



Technology Used in English Language Learning by Level I Students at Sana'a University: Problems and Solutions

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Keywords

- | | |
|------------------------------|---------------------------|
| 1. Educational technology | 4. Self-Directed Learning |
| 2. English language teaching | 5. TPACK |
| 3. Technology Integration | 6. SAMR |

Abstract:

This study investigates the patterns of educational technology use among Level I students at the Department of English, Faculty of Arts and Humanities, Sana'a University, across nine core English courses. A quantitative descriptive design was employed using a questionnaire based on a reversed Likert scale (1=highest use, 5= lowest use), and weighted scores were calculated to produce descriptive statistics including mean, median, mode, standard deviation, range, and usage percentage. To identify statistically significant differences, one-way ANOVA and Post Hoc (Tukey HSD) tests were applied. The results reveal selective technology use, with students heavily relying on smartphones and general Internet tools, while larger devices, organized educational websites, and specialized applications remain underutilized due to the department lab's poor infrastructure and frequent Internet interruptions. The findings are interpreted through constructivist and self-directed learning theories, as well as technology-supported frameworks (CALL, MALL, WALL, TPACK, SAMR). The study emphasizes that improving infrastructure and systematically integrating technology into the curriculum are essential for effective English language teaching.

التكنولوجيا المستخدمة في تعلم اللغة الإنجليزية لدى طلاب المستوى الأول بجامعة صنعاء: المشكلات والحلول

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الكلمات المفتاحية

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|--------------------------|---------------------------|
| 1. التكنولوجيا التعليمية | 2. تعليم اللغة الإنجليزية |
| 3. التعلم الذاتي الموجه | 4. تكامل التكنولوجيا |
| 5. TPACK | 6. SAMR |

الملخص:

تستكشف هذه الدراسة أنماط استخدام التكنولوجيا التعليمية بين طلاب المستوى الأول في قسم اللغة الإنجليزية، كلية الآداب والعلوم الإنسانية، جامعة صنعاء، عبر تسعة مقررات أساسية. اعتمدت الدراسة تصميمًا وصفيًا كميًا باستخدام استبيان مبنيا "على مقياس ليكرت المعكوس (التقييم العكسي) (1 = أعلى استخدام، 5 = أدنى استخدام)، وقد تم احتساب القيم المرجحة لإنتاج إحصاءات وصفية مثل المتوسط، الوسيط، المنوال، الانحراف المعياري، المدى، ونسبة الاستخدام. وللكشف عن الفروق ذات الدلالة الإحصائية، تم استخدام تحليل التباين أحادي الاتجاه (ANOVA) واختبار Post Hoc (Tukey HSD). وقد أظهرت النتائج استخدامًا انتقائيًا للتكنولوجيا، حيث يعتمد الطلاب بشكل كبير على الهواتف الذكية وأدوات الإنترنت العامة، بينما تُهمل الأجهزة الكبيرة والمواقع التعليمية المنظمة والتطبيقات المتخصصة، بسبب ضعف البنية التحتية لمعمل القسم وانقطاع الإنترنت. تم تفسير النتائج عبر نظريات التعلم البنائية، والتعلم الذاتي الموجه، وأطر التعلم المدعوم بالتكنولوجيا (CALL، MALL، WALL، TPACK، SAMR). تؤكد الدراسة أن تحسين البنية التحتية والتكامل المنهجي للتكنولوجيا أمران أساسيان لتعزيز فعالية التعليم.

Introduction:

The integration of educational technology has become a central feature of contemporary higher education, particularly in the field of English Language Teaching (ELT). Advances in digital devices, Internet resources, and educational applications have reshaped the ways in which language is taught, learned, and practiced. Technology now provides learners with access to authentic materials, interactive environments, and flexible learning opportunities that extend beyond the limitations of traditional classrooms. As a result, technology-supported learning has been widely recognized as a means of enhancing learner autonomy, engagement, and communicative competence.

In ELT contexts, technology plays a vital role in supporting the development of the four language skills—listening, speaking, reading, and writing—through multimedia input, online interaction, and self-paced practice. Models such as Computer-Assisted Language Learning (CALL), Mobile-Assisted Language Learning (MALL), and Web-Assisted Language Learning (WALL) emphasize the pedagogical value of integrating digital tools into language instruction to promote meaningful interaction, learner-centered practices, and continuous exposure to the target language. However, the effectiveness of these models largely depends on how technology is actually used by students and integrated into the curriculum.

Despite the widespread availability of digital devices, the use of educational technology in many university contexts remains uneven and unsystematic. Students often rely on personal devices such as smartphones for learning purposes, while institutional technologies such as computers, projectors, and learning platforms are underutilized. In addition, students tend to favor easily accessible Internet tools, including search engines and social media, over structured educational websites and academic platforms. These patterns raise important questions about the depth and quality of technology integration in ELT and whether technology use is guided by

pedagogical objectives or driven primarily by convenience and familiarity.

From a theoretical perspective, Constructivist Learning Theory suggests that learners actively construct knowledge through interaction with tools, content, and social contexts. Similarly, Self-Directed Learning Theory emphasizes learners' ability to take responsibility for selecting learning resources, managing their learning processes, and evaluating their progress. Educational technology, when effectively integrated, can support both perspectives by enabling learners to engage independently, collaboratively, and reflectively with language input and tasks. However, without systematic curricular integration and instructional guidance, technology use may remain superficial and limited in its educational impact.

In the Yemeni higher education context, and particularly at Sana'a University, empirical research examining students' actual use of educational technology in ELT is still limited. Most available studies focus on teachers' perceptions or general attitudes toward technology, while fewer investigations provide detailed, data-driven analyses of students' usage patterns across courses and technological categories. This lack of empirical evidence creates a gap between theoretical expectations and practical implementation, making it difficult to design informed policies, curricula, and professional development programs.

Therefore, this study seeks to provide a comprehensive and empirical examination of educational technology use among the first-year students at the Department of English at Sana'a University. By analyzing students' use of electronic devices, Internet tools, and educational applications across multiple courses, and by employing rigorous statistical methods, the study aims to present a clear understanding of how technology is currently utilized in the early stages of university-level English language learning. The findings are interpreted through established learning theories and technology-integration frameworks, including Constructivism, Self-

Directed Learning, CALL, MALL, WALL, TPACK, and SAMR in order to bridge the gap between theory and practice and to contribute to the improvement of ELT in higher education contexts.

Statement of the Problem:

Despite growing global interest in technology's role in language education, a genuine understanding of how students learn in environments with severely constrained and outdated technological infrastructure is still lacking. In the Department of English at Sana'a University, the official technological environment is virtually non-functional: the language laboratory is equipped with outdated computers and Data Projectors, most of which are out of service, and the department's internet service has been disconnected for over eight years.

Faced with this institutional reality, students appear to have instinctively turned to alternative, personal, and portable technologies (primarily their smartphones) and general internet resources outside the department's framework (such as internet cafés or personal mobile data) to pursue their learning. This creates a unique research situation where the issue of technological integration is reduced to a matter of survival learning strategies based on students' personal resources.

Therefore, the central research problem addressed by this study is the lack of a quantitative and accurate depiction of the alternative (and necessary) patterns developed by Level I English students for using technology in their learning, amidst an almost complete absence of supportive institutional technological infrastructure. This study does not search for an ideal "integration," but rather investigates the "reality of adaptation" to available possibilities.

This central problem raises the following specific questions:

- What tools and applications have become real operational substitutes for the dysfunctional infrastructure?

- How do students repurpose their personal digital use for academic purposes?
- What is the magnitude of the gap between what is supposed to be (using labs and academic platforms) and what actually exists (using personal phones and social sites)?
- Can these alternative patterns be considered a form of "enforced self-directed learning" in the face of material challenges?

Without answering these questions through field data, discussions about developing English language teaching with technology in this context remain disconnected from reality and unable to offer practical, actionable recommendations.

Objectives of the Study:

This study aims to examine patterns of educational technology use among Level I students at the Department of English, Faculty of Arts and Humanities, Sana'a University. Specifically, it seeks to:

1. Identify the electronic devices used by students for learning English.
2. Examine students' use of internet tools and educational applications.
3. Determine whether significant differences exist in technology use across English courses using one-way ANOVA and post hoc tests.
4. Explore the alignment between available institutional infrastructure and students' actual technology use.
5. Interpret students' technology use in light of established learning theories and technology-integration frameworks

Research Questions:

This study seeks to answer the following research questions:

1. What are the actual and alternative patterns of electronic device usage among Level I students in learning English at Sana'a University, given the non-operational state of the

- department's computer lab and equipment?
2. How do Level I students circumvent the lack of institutional internet access (disconnected for over eight years) by using personal tools and resources to support their English language learning?
 3. To what extent do Level I students repurpose general-purpose applications for academic English language learning tasks?
 4. Are there statistically significant differences in these compensatory usage patterns across different English courses?
 5. How does the physical reality of outdated and non-functional infrastructure explain the recorded patterns of technology use?

Theoretical Framework and Review of Related Literature:

The integration of educational technology into English Language Teaching (ELT) is grounded in well-established theoretical frameworks, particularly Constructivist Learning Theory and Self-Directed Learning (SDL). Constructivism posits that learners actively construct knowledge through interactions with content, peers, and digital tools, rather than passively receiving information (Piaget, 1971; Vygotsky, 1978). From this perspective, technology is not merely a delivery tool; it serves as a medium that facilitates collaboration, problem-solving, and authentic engagement. Self-Directed Learning (SDL) complements this view by emphasizing learners' autonomy in selecting resources, managing learning activities, and assessing their own progress (Candy, 1991; Knowles, 1975). Within the ELT context, SDL implies that students should be empowered to choose devices, Internet tools, and educational applications that most effectively meet their individual learning needs.

Several frameworks for technology integration further guide pedagogical use of digital

resources in language learning. CALL (Computer-Assisted Language Learning), MALL (Mobile-Assisted Language Learning), and WALL (Web-Assisted Language Learning) provide structured approaches to create interactive, learner-centered, and context-sensitive learning experiences (Levy, 1997; Stockwell, 2012; Warschauer & Kern, 2000). These models demonstrate that technology can enhance both autonomous and collaborative learning when applied thoughtfully in curriculum design.

Empirical studies on technology use in ELT reveal consistent patterns that highlight the gap between theoretical potential and actual practice. Kessler (2018) found that university students heavily rely on personal devices, especially smartphones, while institutional resources such as computer labs and projectors are underutilized. Similarly, it has been observed that learners prefer familiar, general-purpose online tools, including search engines and social media platforms, over specialized educational applications, indicating that convenience and accessibility strongly influence adoption (Godwin-Jones (2019)). In developing higher education contexts, these tendencies are more pronounced. Almekhlafi and Almeqdadi (2010) reported that infrastructural limitations and lack of systematic integration constrain effective technology use. Likewise,

Recent local and regional studies corroborate these findings regarding technology use in Yemeni higher education. For instance, Al-Makhalfi and Al-Qabati (2020) found that while university students in Yemen actively use smartphones and social media applications for peer communication and collaborative learning, the structured application of these digital tools within formal grammar and writing instruction remains notably limited. Similarly, research by Al-Abdal and Al-Mohammadi (2021) on e-learning adoption at Yemeni universities reported that student engagement with official institutional platforms is often irregular. This sporadic use is primarily

attributed to unreliable internet connectivity and a lack of consistent pedagogical guidance from instructors. Furthermore, Al-Sofi (2022) emphasized that although mobile-assisted language learning (MALL) tools show promise in enhancing vocabulary acquisition and speaking practice outside the classroom, their systematic integration into formal English language teaching (ELT) curricula and assessment remains minimal. Consequently, students often rely on self-directed, informal digital practices for language learning (Al-Sofi, 2022). These studies collectively indicate that, despite the high availability of personal digital devices among students, their structured pedagogical use is constrained by persistent institutional and infrastructural challenges.

A comparative analysis of these studies shows recurring patterns: students consistently prefer portable and familiar technologies, show moderate engagement with course-specific applications, and demonstrate limited utilization of institutional resources. These trends suggest that technology use is shaped not merely by availability but also by accessibility, perceived usefulness, prior experience, and institutional support. While theoretical frameworks such as Constructivism, SDL, CALL, MALL, and WALL provide strong guidance for effective technology integration, practical implementation often lags due to infrastructural constraints, lack of systematic curriculum integration, and insufficient guidance from instructors.

From an analytical standpoint, these studies justify the focus of the present research. They demonstrate the need for empirical, data-driven investigation into actual usage patterns of educational technology among Level I English students at Sana'a University. The literature indicates that while students can engage autonomously with digital resources, their use is selective and influenced by both personal preferences and institutional context. This underscores the importance of connecting theoretical insights with the local educational environment, ensuring that recommendations

for ELT technology integration are both evidence-based and practically feasible.

In conclusion, the theoretical and empirical literature establishes a clear rationale for this study. By analyzing patterns of device, Internet, and application usage among foundational-level English students, this research addresses gaps identified in prior studies and provides insights into how Constructivist and SDL principles manifest in real educational environments. Understanding both learner behavior and the institutional context is crucial for designing effective technology-enhanced language learning strategies.

Methodology:

The study explored the role of modern technology in enhancing self-directed language learning (SDLL) beyond traditional classrooms, focusing on first-year undergraduate students at the English Department at Sana'a University. The study population consisted of all enrolled students during the 2021–2022 academic year ($N = 110$). A simple random sample of 55 students (50%) was selected, with equal representation (50%) from both the first and second semesters to ensure balance and minimize sampling bias.

Data were collected from the study sample during the 2021–2022 academic year using a structured research instrument developed in line with the objectives and scope of the study. The data examined students' use of technological devices, Internet resources, and multimedia applications. A reversed five-point Likert scale was employed, with 1 indicating the highest level of use ("Always") and 5 the lowest ("Never"), to facilitate statistical analysis and ensure consistency in interpreting the results. Following data collection, the data underwent preliminary screening and statistical cleaning to ensure completeness and consistency. Invalid data resulting from missing responses or inconsistent answering patterns were excluded, and only valid data were retained for analysis.

Due to the extensive item-level analysis across courses, rounded weighted values were used as

representative indicators for each course and were systematically organized in tables to enhance clarity and comparability. A one-way analysis of variance (ANOVA) was conducted to examine statistically significant differences in technology use across courses. When significant differences were found, Post Hoc tests, specifically Tukey's HSD, were applied to determine the direction of these differences and to identify the exact pairs of courses that contributed most to the observed variation, allowing for a deeper understanding of usage patterns across subjects.

The findings confirmed the pivotal role of modern technology, particularly mobile phones and applications, in facilitating self-directed language learning (SDLL) beyond traditional classroom settings. The findings confirm that tools such as language learning apps (e.g. busuu) and mobile-optimized resources effectively promote learner autonomy by providing flexible, personalized, and accessible practice opportunities (Rosell-Aguilar, 2018; Stockwell, 2010).

However, successful integration is not merely a technical issue but a pedagogical one, heavily influenced by teacher perceptions, institutional support, and the learners' own readiness (Almekhlafi and Almeqdadi, 2010; Kessler, 2007). As noted in the Yemeni context, structural and infrastructural challenges — such as limited availability of ICT tools and inadequate infrastructure — can significantly impede the adoption and effective use of educational technologies, even when their potential benefits are recognized (Alkamel & Chouthaiwale, 2020). The theoretical foundations of this approach are robust,

drawing from principles of constructivism (Piaget, 1972), social learning (Vygotsky, 1978), and the core philosophy of SDLL (Knowles, 1975; Candy, 1991). The evolution of technology, from early Computer-Assisted Language Learning (CALL) (Levy, 1997; Warschauer & Kern, 2000) to today's mobile and networked learning, provides an ever-expanding toolkit for educators and learners (Godwin-Jones, 2010, 2021). Empirical evidence continues to grow, showing positive impacts on vocabulary acquisition, overall proficiency, and learner motivation (Cakır, 2015; Sung et al., 2016; Almekhlafi, 2021).

In conclusion, the future of language education lies in a synergistic blend of formal instruction and informal, technology-enhanced self-directed learning, a trend reflected in the increasing use and positive perceptions of online learning among EFL faculty in Yemen (Al-refaee, Afzal & Mohammed, 2025). The challenge for educators and policymakers is to move beyond simply providing access to technology and toward strategically fostering the digital literacies, pedagogical training, and supportive ecosystems required to empower learners as autonomous, lifelong language users.

Data Analysis and Discussion:

This section presents and discusses the findings on technology usage among Level I students, addressing the three main areas of investigation: electronic devices, Internet tools, and educational applications.

Electronic Devices Usage – Level I

Table 1

<u>Courses</u>	<u>Grammar 1</u>	<u>Grammar 2</u>	<u>Speaking 1</u>	<u>Speaking 2</u>	<u>Reading 1</u>	<u>Reading 2</u>	<u>Writing 1</u>	<u>Writing 2</u>	<u>Computer Skills</u>	<u>Mean</u>	<u>Median</u>	<u>Mode</u>	<u>SD</u>	<u>Range</u>	<u>% Usage</u>
<u>Devices</u>															
<u>Memory Flash / CD</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>3</u>	<u>4</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>0</u>	<u>3-4</u>	<u>40%</u>
<u>Smartphone</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>0</u>	<u>2-3</u>	<u>80%</u>
<u>MP3 / MP4</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>0</u>	<u>3-4</u>	<u>20%</u>

<u>Data Projectors</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>4</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>0</u>	<u>4-5</u>	<u>10%</u>
<u>Computer / Laptop</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>4</u>	<u>4</u>	<u>2</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>1</u>	<u>2-5</u>	<u>10%</u>

Device Data Usage – Level I

The results indicate that Smartphones are the most frequently used devices, with 80% of students relying on them for accessing educational content, communicating, and using applications. Flash Drives /CDs are moderately used (40%), reflecting their role in storing and transferring files. MP3/MP4 devices are less common (20%), suggesting their use is supplementary and dependent on course requirements. Larger institutional devices, such as Data Projectors and Computers/Laptops, are rarely used (10%), highlighting a lack of systematic integration into classroom activities despite their availability.

Table 2 One-Way ANOVA for Devices Usage – Level I

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>Sig.</u>
<u>Between Groups</u>	<u>4.862</u>	<u>4</u>	<u>1.215</u>	<u>6.502</u>	<u>0.000</u>
<u>Within Groups</u>	<u>20.635</u>	<u>50</u>	<u>0.413</u>		
<u>Total</u>	<u>25.497</u>	<u>54</u>			

The ANOVA results confirm statistically significant differences in device usage across courses ($F = 6.502$, $p = 0.000$), indicating that students' reliance on devices is influenced by course content and learning requirements.

Table 3 Post Hoc (Tukey HSD) Test for Devices Usage – Level I

<u>(I) Device</u>	<u>(J) Device</u>	<u>Mean Difference (I-J)</u>	<u>Std. Error</u>	<u>Sig.</u>
<u>Smartphone</u>	<u>Memory Flash / CD</u>	<u>-1.00</u>	<u>0.25</u>	<u>0.001</u>
<u>Smartphone</u>	<u>MP3 / MP4</u>	<u>-0.50</u>	<u>0.23</u>	<u>0.082</u>
<u>Smartphone</u>	<u>Data Projectors</u>	<u>-2.50</u>	<u>0.30</u>	<u>0.000</u>
<u>Smartphone</u>	<u>Computer / Laptop</u>	<u>-2.80</u>	<u>0.28</u>	<u>0.000</u>
<u>Flash Drives / CD</u>	<u>MP3 / MP4</u>	<u>0.50</u>	<u>0.21</u>	<u>0.088</u>
<u>Flash Drives / CD</u>	<u>Data Projectors</u>	<u>-1.50</u>	<u>0.27</u>	<u>0.003</u>
<u>Flash Drives / CD</u>	<u>Computer / Laptop</u>	<u>-1.80</u>	<u>0.26</u>	<u>0.001</u>

Note: The mean difference between smartphone use and MP3/MP4 player use is not statistically significant ($p > .05$). No significant difference was found between Memory Flash/CDs and MP3/MP4 players.

The Post Hoc analysis confirms that Smartphones are significantly more used than

all other devices, while Flash Drives /CDs are used significantly more than large devices. These results illustrate that students select tools based on convenience and accessibility, consistent with Constructivist and Self-Directed Learning principles.

Internet Tools Usage – Level I

Table 4

<u>Courses</u>	<u>Grammar 1</u>	<u>Grammar 2</u>	<u>Speaking 1</u>	<u>Speaking 2</u>	<u>Reading 1</u>	<u>Reading 2</u>	<u>Writing 1</u>	<u>Writing 2</u>	<u>Computer Skills</u>	<u>Mean</u>	<u>Median</u>	<u>Mode</u>	<u>SD</u>	<u>Range</u>	<u>% Usage</u>
<u>Internet</u>															
<u>Google / Search Engines</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>0</u>	<u>2-3</u>	<u>60%</u>
<u>E-mails</u>	<u>4</u>	<u>4</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>0</u>	<u>3-4</u>	<u>40%</u>
<u>Educational Websites</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>0</u>	<u>4-4</u>	<u>20%</u>
<u>Online App for Learning</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>0</u>	<u>2-3</u>	<u>50%</u>

<u>Social Media Groups</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>0</u>	<u>3-4</u>	<u>60%</u>
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Internet Data Usage – Level I

Level I students rely moderately on Google/Search Engines (60%) and Social Media Groups (60%) for academic purposes, reflecting their preference for familiar and easily accessible digital tools. Emails (40%) and Educational Websites (20%) are used less consistently, indicating limited engagement with structured digital resources. Online learning apps show intermediate use (50%), suggesting selective engagement for specific tasks or courses. The following table ANOVA for Internet Usage – Level I

Table 5

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>Sig.</u>
<u>Between Groups</u>	<u>2.875</u>	<u>4</u>	<u>0.719</u>	<u>4.215</u>	<u>0.005</u>
<u>Within Groups</u>	<u>8.520</u>	<u>50</u>	<u>0.170</u>		
<u>Total</u>	<u>11.395</u>	<u>54</u>			

One-Way ANOVA for Internet Usage – Level I

The ANOVA confirms significant differences in Internet tool usage across courses ($F = 4.215$, $Sig. = 0.005$). The following table Post Hoc (Tukey HSD) – Internet Usage.

Table 6

<u>(I) Tool</u>	<u>(J) Tool</u>	<u>Mean Difference (I-J)</u>	<u>Std. Error</u>	<u>Sig.</u>
<u>Google / Search</u>	<u>E-mails</u>	<u>-1.00</u>	<u>0.28</u>	<u>0.002</u>
<u>Google / Search</u>	<u>Educational Websites</u>	<u>-1.25</u>	<u>0.31</u>	<u>0.000</u>
<u>Google / Search</u>	<u>Online App Learning</u>	<u>-0.50</u>	<u>0.24</u>	<u>0.079</u>
<u>Google / Search</u>	<u>Social Media Groups</u>	<u>-1.00</u>	<u>0.27</u>	<u>0.001</u>
<u>E-mails</u>	<u>Educational Websites</u>	<u>-0.25</u>	<u>0.23</u>	<u>0.114</u>
<u>E-mails</u>	<u>Online App Learning</u>	<u>0.50</u>	<u>0.25</u>	<u>0.081</u>
<u>Social Media Groups</u>	<u>Educational Websites</u>	<u>-0.25</u>	<u>0.22</u>	<u>0.098</u>

Post Hoc (Tukey HSD) Test for Internet Usage – Level I

Note: The mean difference is significant at the 0.05 level.

The Post Hoc analysis indicates that Google/Search Engines are significantly more used than Emails, Educational Websites, and Social Media Groups. This pattern aligns with Constructivist and Self-Directed Learning principles, showing that students favor tools that are versatile and accessible. However, no statistically significant difference was found

between Google/Search Engines and Online Learning Applications ($p = .079$).

Educational Applications Usage – Level I:

At Level I, students make use of a limited range of educational applications to assist their learning in foundational English courses such as Grammar, Speaking, Reading, Writing, and Computer. These applications mainly include basic productivity tools, multimedia resources, and electronic dictionaries that help students develop essential language and computer skills.

Table 7

<u>Courses</u>	<u>Grammar 1</u>	<u>Grammar 2</u>	<u>Speaking 1</u>	<u>Speaking 2</u>	<u>Reading 1</u>	<u>Reading 2</u>	<u>Writing 1</u>	<u>Writing 2</u>	<u>Computer Skills</u>	<u>Mean</u>	<u>Median</u>	<u>Mode</u>	<u>SD</u>	<u>Range</u>	<u>% Usage</u>
<u>Applications</u>															
<u>PowerPoint</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>0</u>	<u>2-2</u>	<u>40%</u>
<u>Excel</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>0</u>	<u>2-3</u>	<u>50%</u>

<u>Word</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>0</u>	<u>2-2</u>	<u>60%</u>
<u>English-Arabic Dictionary</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>0</u>	<u>2-3</u>	<u>50%</u>
<u>English-English Dictionary</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>4</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>0</u>	<u>2-4</u>	<u>50%</u>
<u>Video</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>0</u>	<u>2-3</u>	<u>40%</u>
<u>Audio (MP3/MP4)</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>0</u>	<u>2-3</u>	<u>40%</u>
<u>Article</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>0</u>	<u>3-3</u>	<u>30%</u>
<u>E-book / PDF</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>0</u>	<u>2-3</u>	<u>50%</u>
<u>WhatsApp</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>0</u>	<u>2-3</u>	<u>40%</u>
<u>Facebook</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>0</u>	<u>2-3</u>	<u>50%</u>

Applications Data Usage – Level I

Productivity applications such as Word and Excel are used consistently (60% and 50%, respectively), reflecting their role in writing and organizing academic content. PowerPoint shows moderate use (40%), mainly for presentations. Digital dictionaries (both English-Arabic and English-English) are moderately used (50%), supporting reading and comprehension tasks. Multimedia resources, including Video and Audio (MP3/MP4), are used variably (40%), indicating selective engagement depending on course content. Social applications such as WhatsApp and Facebook are employed for supplementary

communication (40–50%). The following table ANOVA for Applications Usage – Level I

Table 8 ANOVA for Applications Usage – Level I

<u>Source</u>	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>Sig.</u>
<u>Between Groups</u>	<u>3.780</u>	<u>4</u>	<u>0.94</u> <u>5</u>	<u>5.31</u> <u>2</u>	<u>0.00</u> <u>3</u>
<u>Within Groups</u>	<u>8.875</u>	<u>50</u>	<u>0.17</u> <u>7</u>		
<u>Total</u>	<u>12.65</u> <u>5</u>	<u>54</u>			

The ANOVA results indicate significant differences among applications, confirming that students do not engage uniformly with all tools.

Table 9 Post Hoc (Tukey HSD) Test for Applications Usage – Level I

<u>(I) Application</u>	<u>(J) Application</u>	<u>Mean Difference (I-J)</u>	<u>Std. Error</u>	<u>Sig.</u>
<u>Word</u>	<u>PowerPoint</u>	<u>0.50</u>	<u>0.18</u>	<u>0.010</u>
<u>Word</u>	<u>Excel</u>	<u>0.25</u>	<u>0.16</u>	<u>0.120</u>
<u>Word</u>	<u>Video</u>	<u>0.70</u>	<u>0.20</u>	<u>0.005</u>
<u>Word</u>	<u>Article</u>	<u>-0.50</u>	<u>0.17</u>	<u>0.008</u>
<u>Excel</u>	<u>Video</u>	<u>0.45</u>	<u>0.19</u>	<u>0.021</u>
<u>PowerPoint</u>	<u>Article</u>	<u>-1.00</u>	<u>0.21</u>	<u>0.001</u>

Note: The mean difference is significant at the 0.05 level.

The Post Hoc analysis confirms that Word is significantly more used than PowerPoint and Video, while Article usage is significantly lower. This pattern illustrates students' strategic engagement with tools, prioritizing productivity applications for core academic tasks.

Integrated Discussion: From Observed Patterns to a Unified Interpretation

The data presents a clear and consistent portrait: Level I students employ a selective,

hierarchical, and fundamentally context-dependent approach to educational technology. The established hierarchy places portable personal devices—most dominantly, smartphones—at the forefront, followed by adaptable, general-purpose tools like internet search engines and productivity software. In stark contrast, institutionally-provided equipment and specialized educational platforms are relegated to the periphery of their learning practices. This observed selectivity is not arbitrary; it finds robust explanatory power in key pedagogical theories, namely Constructivism and Self-Directed Learning (SDL). Students emerge not as passive

recipients of prescribed tools, but as active agents who strategically construct their personal learning environments. They consistently select resources based on perceived utility, immediate accessibility, and personal relevance, with the smartphone serving as the central node in this self-fashioned ecosystem. This device facilitates autonomous, just-in-time learning opportunities that seamlessly extend beyond the physical and temporal confines of the classroom, providing strong empirical support for the principles of Mobile-Assisted Language Learning (MALL) as enacted through learner agency rather than top-down curricular design.

Crucially, this theoretically coherent pattern cannot be divorced from the stark material realities that define the learning context. The statistical evidence must be interpreted through the critical lens of the infrastructural constraints central to this study. The extreme underutilization of devices like institutional computers and data projectors (each at a mere 10%) is less a reflection of pedagogical choice and more a direct quantitative indicator of their chronic unavailability or non-operational status. Within this landscape of scarcity, the students' technological hierarchy transforms from a simple preference into a sophisticated, adaptive ecosystem of compensatory learning. The smartphone's 80% usage rate underscores its role as a multi-functional compensatory hub, personally funded by students' mobile data plans to substitute for absent computer labs, projectors, and media resources. Similarly, the significant use of Memory Flash/CDs (40%) reveals the innovation of a physical, peer-to-peer knowledge distribution network, a pragmatic workaround for unreliable institutional internet. Furthermore, the marked preference for familiar, general platforms like Google/Search and Social Media (each at 60%) over dedicated Educational Websites (20%) highlights a pragmatic adaptation: students leverage universally accessible tools to fulfill academic needs when specialized institutional alternatives are effectively absent.

Synthesizing the observational, theoretical, and contextual layers yields a compelling overarching narrative. The technology use documented here is ultimately a strategic, resource-optimizing practice. It represents a continuous, pragmatic negotiation between the learner's innate drive for autonomy and convenient, relevant tools (as predicted by Constructivist and SDL frameworks) and the imposing realities of an environment characterized by significant infrastructural and institutional limitations. Therefore, the primary challenge revealed is not a simple digital divide of device access, but a more profound gap between robust, informal, student-directed digital practices and their systematic integration into formal pedagogical structures. For educators and institutions, this analysis suggests that meaningful progress requires moving beyond merely provisioning hardware. The imperative is to intentionally design learning experiences that bridge this gap, creatively linking formal curriculum objectives with the informal, adaptive digital competencies students are already actively cultivating and employing.

Conclusion

This study provides a comprehensive, context-sensitive examination of technology use among Level I students at the Department of English at Sana'a University during the academic year 2020–2021. Rather than presenting technology usage as a simple inventory of tools, the findings reveal a complex landscape of adaptive resilience and strategic improvisation shaped by material constraints, pedagogical realities, and learner agency. The patterns documented in this study are therefore not merely a reflection of "technology use," but rather a map of survival-oriented adaptation within a technologically constrained educational environment.

In direct response to Research Question 5, the findings clearly demonstrate that the physical reality of outdated, limited, and often non-functional technological infrastructure is the paramount factor explaining the observed

usage patterns. This reality fundamentally reframes the discussion from one focused on the idealized notion of “technology integration” to one concerned with understanding, supporting, and legitimizing learner-driven adaptation in resource-constrained contexts. In the absence of consistent institutional support, students exhibit remarkable autonomy and creativity in constructing their own functional—albeit imperfect—digital learning ecosystems.

Empirically, the study examined students' use of electronic devices, Internet tools, and educational applications across core English language courses, including Grammar, Speaking, Reading, Writing, and Computer Skills. Data collected through a reversed Likert-scale questionnaire enabled a nuanced understanding of students' preferences and engagement patterns. The application of descriptive statistics, One-Way ANOVA, and Post Hoc (Tukey HSD) analyses provided clear evidence of statistically significant differences in technology use across courses, confirming that students' engagement with digital tools is closely linked to course demands, instructional practices, and individual learning strategies.

The findings indicate a strong reliance on portable, personal, and easily accessible devices. Smartphones emerged as the dominant technological tool, used by approximately 80% of students, followed by Flash Drivers and CDs (40%). This reliance reflects students' prioritization of convenience, mobility, affordability, and immediacy in accessing learning materials. In contrast, larger technological devices such as desktop computers, laptops, and data projectors were markedly underutilized (approximately 10%), despite their nominal availability within the department. This disparity highlights a clear disconnect between the physical presence of technological resources and their meaningful integration into teaching and learning practices. The limited use of larger devices appears to stem from insufficient curricular integration, lack of systematic instructional planning, and minimal faculty mediation, rather than from students' resistance to technology itself.

A similar pattern was observed in Internet usage. Students demonstrated a strong preference for general-purpose, familiar platforms such as Google and search engines, as well as social media groups, which were used by approximately 60% of respondents. These tools were valued for their accessibility, speed, and support for peer communication and collaborative learning. In contrast, more structured academic tools—such as educational websites, emails, and online learning applications—were used inconsistently or minimally. Statistical analyses confirmed significant variations across courses, suggesting that Internet tool selection is driven not only by availability but also by perceived relevance, immediacy of learning needs, and individual learning habits.

With regard to educational applications, productivity tools such as Microsoft Word and Excel played a central role in students' academic work, reflecting their consistent use for writing assignments, organizing information, and processing course content. Multimedia tools, including video and audio resources, along with social applications such as WhatsApp and Facebook, were used selectively as supplementary learning aids rather than as primary instructional tools. Electronic dictionaries were moderately used, reflecting varying levels of language proficiency and differing needs for lexical support. Collectively, these patterns indicate that students engage with educational applications in a highly strategic and purposeful manner, selecting tools based on perceived utility rather than institutional recommendation.

Crucially, the apparent “underutilization” of institutional technological resources and the unequal reliance on informal Internet tools must be interpreted within the broader context of structural limitations. These patterns are not merely pedagogical shortcomings but are deeply rooted in the material conditions of deficient infrastructure, unreliable electricity, inconsistent Internet connectivity, and limited technical support. Within this context, students' selective use of technology represents

a necessary practice of adaptive learning survival rather than a failure to engage with available resources.

The findings align closely with Constructivist Learning Theory and Self-Directed Learning principles, as students demonstrate autonomy in selecting tools that support knowledge construction and learning management. Their preference for portable devices and familiar platforms reflects a flexible, learner-centered approach shaped by necessity rather than design. However, the persistent underutilization of larger devices and structured academic platforms underscores the importance of guided instructional strategies, curriculum alignment, and institutional scaffolding to realize the full pedagogical potential of educational technology.

Despite students' evident capacity to leverage technology for learning, several interconnected challenges emerge. These include limited and inconsistent use of larger devices, an overreliance on convenience-driven Internet tools, irregular and assignment-specific use of multimedia and social applications, varying levels of digital literacy among students, and the systematic underutilization of departmental technological facilities due to the absence of intentional instructional integration. Together, these challenges highlight the gap between students' adaptive potential and the institutional conditions required to support effective technology-enhanced learning.

From a practical perspective, the findings emphasize the need for realistic and context-aware approaches to technology integration. Strategic curriculum design, active faculty involvement, and targeted professional development are essential to guide students' use of both personal devices and institutional resources. Enhancing students' digital literacy skills and embedding technology explicitly within course objectives can promote more consistent, meaningful, and pedagogically aligned use of digital tools. Such efforts align with established frameworks such as CALL, MALL, and WALL, while remaining sensitive

to the material realities of the educational context.

While this study offers a detailed empirical analysis, several limitations must be acknowledged. The research focuses exclusively on Level I students in one department at Sana'a University during the 2020–2021 academic year, which limits the generalizability of the findings. The reliance on self-reported data introduces potential biases related to perception and recall, despite the use of a reversed Likert scale. The quantitative design, although robust, does not capture the deeper motivations and experiences underlying students' technological choices. Furthermore, the absence of teacher and institutional perspectives restricts the analysis to the learner viewpoint, and the temporal specificity of the data means that subsequent technological developments may alter usage patterns. Finally, while strong correlations are identified, causality cannot be conclusively established due to the influence of confounding factors such as personal preference and varying levels of digital competence.

Nevertheless, these limitations do not diminish the validity or significance of the study's core findings. Instead, they define the contextual and methodological boundaries within which the results should be interpreted. The study provides a realistic and grounded portrayal of educational technology use in a developing higher education context, revealing both the constraints students face and the adaptive strategies they employ.

Therefore, Level I students at the English Department, Sana'a University, demonstrate a selective, pragmatic, and contextually driven approach to technology use, balancing accessibility, convenience, and educational value. Their autonomy and self-directed engagement reflect strong learner agency, yet this agency often develops independently of institutional guidance. The study highlights a persistent gap between the theoretical promise of educational technology and its practical implementation in resource-constrained

environments. By aligning infrastructure development, curriculum planning, and instructional practice with contextual realities, higher education institutions can move toward more sustainable, equitable, and effective models of technology integration in English language teaching

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