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**Age-Related Differences in Learner Satisfaction, Engagement, and Usability Perceptions  
among South African Online Learners across Different Provinces: A Cross-Sectional  
Quantitative Study**

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**Age-Related Differences in Learner Satisfaction, Engagement, and Usability Perceptions among South African Online Learners across Different Provinces: A Cross-Sectional Quantitative Study**



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**Abstract**

**Purpose:** This study examines whether learner satisfaction, engagement, skill development, and perceptions of usability and convenience differ across age groups in an online learning context.

**Methodology:** A mono-method quantitative, cross-sectional design was employed. Data were collected using a structured Likert-scale survey administered via Microsoft Forms to 596 learners enrolled in digital learning programs offered by Infomage & RIMS Group in South Africa. A non-probability sampling approach was used. Descriptive statistics and one-way ANOVA were conducted to assess differences across age cohorts (18–24, 25–34, and 35–44 years). Given unequal group sizes and variances, Welch’s ANOVA and Games-Howell post hoc tests were applied to ensure robustness.

**Findings:** The results revealed no statistically significant differences across age groups for satisfaction, engagement, or perceived skill development. However, perceptions of usability and convenience differed significantly ( $p = .027$ ), with older learners reporting more positive experiences. While post hoc comparisons did not reach statistical significance, observed trends suggest that age may influence usability expectations. The null hypotheses for Composites 1, 2, and 3 failed to be rejected, while the null hypothesis for Composite 4 was rejected.

**Unique Contribution to Theory, Practice and Policy:**

This study contributes to theory by identifying usability, rather than satisfaction or engagement, as the primary dimension influenced by age in digital learning environments. Practically, the findings highlight the importance of aligning platform design with diverse user expectations and cognitive preferences. From a policy perspective, the results support the development of inclusive digital learning strategies that account for usability differences across age groups to enhance accessibility and learner experience.

**Keywords:** *Online Learning, Age Differences, Learner Satisfaction, Engagement, Usability*

**JEL Codes:** *I21, J24, I23, I25, O33*

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## INTRODUCTION

In recent years, the education landscape has undergone a significant transformation through the integration of technology, commonly referred to as EdTech (Alam & Mohanty, 2023). This technological convergence has helped address enduring challenges such as limited scalability and learner engagement, while enabling individuals to take greater control of their own learning journeys. However, the shift has also introduced new complexities, particularly around equitable access, digital literacy, and inclusivity (Framework, 2023). While digital platforms can streamline content delivery and personalize learning, not all learners benefit equally—especially when age-related differences in digital familiarity and learning preferences are considered (Shanganlall, 2023).

In the African context, educational technologies have created promising opportunities for “leapfrogging” — allowing those previously disadvantaged by infrastructure limitations to catch up with global peers (Sehloho, 2024). Yet, age remains an important factor influencing how easily learners adapt to and benefit from these technologies. Younger learners may navigate digital platforms with ease, while older learners might face challenges related to usability, confidence, or digital literacy, which can impact their learning outcomes and satisfaction (Castillo-Canales, et al., 2023).

This study aims to address these challenges by examining learner experiences within digital learning environments in the South African context. It is structured around three primary objectives. The first objective is to examine how learner satisfaction with digital learning varies across different age groups. The second objective is to assess the influence of age on learners’ perceived knowledge gains within digital learning environments. The third objective is to explore age-related differences in learners’ perceptions of convenience, usability, and accessibility when using digital learning platforms.

The study is empirical in nature, utilizing primary data collected from an existing Infomage & Rims Group (IRG) program, funded by the Education, Training & Development Sector Education Authority ETDP SETA) in South Africa. This program delivered accredited training in Cybersecurity and Technopreneurship (Technology entrepreneurship) across all nine provinces of South Africa. Learners were provided with the necessary resources to complete their studies. These programs were pivotal, preparing learners for employment in a rapidly evolving, technology-driven world (Campbell, 2023). Surveying these learners offered invaluable insights into the effectiveness of digital learning in such programs, recognizing their experiences (utilizing quantitative methods) as critical to shaping future educational strategies. Within this context, the following research questions are addressed:

**Table 1: Primary and Secondary Questions in the Study**

<b>Primary research question:</b>	Does age have an impact on learners' satisfaction, engagement, usability and perceptions of usability and convenience in a digital learning program?
<b>Secondary research questions:</b>	<ol style="list-style-type: none"> <li>1. How does learner satisfaction with digital learning differ across age groups?</li> <li>2. In what ways does age influence learner engagement within digital learning environments?</li> <li>3. Are there age-related differences in learners' perceptions of usability and convenience when using digital platforms?</li> <li>4. To what extent does age shape learners' overall experience and comfort in digital learning compared to traditional methods?</li> </ol>

The researcher ensured that there was an alignment between the studies' secondary questions (SQ) and the questions asked in the surveys that were sent out to participants. To ensure there was clarification, an alignment table was developed to demonstrate the linkage.

**Table 2: Alignment Matrix between SRQ and Survey Questions**

Secondary Research Question (SRQ)	Composite Grouping(s)	Survey Questions
SRQ1: How does learner satisfaction with digital learning differ across age groups?	Composite 1 – Satisfaction	Q1, Q2, Q3
SRQ2: In what ways does age influence learner engagement within digital learning environments?	Composite 2 – Engagement	Q4, Q5
SRQ3: Are there age-related differences in learners' perceptions of usability and convenience?	Composite 4 – Usability & Convenience	Q10, Q11
SRQ4: To what extent does age shape learners' experience compare to traditional methods?	Composite 3 – Assessment & Skills	Q8, Q9

This study was a mono-method quantitative study, which was aimed at confirming a theory. The theories being tested were underpinned by the hypothesis presented in the table below.

**Table 3: Hypothesis**

Hypothesis	Statement
<b>H<sub>0</sub> (Null)</b>	There is no significant difference in learner satisfaction, engagement, or perceptions of usability and convenience across different age groups.
<b>H<sub>1</sub> (Directional 1)</b>	Learners in different age groups report significantly different levels of satisfaction, engagement, and perceptions of usability and convenience.
<b>H<sub>2</sub> (Directional 2)</b>	Older or younger age groups consistently report higher or lower satisfaction, engagement, or usability/convenience compared to others.

Within the South African context, digital learning initiatives are further shaped by national policy frameworks such as the National Digital and Future Skills Strategy (Department of Communications and Digital Technologies, 2020), which aims to equip citizens with competencies required for participation in a digitally driven economy. However, structural barriers continue to influence the effectiveness of these initiatives. High data costs and unequal

internet access remain persistent challenges (Research ICT Africa, 2021; World Bank, 2020), while frequent load-shedding disrupts consistent participation in online learning (CSIR, 2023). These constraints may disproportionately affect different age groups, as younger learners may be more adaptable to navigating digital platforms under constrained conditions, while older learners may experience greater difficulty in troubleshooting connectivity issues and maintaining consistent access (van Dijk, 2020). As a result, understanding how age interacts with these contextual barriers is critical for designing inclusive and resilient digital learning environments in South Africa.

### **Statement of the Problem**

Despite the rapid expansion of digital learning initiatives in South Africa, there remains limited empirical evidence on how learner characteristics—particularly age—influence experiences within these environments. While digital platforms are often assumed to provide equitable access and outcomes, disparities in digital literacy, usability expectations, and access to technological resources may result in uneven learner experiences. Existing studies offer mixed findings regarding the role of age, and many fail to account for contextual challenges such as high data costs, mobile-first access, and infrastructure constraints. Furthermore, limited attention has been given to usability as a distinct dimension influencing learner outcomes. This creates a gap in understanding how age interacts with platform design and contextual factors to shape satisfaction, engagement, and perceived skill development. This study therefore seeks to address this gap by examining age-related differences in learner experiences within a South African digital learning context.

## **LITERATURE REVIEW**

### **Digital Learning and Learner Experience**

Digital learning has become a central component of modern education, driven by advancements in educational technology (EdTech) that enable scalable, flexible, and accessible learning environments (Alam & Mohanty, 2023). These platforms allow learners to engage with content asynchronously, personalize their learning pace, and access resources beyond traditional classroom constraints. As a result, digital learning has been widely adopted in both developed and developing contexts to address challenges related to access, cost, and infrastructure (Framework, 2023).

Learner experience in digital environments is typically evaluated through key dimensions such as satisfaction, engagement, and perceived learning outcomes. Satisfaction reflects the overall evaluation of the learning experience, while engagement captures the level of active participation and involvement in learning activities. Perceived skill development relates to learners' self-assessment of knowledge acquisition and competency improvement. Research suggests that when digital platforms are well-designed and supported, these dimensions can reach levels comparable to traditional learning environments (Cole et al., 2014).

However, digital learning outcomes are not solely determined by content quality or instructional design. Factors such as learner motivation, self-regulation, and prior experience with digital tools play a significant role in shaping how learners interact with and benefit from online platforms (Nguyen et al., 2022). This highlights the importance of understanding how different learner characteristics, including age, influence the overall digital learning experience.

## **Age and Digital Learning**

Age has been widely studied as a variable influencing technology adoption and learning experiences, though findings remain mixed and context dependent. The concept of “digital natives” suggests that younger individuals, having grown up with technology, are more comfortable and proficient in digital environments. This assumption has often led to the expectation that younger learners will perform better and report more positive experiences in online learning contexts.

However, empirical evidence challenges this assumption. The notion of “digital natives” has been critically examined within the South African context, where access to technology and digital skills remain unevenly distributed. Czerniewicz and Brown (2013) argue that digital proficiency is not determined by age alone, but is shaped by socio-economic factors, access to resources, and educational opportunities. This challenges the assumption that younger learners are inherently more capable in digital environments. Similarly, Cole et al. (2014) found no significant differences in overall satisfaction across age groups when digital learning environments are well-structured and accessible, while Liu and Haque (2017) showed that age does not directly influence course satisfaction once factors such as internet self-efficacy are considered. These findings suggest that individual competencies and contextual factors may be more important than age alone in shaping digital learning experiences.

In contrast, other studies indicate that older learners may report higher levels of satisfaction and more positive perceptions of online learning. This has been attributed to factors such as stronger intrinsic motivation, clearer learning goals, and better self-regulation (Nguyen et al., 2022). However, within the South African context, many mature learners in digital education programmes are also full-time employees or individuals seeking to improve employability in a constrained economic environment. This may further strengthen goal-directed behaviour and commitment to learning, potentially reinforcing the patterns observed in global studies. At the same time, contextual barriers such as limited access to reliable internet and electricity may moderate these advantages, suggesting that the relationship between age and digital learning experiences remains context dependent.

Overall, the literature suggests that age does not uniformly determine digital learning outcomes but may influence specific aspects of the learning experience. This reinforces the need to examine age-related differences across multiple dimensions rather than assuming a single directional effect.

## **Usability and Platform Design**

Within the South African context, usability must also be understood in relation to a predominantly mobile-first learning environment. Many learners, particularly those in rural or under-resourced provinces, access digital learning platforms primarily through smartphones rather than desktop or laptop devices (Research ICT Africa, 2021; World Bank, 2020). This introduces additional usability constraints, including smaller screen sizes, limited processing power, higher data costs, and intermittent connectivity. These factors can significantly influence how learners navigate platforms, access content, and complete learning activities. As a result, platform usability in such contexts extends beyond interface design to include optimization for low-bandwidth environments, mobile compatibility, and resilience to disruptions such as load-shedding (Czerniewicz et al., 2020; Department of Communications and Digital Technologies, 2020). Failure to account for these constraints may

disproportionately affect learners' experiences and limit the effectiveness of digital learning initiatives.

Usability is a critical factor in the effectiveness of digital learning platforms, influencing how easily learners can navigate, interact with, and benefit from the system. It encompasses elements such as interface design, navigation structure, accessibility, and overall user experience. High usability reduces cognitive load, allowing learners to focus on content rather than struggling with the platform itself (Holt et al., 2023).

Research indicates that usability plays a significant role in shaping learner satisfaction and engagement. Platforms that are intuitive, stable, and easy to navigate tend to result in more positive user experiences and improved learning outcomes. Conversely, poorly designed interfaces can lead to frustration, disengagement, and reduced effectiveness of digital learning initiatives.

Age-related differences in usability perceptions have also been observed. Older learners often prefer structured, linear interfaces with clear navigation pathways and minimal complexity, which align with goal-oriented and task-focused approaches to learning (Beutell, 2013). In contrast, younger learners, who are accustomed to highly interactive and visually dynamic digital environments, may have higher expectations for interface responsiveness and design sophistication.

Furthermore, younger users may critically evaluate digital platforms against the standards set by commercial applications such as social media and gaming environments. Studies using techniques such as think-aloud protocols have shown that younger learners actively assess usability features and may be more sensitive to design limitations (Carioli & Peru, 2019). This suggests that usability is not solely determined by technical functionality but also by the alignment between platform design and user expectations.

Taken together, these findings highlight usability as a key dimension through which age-related differences in digital learning experiences may emerge. In practical terms, poor usability—manifested through high cognitive load, complex navigation, or limited mobile optimisation—can directly reduce learner satisfaction by increasing frustration and effort required to complete tasks (Holt et al., 2023). It may also lower engagement, as learners are less likely to persist with platforms that are difficult to use, and can negatively influence perceived skill development if learners struggle to access or interact with content effectively (Cole et al., 2014; Nguyen et al., 2022). These effects may differ across age groups, as younger learners may tolerate or adapt to complex interfaces more readily, while older learners may be more sensitive to usability barriers (Beutell, 2013). Understanding this relationship is essential for designing inclusive platforms that accommodate diverse learner profiles and enhance overall learning outcomes.

## **METHODOLOGY**

### **Research Design**

This study adopted a positivist research philosophy and employed a mono-method quantitative, cross-sectional research design. The design was appropriate for capturing learners' perceptions of digital learning experiences at a single point in time. It enabled the measurement of key constructs, including satisfaction, engagement, assessment & skills, and usability & convenience, through structured survey responses. The quantitative approach supported

objective analysis and hypothesis testing, aligning with the study's aim of identifying statistically significant differences across age groups.

### **Sampling Technique**

The study utilized a non-probability sampling technique, specifically convenience sampling. Participants were selected from learners enrolled in digital learning programs offered by Infomage & RIMS Group (IRG). This sampling approach was appropriate due to the accessibility of participants within the program and the study's focus on capturing real-world learner experiences within an existing digital learning environment.

### **Sample Size**

A total of 594 usable responses were obtained from an invited population of approximately 2,000 learners, yielding a response rate of approximately 30%. The sample included learners from multiple provinces across South Africa and represented diverse demographic characteristics, including age, gender, education level, and prior digital learning experience. The age groups analyzed in the study were 18–24, 25–34, and 35–44 years.

### **Data Collection Procedure**

Primary data were collected using a structured questionnaire administered via Microsoft Forms. The survey consisted of Likert-scale items designed to measure learners' perceptions across four composite constructs: Satisfaction, Engagement, Assessment & Skills, and Usability & Convenience. Responses were captured on a five-point Likert scale ranging from "strongly disagree" to "strongly agree."

The survey was distributed to participants enrolled in the digital learning program and remained open for an extended period to allow sufficient time for response collection. Completed responses were exported to Microsoft Excel for data cleaning, coding, and preparation prior to analysis.

### **Statistical Analysis**

Data analysis was conducted using Microsoft Excel and Jamovi statistical software. The analysis consisted of both descriptive and inferential statistical techniques. Descriptive statistics, including means, standard deviations, and frequency distributions, were used to summarize participant characteristics and overall response patterns.

Inferential analysis was conducted using one-way Analysis of Variance (ANOVA) to assess whether significant differences existed across age groups for each composite variable. Due to unequal group sizes and variance heterogeneity, Welch's ANOVA was applied to improve the robustness of the results. Where significant differences were identified, the Games-Howell post hoc test was used to examine pairwise group differences. This combination of statistical techniques ensured a rigorous assessment of the impact of age on learner satisfaction, engagement, skill development, and usability perceptions.

## **RESULTS**

This section presents the results of the statistical analyses conducted in the study. The findings are organized into three parts: descriptive statistics, one-way analysis of variance (ANOVA), and post hoc analysis. These analyses were used to examine differences in learner perceptions across age groups for each composite variable.

## Descriptive Statistics

Table 4 presents the descriptive statistics for each composite variable across the three age groups (18–24, 25–34, and 35–44 years).

**Table 4: Descriptive Statistics (Summary)**

Age Group	n	Satisfaction (Mean ± SD)	Engagement (Mean ± SD)	Assessment & Skills (Mean ± SD)	Usability & Convenience (Mean ± SD)
18–24	181	12.25 ± 2.64	8.45 ± 1.74	8.28 ± 1.77	7.84 ± 1.79
25–34	388	12.29 ± 2.81	8.50 ± 1.89	8.28 ± 1.88	8.18 ± 1.85
35–44	24	13.38 ± 2.62	8.88 ± 1.94	8.67 ± 1.90	8.75 ± 1.96

The results indicate that learners across all age groups reported generally similar levels of satisfaction, engagement, and perceived skill development. However, differences are more apparent in the Usability & Convenience composite, with older learners reporting higher mean scores.

## One-Way ANOVA Results

Table 5 summarizes the results of the one-way ANOVA conducted to assess differences across age groups.

**Table 5: Summary of One-Way ANOVA Results with Effect Sizes**

Composite (DV)	Age 18–24	Age 25–34	Age 35–44	F (2, 590)	$\eta^2$	p	Significant
Satisfaction	12.25 ± 2.64	12.29 ± 2.82	13.38 ± 2.62	1.84	< .01	.159	X
Engagement	8.45 ± 1.74	8.50 ± 1.89	8.88 ± 1.94	0.57	< .01	.567	X
Assessment & Skills	8.28 ± 1.77	8.28 ± 1.88	8.67 ± 1.90	0.50	< .01	.610	X
Usability & Convenience	7.84 ± 1.79	8.18 ± 1.85	8.75 ± 1.96	3.64	.012	.027	✓

The analysis revealed no statistically significant differences for Satisfaction, Engagement, and Assessment & Skills. However, a statistically significant difference was found for Usability & Convenience,  $F(2, 590) = 3.64$ ,  $p = .027$ , with a small effect size ( $\eta^2 \approx .012$ ).

## Welch's ANOVA Results

Given unequal group sizes and variance differences, Welch's ANOVA was conducted as a robustness check.

**Table 6: Welch's ANOVA – Usability & Convenience**

Variable	F	df <sub>1</sub>	df <sub>2</sub>	p
Usability & Convenience	3.49	2	61.5	.037

The results confirm a statistically significant difference across age groups for usability and convenience perceptions.

## Post Hoc Analysis

The Games-Howell post hoc test was conducted to examine pairwise differences between age groups.

**Table 7: Group Descriptives – Usability & Convenience**

Age Group	n	Mean	SD	SE
18–24	181	7.84	1.79	0.1332
25–34	388	8.18	1.85	0.0940
35–44	24	8.75	1.96	0.4004

**Table 8: Games-Howell Post Hoc Test – Usability & Convenience**

Comparison	Mean Difference	<i>p</i>
18–24 vs 25–34	-0.335	.100
18–24 vs 35–44	-0.910	.096
25–34 vs 35–44	-0.575	.357

None of the pairwise comparisons reached statistical significance at the  $\alpha = .05$  level. However, the comparison between the 18–24 and 35–44 age groups approached significance ( $p = .096$ ), suggesting a potential trend in which older learners report more positive perceptions of usability and convenience.

## CONCLUSION AND RECOMMENDATIONS

### Summary

This study examined whether learner satisfaction, engagement, skill development, and perceptions of usability and convenience differ across age groups in a digital learning environment. The findings indicated that learners across all age groups reported broadly similar levels of satisfaction, engagement, and perceived skill development. This suggests that digital learning programs can provide consistent educational value across diverse age cohorts when adequately designed and supported.

However, the study identified a statistically significant difference in perceptions of usability and convenience, with older learners (35–44 years) reporting more positive experiences compared to younger learners. Although pairwise comparisons did not reach statistical significance, the observed trend suggests that age may influence how learners perceive and interact with digital learning platforms.

### Conclusion

The study concludes that age is not a significant determinant of learner satisfaction, engagement, or perceived skill development in digital learning environments. These findings indicate that well-structured digital learning programs can deliver equitable learning experiences across age groups.

However, age does have a modest but statistically significant influence on perceptions of usability and convenience. Older learners demonstrated more positive evaluations of platform usability, suggesting that usability is a key dimension through which age-related differences manifest. This finding challenges the assumption that younger learners, often considered “digital natives,” will inherently have more favorable experiences in digital learning environments. Overall, the study establishes that while learning outcomes may remain consistent across age groups, platform design and usability play a critical role in shaping the overall learner experience.

## **Recommendations**

### **Theoretical Recommendations**

The study contributes to existing literature by identifying usability as the primary dimension influenced by age in digital learning environments. Future research should further explore the relationship between age, digital literacy, and usability perceptions, particularly in developing country contexts. Researchers are encouraged to incorporate mixed-method approaches to better understand the underlying behavioural and cognitive factors influencing these perceptions.

### **Practical Recommendations**

Digital learning providers should prioritize user-centered design principles to enhance platform usability for diverse learner groups. This includes simplifying navigation, ensuring interface clarity, and providing structured learning pathways that accommodate different cognitive preferences. Program designers should avoid assuming that younger learners will naturally adapt to digital platforms and instead focus on creating inclusive and intuitive user experiences for all age groups.

### **Policy Recommendations**

Policy makers and education stakeholders should support the development and implementation of digital learning frameworks that emphasize accessibility and usability across diverse populations. Investment in digital skills development and platform optimization should be prioritized to ensure that learners of all ages can effectively engage with digital education initiatives. Additionally, quality assurance mechanisms should incorporate usability assessments as a standard component of digital learning program evaluation.

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