 2026); not directly tested for Wordwall	Test anxiety may occur in any assessment format, depending on task, stakes, and perceived autonomy and competence (De Jonge et al., 2024; Vasiou & Vasilaki, 2025)
Evidence and limitations	Direct evidence linking Wordwall-based assessment to test anxiety among equivalency learners remains insufficient	Not examined through a direct comparison in this review; the contrast in this table is conceptual

Table 2 should be read as an interpretive summary rather than as a set of findings. It shows that the relevance of Wordwall-based assessment is determined not merely by its digital delivery, but by the way its interactive functions are embedded in the assessment process. From an andragogical perspective, features such as active participation, repeated practice, immediate feedback, and flexible task formats may be adapted to the characteristics of equivalency learners (Cherrstrom et al., 2024; Manurung et al., 2025; Sari et al., 2024). At the same time, the use of digital assessment cannot be separated from practical conditions, including technological access, learning environments, and tutor preparedness (Arbarini et al., 2022; Saleha & Shofwan, 2025). With respect to test anxiety, the entries in the table indicate where relevance is proposed on the basis of related studies; they do not describe outcomes that have been observed for Wordwall.

The link between the two strands of evidence is therefore indirect. Research on game-based and gamified assessment has documented findings related to motivation and test anxiety, suggesting that assessment format may shape how learners experience evaluative situations (Bonefont et al., 2022; Mavridis & Tsiatsos, 2017; Nugroho & Singh, 2026), while conceptual and review work clarifies how game elements relate to assessment (Landers & Sanchez, 2022; Su & Zou, 2024). Studies specifically examining Wordwall have focused on its use for assessment, learner engagement, satisfaction, and learning-related outcomes rather than on test anxiety as a primary outcome (Anisah, 2022; Aprilia et al., 2024; Indriyani et al., 2026; Kartini & Syarifah, 2025). Accordingly, the psychological relevance of Wordwall should be understood as conditional on its assessment design and implementation, rather than as an inherent effect of the platform.

Taken together, the literature points to a research gap at the intersection of digital andragogy, Wordwall-based gamified assessment, and test anxiety in equivalency education. Although these dimensions have been examined individually, limited research has brought them together within the context of equivalency learning. The present synthesis proposes a conceptual relationship in which digital andragogy informs the design of interactive and gamified assessment, which may shape learner engagement and perceived assessment conditions and, in turn, may be relevant to test anxiety. This relationship is a proposition derived from the convergence of existing findings. It should not be

interpreted as evidence of a causal effect, and it has not been empirically tested in equivalency education. This proposed relationship is illustrated in Figure 2.

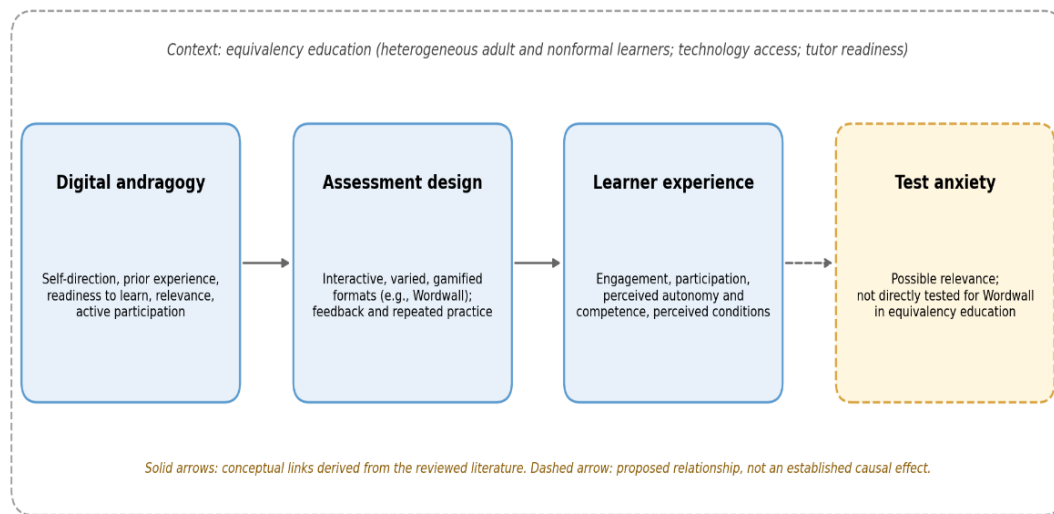


Figure 2. *Proposed Conceptual Relationship between Digital Andragogy, Assessment Design, Learner Experience, and Test Anxiety*

4. CONCLUSION

This review examined the potential relevance of Wordwall-based gamified assessment to test anxiety from a digital andragogical perspective in equivalency education. The synthesis suggests that digital andragogy provides a relevant conceptual foundation for designing assessment that emphasizes participation, relevance, flexibility, and feedback for equivalency learners, and that Wordwall's interactive features and varied task formats are conceptually compatible with these principles. Research on game-based and gamified assessment indicates potential relevance to learners' test anxiety, whereas studies on Wordwall mainly document its usability, engagement, and assessment functions.

Direct evidence that Wordwall-based gamified assessment reduces test anxiety among equivalency learners is therefore still insufficient. Wordwall should be viewed as a potentially relevant assessment medium whose psychological implications depend on assessment design, implementation, and learning context rather than on the platform itself. The contribution of this review lies in its conceptual integration of digital andragogy, Wordwall-based gamified assessment, and test anxiety, not in establishing an intervention effect. Further empirical research is needed to examine whether and under what conditions Wordwall-based gamified assessment is associated with lower test anxiety among equivalency learners.

AI USAGE STATEMENT

During the preparation of this manuscript, the author(s) used ChatGPT, Claude, and Grammarly to assist with language editing, paraphrasing, and proofreading. The author(s) reviewed and revised the generated content as necessary and take full responsibility for the accuracy, originality, and content of the published work.

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