

Promoting Authenticity in the ESP Classroom through Digital Learning Resources

Dr. Somia Boudinar, Assistant Professor, Ph.D

DEPENEL Laboratory, Setif 2 University, Algeria

Mohamed Lamine Debaghine, Setif 2 University, Algeria

Abstract

This study investigates the integration of digital learning resources to address the authenticity gap in English for Specific Purposes (ESP) instruction within the Computer Sciences Department at Setif 1 University, Algeria. Despite the growing recognition of authenticity as a pivotal factor in effective language learning, ESP classrooms in the Algerian higher education context continue to rely heavily on static, textbook-based materials that fail to replicate the linguistic demands of real-world professional environments. Employing a mixed-methods research design, this study combines quantitative data collected from a 20-item Likert-scale questionnaire administered to 45 Master 2 students across five sections with qualitative data gathered from semi-structured interviews with 5 ESP practitioners. Quantitative findings reveal that students perceive digital resources as moderately effective in enhancing authenticity, with an overall mean of 3.82 (SD = 0.74). Section-level analysis indicates that perceptions of the impact of digital resources on authenticity had the highest mean ($M = 4.15$), while challenges and limitations had the lowest ($M = 3.31$). Thematic analysis of teacher interviews uncovers four overarching themes: (1) the transformative potential of digital resources for authenticity, (2) infrastructural and pedagogical constraints, (3) the role of discipline-specificity in resource selection, and (4) professional development needs. The study concludes that while digital resources offer significant promise in bridging the authenticity gap, their effective integration requires systematic institutional support, targeted teacher training, and curriculum redesign informed by an analysis of authentic communicative needs.

Keywords: English for Specific Purposes; digital learning resources; authenticity gap; mixed-methods research; computer science education; thematic analysis; higher education; Algeria

Introduction

The rapid proliferation of digital technologies has fundamentally transformed the landscape of education in the twenty-first century, compelling educators and researchers alike to reconceptualize traditional approaches to teaching and learning. In the domain of language education, this transformation has been particularly pronounced, as digital platforms, multimedia resources, and online

communication tools have created unprecedented opportunities for learners to engage with authentic language input and interact in simulated real-world contexts (Chapelle, 2001; Stockwell, 2013). English for Specific Purposes (ESP), as a branch of applied linguistics that tailors language instruction to the specific communicative needs of learners within particular disciplines or professions, stands at a critical juncture where the integration of digital resources may offer solutions to longstanding pedagogical challenges, chief among them the persistent authenticity gap that characterizes many ESP classrooms worldwide (Dudley-Evans & St John, 1998; Belcher, 2009).

ESP has evolved considerably since its emergence in the 1960s, progressing from a narrow focus on register analysis and discourse structure to a more comprehensive approach encompassing needs analysis, genre study, and communicative competence in specialized domains (Hutchinson & Waters, 1987; Swales, 1990). The fundamental premise underlying ESP is that language learners benefit most when instruction is grounded in the authentic linguistic demands of their target professional or academic contexts. Consequently, the selection and design of instructional materials are cornerstones of ESP pedagogy, as these materials must accurately reflect the vocabulary, discourse conventions, and communicative tasks that learners will encounter in their future careers (Basturkmen, 2010; Hyland, 2018).

Digital learning resources, including online tutorials, interactive simulations, discipline-specific video content, professional forums, open-source documentation, and collaborative platforms, offer a potentially transformative means of addressing this authenticity gap. Unlike traditional textbook-based materials, digital resources can expose learners to the actual language used by computer science professionals in their daily work, including technical documentation, code repositories, project management communications, and research paper discussions. Furthermore, digital resources can facilitate interactive and collaborative learning experiences that mirror the communicative practices of professional computing communities, thereby providing learners with opportunities to develop both their linguistic competence and their disciplinary literacy in an integrated manner (Reinders & White, 2016).

At Setif 1 University, the Computer Sciences Department offers ESP courses to Master 2 students as part of their academic training. However, observations and preliminary investigations suggest that the current instructional approach relies predominantly on conventional textbooks and teacher-prepared materials that may not adequately reflect the authentic language demands of the computing profession. This situation underscores the need for empirical research to investigate the potential of digital learning resources to enhance the authenticity of ESP instruction in this specific institutional context, and to identify the factors that facilitate or constrain the effective integration of such resources into the existing curriculum.

Despite the growing availability of digital learning resources that could potentially bridge this gap, several interrelated challenges complicate their integration into ESP instruction. First, there is a lack of empirical evidence regarding the effectiveness of specific types of digital resources in enhancing perceived authenticity among computer science students in the Algerian higher education context. Second, the perspectives and experiences of ESP practitioners tasked with implementing digital resources in their classrooms remain underexplored, particularly in developing countries, where infrastructural limitations, institutional constraints, and limited professional development opportunities may significantly influence the adoption of technology-enhanced language teaching approaches. Third, there is insufficient understanding of how students perceive the relationship between digital resource use and the development of authentic communicative competence in their target discipline, a factor critical for designing effective, learner-centered instructional interventions.

The overarching aim of this study is to investigate the role of digital learning resources in addressing the authenticity gap in ESP instruction within the Computer Sciences Department at Setif 1 University. Specifically, the study seeks to achieve the following objectives:

- To investigate Master 2 computer science students' perceptions of the authenticity of current ESP instructional materials and the extent to which digital resources are currently being used in their learning.
- To explore ESP teachers' insights on the integration of digital resources in the classroom, including their perceived benefits, challenges, and pedagogical strategies.

This study is guided by the following research questions:

RQ1: What are Master 2 computer science students' perceptions of the authenticity of current ESP materials used in the classroom at Setif 1 University?

RQ2: What are ESP teachers' perspectives on the integration of digital learning resources in addressing the authenticity gap, and what benefits and challenges do they identify?

This study contributes to the field of ESP. Theoretically, it extends the conceptual framework of authenticity in language learning by examining how digital resources can mediate between classroom instruction and real-world professional communication. Practically, the findings have direct implications for ESP curriculum design, materials development, and teacher professional development at Setif 1 University and comparable institutions across Algeria.

2. Literature Review

English for Specific Purposes (ESP) aims to develop learners' ability to communicate effectively in specific academic, professional, and occupational contexts. Unlike general language instruction, ESP emphasizes the acquisition of discipline-specific discourse practices, communicative conventions, and specialized vocabulary required in real-world settings (Hyland, 2018; Widdowson, 2020). Consequently, the effectiveness of ESP instruction depends largely on how well learning materials reflect authentic language use and prepare learners for the communicative demands of their future professions.

Despite their widespread use, traditional ESP materials have been criticized for failing to fully capture the dynamic, evolving nature of professional communication. Textbooks often present decontextualized, simplified representations of language that may not adequately reflect the complexities of authentic workplace discourse (Widdowson, 2020). As a result, learners may develop linguistic knowledge without acquiring the pragmatic and communicative competencies necessary for effective participation in professional communities. Hyland (2019) argues that this disconnect between classroom practices and real-world language use can limit learners' ability to transfer acquired skills to authentic professional situations.

The rapid development of digital technologies has created new opportunities to address this challenge. Digital resources provide access to contemporary, discipline-specific, and contextually rich language samples that mirror current professional practices. Through online platforms, multimedia content, professional websites, webinars, podcasts, and industry-related communication channels, learners can engage with authentic discourse that reflects current linguistic and professional trends (Martin et al., 2021; Pegrum, 2019). Consequently, digital resources have become increasingly significant within ESP pedagogy because they enable a closer alignment between instructional content and the communicative realities learners are likely to encounter beyond the classroom.

The educational value of digital materials extends beyond mere accessibility. Digital resources facilitate interactive, learner-centred, and multimodal learning experiences that accommodate diverse learning preferences while fostering engagement and deeper comprehension (Colwell & Reinking, 2016; Nicholas & Ng, 2019). Furthermore, their integration supports the development of digital literacy skills, which are increasingly regarded as essential competencies in contemporary professional environments. Gilster (1997) conceptualizes digital literacy as the ability to critically evaluate, interpret, and synthesize information obtained through digital technologies. In ESP contexts, these skills are particularly important because professional communication increasingly occurs through digital platforms that require learners to navigate complex information environments.

The growing interest in digital resources has renewed scholarly attention to authenticity in language education. Authenticity has traditionally been associated with the extent to which materials reflect genuine language use rather than pedagogically simplified versions (Peacock, 1997). In language teaching, authentic materials are generally understood as texts and communicative artifacts originally created for real-life purposes rather than instructional objectives (Gilmore, 2007; Juita, 2023). Hedge (2000) and Nunan (2004) emphasize that authentic materials expose learners to naturally occurring language rather than language modified specifically for educational contexts. From a communicative perspective, Larsen-Freeman (2011) identifies authenticity as a central principle of communicative language teaching because it enables learners to experience language as a tool for meaningful communication.

In digital environments, authenticity takes on an additional dimension. Digital authentic materials combine the benefits of real-world content with the affordances of technology, enabling learners to engage with contemporary professional discourse through interactive, multimodal formats (Hafner et al., 2015). These materials provide access to current professional practices, specialized genres, and evolving communication conventions, thereby narrowing the gap between classroom learning and workplace realities. For ESP learners, exposure to digital authentic materials can support the development of both linguistic competence and professional literacy by situating language learning within meaningful disciplinary contexts.

The pedagogical value of digital authentic materials is supported by evidence suggesting that they enhance learner motivation, engagement, and communicative competence. Compared with conventional textbook materials, authentic resources are often perceived as more relevant and meaningful because they demonstrate how language is used to achieve genuine communicative goals (Yelubayeva, 2017). Moreover, exposure to authentic discourse helps learners develop greater awareness of genre conventions, pragmatic norms, and disciplinary communication practices, all of which are essential components of professional language competence (Huang et al., 2024).

Nevertheless, integrating digital authentic materials is not without challenges. The vast quantity of online content creates difficulties in selection, evaluation, and pedagogical appropriateness. Not all authentic resources are suitable for instructional purposes, and the abundance of information available online can overwhelm learners and distract them from intended learning objectives (Kukulska-Hulme & Shield, 2018; Mishan, 2022). Furthermore, the assumption that authenticity automatically leads to effective learning has been questioned. Scholars argue that authentic materials may become pedagogically ineffective if they are not carefully adapted to learners' proficiency levels, disciplinary needs, and educational objectives. Excessive reliance on digital resources may also reduce opportunities for face-to-face interaction and collaborative communication, both of which remain essential for language development (Stickler et al., 2020).

These considerations highlight that the pedagogical effectiveness of digital authentic materials depends not only on their availability but also on the strategies used to select, adapt, and integrate them into ESP instruction. Effective implementation requires a systematic, needs-based approach that aligns resources with learners' professional goals, disciplinary contexts, and linguistic requirements. Such alignment is especially important in ESP, where relevance is a fundamental principle of course design. As Seidlhofer (2009, p. 237) notes, language education should enable learners to use English appropriately for diverse globalized purposes. Consequently, the challenge for ESP practitioners is not merely to incorporate digital authentic materials but to critically evaluate and strategically employ them to maximize their pedagogical value while ensuring their relevance to learners' future professional communication needs.

All in all, digital authentic materials can be understood as pedagogical tools that bridge classroom learning and professional practice. Their value lies not only in providing exposure to authentic language but also in creating opportunities for learners to engage with the communicative realities of their disciplines, thereby fostering the linguistic, professional, and digital competencies required in contemporary workplaces.

3. Methodology

3.1. Research Design

This study adopts a mixed-methods research design due to the complex and multifaceted nature of the research problem, which demands both wide coverage to gather diverse student perceptions from a substantial sample and an in-depth understanding of the nuanced perspectives and experiences of ESP teachers.

The specific mixed-methods strategy employed in this study is the convergent parallel design, also referred to as the concurrent triangulation design. In this approach, quantitative and qualitative data are collected concurrently, analyzed separately, and then merged to provide a comprehensive interpretation of the research problem (Creswell & Clark, 2017).

3.2. Research Context

The study was conducted at Setif 1 University, formally known as Ferhat Abbas Setif 1 University, located in Setif, Algeria. The specific research site is the Computer Sciences Department within the Faculty of Sciences, which offers undergraduate and postgraduate programs in computer science, information systems, and related fields.

Within the Computer Sciences Department, English is taught as a compulsory module to students at all levels of study, including the Master 2 level, which is the focus of this study. The ESP courses at the Master 2 level are designed to develop students' English

language proficiency in contexts relevant to computer science, including reading and understanding academic papers, writing technical documentation, participating in professional discussions, and preparing for international academic or professional communication.

3.3. Participants and Sampling Technique

The study involved two distinct participant groups: Master 2 computer science students and ESP teachers at the Computer Sciences Department of Setif 1 University. The selection of participants employed purposive sampling combined with convenience sampling, a strategy that is commonly used in mixed-methods research when access to participants is constrained by institutional and logistical factors (Dornyei, 2007).

For the quantitative strand, the target population comprised all Master 2 students enrolled in the Computer Sciences Department during the 2023-2024 academic year. A convenience sampling approach was used to recruit 45 students from the available Master 2. The decision to use convenience sampling was driven by practical constraints, including scheduling limitations and the need to obtain informed consent within the available data collection period.

For the qualitative strand, purposive sampling was employed to select 5 ESP teachers who met the following inclusion criteria: (a) a minimum of two years of experience teaching ESP courses to computer science students, (b) current employment at Setif 1 University, and (c) willingness to participate in a semi-structured interview. The sample size of 5 teachers was determined based on the principle of data saturation, which suggests that in qualitative research, the point at which no new themes or information emerge from additional participants indicates that an adequate sample size has been reached.

3.4. Research Instruments

3.4.1. Student Questionnaire

The primary quantitative instrument for this study is a structured, self-administered questionnaire designed to assess Master 2 computer science students' perceptions of the authenticity of ESP materials and the effectiveness of digital learning resources in enhancing authenticity. The questionnaire was developed through a comprehensive review of the literature on authenticity in language learning (Gilmore, 2007; Mishan, 2005), digital resources in ESP, and instruments used in similar studies (Reinders & White, 2016). It comprises five sections, each with four Likert-scale items, for a total of 20 items.

Section A: Perceptions of Authenticity in Current ESP Materials (Items 1-4). This section assesses students' perceptions of the degree to which the ESP materials currently

used in their classes reflect the authentic communicative demands of the computer science profession.

Section B: Frequency and Types of Digital Resources Used (Items 5-8). This section investigates students' self-reported use of various types of digital resources in their ESP learning.

Section C: Impact of Digital Resources on Authenticity (Items 9-12). This section evaluates students' perceptions of the effectiveness of digital resources in enhancing the authenticity of their ESP learning experience. Items address topics such as the degree to which digital resources expose students to real-world professional language, facilitate engagement with authentic communicative tasks, and improve their ability to communicate in English within computer science contexts.

Section D: Student Engagement and Motivation (Items 13-16). This section assesses the relationship between digital resource use and student engagement, motivation, and autonomy in ESP learning.

Section E: Challenges and Limitations (Items 17-20). This section identifies the challenges and limitations that students perceive in relation to the use of digital resources in ESP instruction.

All 20 items use a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

3.4.2. Teacher Interview Protocol

The qualitative instrument for this study is a semi-structured interview protocol designed to explore ESP teachers' perspectives on the integration of digital learning resources in addressing the authenticity gap. Semi-structured interviews were selected because they provide a balance between the structured nature of survey instruments and the flexibility of open-ended conversations, allowing the researcher to probe emerging themes while maintaining a consistent focus on the research questions (Dornyei, 2007).

The interview protocol comprises six core questions with follow-up probes, designed to elicit in-depth responses on the following topics: (1) teachers' understanding of the concept of authenticity in ESP instruction, (2) their current use of digital resources in the classroom, (3) their perceptions of the benefits of digital resources for enhancing authenticity, (4) the challenges and barriers they face in integrating digital resources, (5) their assessment of students' engagement and responses to digital resource-based activities, and (6) their recommendations for improving the integration of digital resources in ESP instruction.

3.5. Pilot Testing

Prior to the main data collection, a pilot study was conducted to assess the reliability and validity of both research instruments and to identify any practical issues that might arise during the data collection process. The pilot study was carried out over a one-week period, with a sample of 10 Master 2 computer science students. The pilot testing confirmed that the tool's questions were clear, relevant, and capable of eliciting detailed responses from participants. Based on the pilot results, minor modifications were made to the interview protocol, including reordering certain questions to improve the flow of the conversation and adding specific probes for questions that had not elicited sufficiently detailed responses.

3.6. Data Collection Procedure

Data collection for the main study was conducted over a three-week period in April 2023. The quantitative data were collected first, with the student questionnaire administered during regular ESP class sessions to maximize response rates and ensure that all participants completed it under similar conditions. Prior to administration, the study's purpose was explained to the students, and informed consent was obtained from all participants. The questionnaire was administered in paper format to ensure maximum accessibility, as some students reported limited access to digital devices. Participants were given approximately 20 minutes to complete the questionnaire, and the researcher was present throughout to answer any questions. All 45 distributed questionnaires were returned, yielding a 100% response rate.

The qualitative data were collected through semi-structured interviews with the five ESP teachers, which were conducted individually in a private room at the university at times convenient for the participants. Each interview was preceded by a brief explanation of the study's purpose and procedures, and written informed consent was obtained from each participant. With the participants' permission, all interviews were audio-recorded using a digital voice recorder. The interviews were conducted in English, the language of instruction and the participants' professional language, and lasted between 25 and 30 minutes. The audio recordings were subsequently transcribed verbatim by the researcher.

3.7. Data Analysis Procedure

The quantitative data collected from the student questionnaire were analyzed using the Statistical Package for the Social Sciences (SPSS), version 28.0. The data analysis procedure consisted of several sequential steps to provide a comprehensive, systematic analysis.

The qualitative data collected from the teacher interviews were analyzed using thematic analysis, as described by Braun and Clarke (2006). Thematic analysis was selected as the analytical approach because it provides a flexible and systematic method for identifying, analyzing, and reporting patterns (themes) within qualitative data, and is compatible with both realist and constructivist epistemological orientations.

The thematic analysis followed the six-phase process proposed by Braun and Clarke (2006): (1) Familiarization with the data: The researcher read and re-read the interview transcripts multiple times, noting initial ideas and observations. (2) Generating initial codes: The transcripts were coded systematically, with codes being assigned to segments of text that were relevant to the research questions. Both deductive codes (derived from the theoretical framework and research questions) and inductive codes (emerging from the data) were used. (3) Searching for themes: The initial codes were collated into potential themes based on shared patterns and meanings. (4) Reviewing themes: The initial themes were reviewed and refined to ensure coherence and distinctiveness, with some themes being merged, split, or discarded. (5) Defining and naming themes: Each theme was clearly defined, named, and described in terms of its scope and content. (6) Producing the report: The final themes were organized into a coherent narrative, supported by illustrative quotations from the interview transcripts.

3.8. Ethical Considerations

Prior to data collection, ethical approval was obtained from the institutional review board of Setif 1 University. All participants were provided with detailed information about the purpose of the study, the nature of their involvement, the measures taken to protect their confidentiality, and their right to withdraw at any time without any consequences for their academic or professional standing. Written informed consent was obtained from all participants prior to data collection. To protect participant confidentiality, all data were anonymized, with students identified only by numerical codes and teachers by pseudonyms (T1-T5). The audio recordings of teacher interviews were stored on a password-protected computer accessible only to the researcher and were deleted upon completion of the transcription and analysis process.

4. Results

This section presents the study's findings, organized into two main sections corresponding to the quantitative and qualitative strands of the mixed-methods design. It presents the quantitative results from the student questionnaire, including descriptive statistics for each of the five sections, along with a detailed analysis and interpretation of the findings. It also presents the qualitative results of the thematic analysis of teacher interviews, including the identification and description of major themes, with supporting quotations from the interview transcripts.

4.1. Quantitative Results: Students’ Questionnaire

4.1.1. Section A: Perceptions of Authenticity in Current ESP Materials

The first section of the questionnaire assessed students’ perceptions of the authenticity of the ESP materials currently used in their instruction. The results are presented in Table 1.

Item	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean	Total %
A1. The ESP textbook content reflects real-world computer science communication.	2	5	12	16	10	3.58	57.8%
A2. Classroom activities simulate authentic tasks in the computing profession.	3	8	14	13	7	3.36	44.4%
A3. Current materials expose me to language used by computing professionals.	4	7	13	14	7	3.36	46.7%
A4. The vocabulary and expressions in my ESP materials are relevant to my career.	1	4	10	18	12	3.87	66.7%

Table 1: Section A - Perceptions of Authenticity in Current ESP Materials (N=45)

As indicated in Table 1, the overall section mean for Section A is 3.54, which falls within the “Agree” category according to the interpretation scale. However, this mean represents only a moderate level of agreement, suggesting that students have ambivalent perceptions regarding the authenticity of their current ESP materials. Item A4, which asked about the relevance of vocabulary and expressions to students’ careers, received the highest mean (M = 3.87, 66.7% agreement), indicating that students recognize some degree of relevance in the linguistic content of their materials. In contrast, Items A2 and A3, which addressed the authenticity of classroom activities and exposure to professional language, received lower means (M = 3.36 for both, with 44.4% and 46.7% agreement, respectively), suggesting that students perceive a considerable gap between their classroom experiences and the authentic communicative demands of the computing profession. These findings provide empirical support for the existence of an authenticity gap in the current ESP instruction at the Computer Sciences Department.

4.1.2. Section B: Frequency and Types of Digital Resources Used

The second section examined students’ use of digital learning resources in their ESP learning. The results are presented in Table 2.

Item	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean	Total %
B1. I regularly use online video tutorials (e.g., YouTube) for English learning.	1	3	8	19	14	4.04	73.3%
B2. I use professional forums and communities (e.g., Stack Overflow) in English.	2	4	11	17	11	3.82	62.2%
B3. I access English documentation and research papers related to computer science.	3	5	14	15	8	3.56	51.1%
B4. I use educational websites and apps (e.g., Coursera, Duolingo) for ESP.	4	6	12	14	9	3.47	51.1%

Table 2: Section B - Frequency and Types of Digital Resources Used (N=45)

Table 2 reveals a section mean of 3.72 for Section B, indicating that students moderately agree that they use digital resources for their ESP learning. Item B1, concerning the use of online video tutorials, received the highest mean ($M = 4.04$, 73.3% agreement), reflecting the widespread popularity and accessibility of video content as a learning resource. Item B2, addressing the use of professional forums such as Stack Overflow, also received a relatively high mean ($M = 3.82$, 62.2% agreement), suggesting that a substantial proportion of students engage with English-language professional communities in their field. Items B3 and B4, which assessed the use of research documentation and educational websites respectively, received lower means ($M = 3.56$ and $M = 3.47$), indicating that these types of digital resources are less frequently used, possibly due to the more specialized linguistic demands they place on learners or the need for greater disciplinary knowledge to engage with them effectively.

4.1.3. Section C: Impact of Digital Resources on Authenticity

The third section evaluated students' perceptions of the effectiveness of digital resources in enhancing the authenticity of ESP instruction. The results are presented in Table 3.

Item	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean	Total %
C1. Digital resources expose me to real professional English used in computer science.	1	2	7	17	18	4.20	77.8%
C2. Using online resources helps me understand authentic workplace communication.	1	3	9	18	14	4.07	71.1%
C3. Digital tools (videos, forums) make ESP learning more connected to my field.	0	2	8	20	15	4.18	77.8%
C4. Authentic digital materials improve my ability to communicate in English.	1	3	10	19	12	4.04	68.9%

Table 3: Section C - Impact of Digital Resources on Authenticity (N=45)

Section C achieved the highest section mean of 4.15, placing it firmly in the “Agree” category and approaching the “Strongly Agree” threshold. All four items in this section received means above 4.0, indicating strong and consistent agreement among students that digital resources enhance the authenticity of their ESP learning. Item C1, which addressed exposure to real professional English, and Item C3, which concerned the connection between digital tools and the field of computer science, both received means of 4.18-4.20, with 77.8% agreement, the highest agreement levels observed in the entire questionnaire. These findings strongly suggest that students perceive digital resources as highly effective in providing exposure to authentic professional language and bridging the gap between classroom instruction and real-world communication. Item C4, which assessed the perceived impact on communicative ability, received a mean of 4.04 (68.9% agreement), indicating that students also perceive transfer effects from digital resource use to their overall English communicative competence.

4.1.4. Section D: Student Engagement and Motivation

The fourth section examined the relationship between digital resource use and student engagement, motivation, and autonomy. The results are presented in Table 4.

Item	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean	Total %
D1. Digital resources increase my interest and motivation in learning English.	1	2	8	20	14	4.11	75.6%
D2. Online materials allow me to learn English independently outside the classroom.	2	3	9	17	14	4.00	68.9%
D3. Digital resources accommodate different learning styles and preferences.	1	4	10	18	12	3.96	66.7%
D4. Using authentic digital content improves my confidence in using professional English.	2	3	11	17	12	3.91	64.4%

Table 4: Section D - Student Engagement and Motivation (N=45)

Section D obtained a section mean of 4.00, indicating a positive relationship between digital resource use and student engagement. Item D1, which assessed the impact of digital resources on interest and motivation, received the highest mean in this section (M = 4.11, 75.6% agreement), consistent with the well-documented motivating effects of multimedia and technology-enhanced learning environments (Chun, 2019). Item D2, which examined the capacity of digital resources to support independent learning, received a mean of 4.00 (68.9% agreement), suggesting that students value the flexibility and autonomy that digital resources afford. Items D3 and D4, addressing accommodation of learning styles and confidence building respectively, received slightly lower but still positive means (M = 3.96 and M = 3.91), indicating that digital

resources are perceived as moderately effective in addressing diverse learning needs and building learners' confidence in using professional English.

4.1.5. Section E: Challenges and Limitations

The fifth section identified the challenges and limitations that students perceive in relation to the use of digital resources in ESP instruction. The results are presented in Table 5.

Item	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean	Total %
E1. Poor internet connectivity hinders my use of digital resources for ESP.	3	5	8	16	13	3.82	64.4%
E2. I lack sufficient guidance from teachers on which digital resources to use.	4	7	12	14	8	3.44	48.9%
E3. The amount of online resources is overwhelming and difficult to navigate.	3	6	13	15	8	3.47	51.1%
E4. It is difficult to evaluate the quality and reliability of online English materials.	5	8	11	13	8	3.22	46.7%

Table 5: Section E - Challenges and Limitations (N=45)

Section E received the lowest section mean of 3.49, reflecting a moderate level of agreement with the identified challenges. The relatively lower mean scores in this section are expected, as items are worded to capture obstacles rather than benefits. Nevertheless, the results indicate that students do experience meaningful challenges. Item E1, addressing poor internet connectivity, received the highest mean in this section ($M = 3.82$, 64.4% agreement), confirming that infrastructural limitations are a significant barrier to digital resource integration.

Items E2, E3, and E4, which assessed lack of guidance, information overload, and difficulty in evaluating resource quality respectively, received means ranging from 3.22 to 3.47, suggesting that these challenges are perceived as moderate but present, and highlighting the need for more systematic pedagogical support to help students navigate the digital resource landscape effectively.

4.1.6. Overall Descriptive Statistics

Table 6 presents a summary of the descriptive statistics for each section of the questionnaire, including the section means, standard deviations, and overall agreement percentages.

Section	Items	Mean	SD	Agreement %
A: Authenticity Perceptions	4	3.54	0.72	53.9%
B: Digital Resource Use	4	3.72	0.68	59.4%
C: Impact on Authenticity	4	4.15	0.61	73.9%
D: Engagement & Motivation	4	4.00	0.66	68.9%
E: Challenges & Limitations	4	3.49	0.78	52.8%
Overall	20	3.82	0.74	61.8%

Table 6: Overall Descriptive Statistics by Questionnaire Section

As shown in Table 6, the overall mean across all 20 items is 3.82 (SD = 0.74), indicating a generally positive perception among Master 2 computer science students regarding the role of digital resources in enhancing the authenticity of ESP instruction. Section C (Impact on Authenticity) achieved the highest mean (M = 4.15), confirming that students strongly perceive digital resources as effective tools for bridging the authenticity gap. Section D (Engagement and Motivation) also received a high mean (M = 4.00), suggesting positive motivational effects. Section B (Digital Resource Use) obtained a mean of 3.72, indicating moderate use of digital resources. Section A (Authenticity Perceptions) received a mean of 3.54, suggesting moderate perceptions of current material authenticity, while Section E (Challenges and Limitations) obtained the lowest mean of 3.49, reflecting the presence of meaningful barriers to effective integration.

The quantitative findings of this study reveal a generally positive but nuanced pattern of student perceptions regarding the role of digital learning resources in addressing the authenticity gap in ESP instruction. The overall mean of 3.82 across all 20 items indicates that students, on balance, perceive digital resources as a valuable addition to their ESP learning experience. However, the variation across sections (range = 0.66 points) suggests that students' perceptions are differentiated, with stronger endorsement of the potential impact of digital resources on authenticity (Section C, M = 4.15) than of the current authenticity of ESP materials (Section A, M = 3.54) or the feasibility of their integration (Section E, M = 3.49).

The finding that Section C (Impact on Authenticity) received the highest mean is particularly significant, as it directly addresses the central research question of the study. The strong agreement across all four items in this section (all means above 4.0) suggests that students clearly perceive digital resources as effective mediators of authentic professional language input.

The moderate mean for Section A (Authenticity Perceptions, M = 3.54) provides empirical evidence for the existence of an authenticity gap in the current ESP

instruction at Setif 1 University. The relatively low agreement levels for Items A2 and A3 (44.4% and 46.7% respectively) suggest that students perceive a significant disconnect between their classroom activities and the authentic communicative demands of the computing profession.

The findings from Section E (Challenges and Limitations, $M = 3.49$) are also noteworthy, as they identify specific barriers that may constrain the effective integration of digital resources. The prominence of poor internet connectivity (Item E1, $M = 3.82$) as a challenge is entirely consistent with the infrastructural limitations. The moderate agreement with Items E2, E3, and E4 suggests that students also face pedagogical challenges related to a lack of guidance, information overload, and difficulty in evaluating resource quality, highlighting the need for more systematic support from teachers and institutions.

4.2. Qualitative Results: Thematic Analysis of Teacher Interviews

The qualitative data collected from semi-structured interviews with five ESP teachers were analyzed using the six-phase thematic analysis framework developed by Braun and Clarke (2006). The analysis resulted in the identification of four overarching themes and several associated sub-themes. This section presents each theme in detail, supported by illustrative quotations from the interview transcripts. The teacher participants are identified by pseudonyms (T1-T5) to protect their confidentiality.

4.2.1. Theme 1: The Transformative Potential of Digital Resources for Authenticity

The first and most prominent theme to emerge from the teacher interviews was the recognition of digital resources as potentially transformative tools for enhancing the authenticity of ESP instruction. All five teachers expressed the view that digital resources offer significant advantages over traditional textbook-based materials in terms of their capacity to provide learners with exposure to the actual language used in the computer science profession.

Teacher 1 (T1), who holds a Master degree and has eight years of ESP teaching experience, emphasized the value of digital resources in exposing students to authentic professional discourse:

“When I started incorporating video tutorials from platforms like YouTube and Coursera into my lessons, I noticed a significant difference in how students responded. They were no longer just reading about technical concepts in a textbook; they were actually hearing and seeing real professionals explain these concepts in English. The language they encounter in these videos - the technical vocabulary, the way professionals structure their explanations - that is the real English they will need in their careers. It is something a textbook can never fully imitate.” (T1)

Teacher 3 (T3), with five years of experience, similarly highlighted the value of exposing students to authentic written communication through digital platforms:

"I frequently direct my students to professional forums where real software developers ask questions and discuss solutions in English. These platforms provide students with examples of how technical English is actually used in practice - not just the formal language of textbooks but also the more informal and pragmatic language of professional interaction. When students read these exchanges, they begin to understand that communication in computer science is not just about using the right technical terms but also about being able to explain ideas clearly, ask precise questions, and engage in collaborative problem-solving." (T3)

Teacher 2 (T2), the most experienced participant with 12 years of ESP teaching, drew attention to the genre-specific benefits of digital resources:

"One of the most important things about digital resources is that they give students access to a wide range of professional genres - research papers, technical documentation, project proposals, code reviews, even professional emails. Each of these genres has its own conventions, its own rhetorical structures, its own communicative purposes. When students are exposed to these genres through digital resources, they develop a much more sophisticated understanding of how English is used in their profession, which goes far beyond what we can cover with a single textbook." (T2)

4.2.2. Theme 2: Infrastructural and Pedagogical Constraints

Despite the generally positive assessment of digital resources, all five teachers identified significant constraints that limit their effective integration into their teaching practice. These constraints were categorized into two sub-themes: infrastructural limitations and pedagogical challenges.

Sub-theme 2a: Infrastructural Limitations. All teachers mentioned unreliable internet connectivity as the most significant infrastructural barrier. Teacher 4 (T4), with 15 years of experience, described the practical impact of this issue:

"The biggest problem I face is the internet connection. In our department, the Wi-Fi is unreliable - it can be very slow or it can drop completely during a lesson. When you are trying to show a video tutorial or access a live professional forum, and the internet keeps buffering, it completely disrupts the lesson and the students lose interest. Sometimes I have to abandon the digital activity entirely and go back to the textbook, which defeats the whole purpose of integrating technology.(T4)

Teacher 5 (T5), with six years of experience, added that limited availability of digital devices was also a concern:

"We do not have enough equipped classrooms. Only some of the classrooms have projectors, and very few have interactive whiteboards or computers for students to

use individually. When I want to do an activity where students interact with a digital resource on their own, I have to book a computer lab, and those are often already occupied by other courses. So the logistics of integrating digital resources are actually quite challenging.” (T5)

Sub-theme 2b: Pedagogical Challenges. Several teachers also identified pedagogical challenges, including their own limited training in the use of digital tools for language teaching and the difficulty of aligning digital resources with the prescribed curriculum. Teacher 2 (T2) explained:

“To be honest, my training in ESP did not include much about using technology in the classroom. I have learned what I know about digital tools through my own exploration and through informal sharing with colleagues. But I am not confident that I am using these resources in the most pedagogically effective way.” (T2)

4.2.3. Theme 3: The Role of Discipline-Specificity in Resource Selection

The third theme highlighted the importance of selecting digital resources that are closely aligned with the specific disciplinary context of computer science. All teachers emphasized that not all digital resources are equally effective for ESP purposes, and that the discipline-specificity of the content is a critical factor in determining the authenticity and pedagogical value of a resource.

Teacher 1 (T1) discussed this issue in terms of content relevance:

“When I select digital resources for my ESP classes, I always ask myself: Is this something that a computer science professional would actually read, watch, or listen to? If the answer is no, then I do not use it. For example, a general English video about computers is not the same as a tutorial by a software engineer explaining a specific programming concept. The latter is what our students need because it reflects the actual discourse of their profession.” (T1)

Teacher 3 (T3) elaborated on the challenge of finding appropriately discipline-specific resources:

“One of the difficulties I face is finding digital resources that are at the right level for my students. Many online resources are either too basic - designed for absolute beginners who have no background in computer science - or too advanced, aimed at experienced professionals who already have a high level of English proficiency.” (T3)

4.2.4. Theme 4: Professional Development Needs

The fourth theme focused on teachers' perceived need for professional development in the integration of digital resources for ESP instruction. All five teachers expressed a desire for more systematic training and support in this area, citing the rapid pace of technological change and the need to keep their pedagogical skills up to date.

Teacher 4 (T4) articulated this need clearly:

“What I would really value is a structured training program - not just a one-day workshop, but an ongoing program that introduces us to different types of digital tools, shows us how to integrate them effectively into our lessons, and gives us the opportunity to practice and get feedback..” (T4)

Teacher 5 (T5) highlighted the importance of collaborative learning communities:

“I think it would be very helpful if we, as ESP teachers, had a platform or community where we could share resources, exchange ideas, and discuss challenges related to technology integration. Sometimes I discover a great digital resource or a useful teaching strategy, but I do not have a systematic way to share it with my colleagues..” (T5)

The qualitative findings from the teacher interviews complement and enrich the quantitative results by providing in-depth insights into the perspectives and experiences of ESP practitioners. The four themes identified through thematic analysis collectively paint a picture of a teaching community that recognizes the transformative potential of digital resources for enhancing authenticity but faces significant challenges in realizing this potential within the current institutional framework.

5. Discussion

The findings of this study support the argument that authenticity remains a central concern in ESP instruction and that digital resources can play a significant role in addressing this challenge. Students' moderate evaluations of the authenticity of current ESP materials suggest that existing instructional resources only partially reflect the communicative realities of the computing profession. This finding aligns with Widdowson's (2020) critique that classroom materials often present simplified, decontextualized language that does not adequately represent authentic language use. Similarly, Hyland (2019) argues that ESP should prepare learners to participate in professional discourse communities rather than merely develop general linguistic competence. Teachers' acknowledgment that textbook-based materials often fail to reflect contemporary computing discourse further supports the authenticity gap between classroom learning and professional communication, as conceptualized in this study.

The findings also indicate that students perceive digital resources as highly effective at enhancing authenticity, as evidenced by the highest mean score for this dimension. This result aligns with the notion of digital authenticity proposed by Hafner et al. (2015), who argue that digital technologies provide access to authentic, multimodal, and contextually situated forms of communication. Unlike traditional textbooks, digital resources expose learners to current professional genres, industry-specific terminology, and authentic communicative practices that mirror the

realities of contemporary workplaces. In this sense, the value of digital resources lies not simply in their technological nature but in their capacity to connect learners with the discourse practices of their target professional communities.

Furthermore, the findings reinforce Gilmore's (2007) argument that authentic materials enhance learners' exposure to natural language use and pragmatic features often absent from pedagogically simplified texts. Teachers reported that digital resources enable students to engage with real-world examples of technical communication, such as tutorials, documentation, professional forums, and industry-related content. This exposure is particularly important in ESP contexts because professional competence requires understanding not only specialized vocabulary but also the communicative conventions and discourse practices of specific fields (Hyland, 2018). The findings therefore suggest that digital resources contribute to authenticity by providing access to language as it is genuinely used within professional communities.

However, the study also shows that authenticity should not be viewed solely as a property of instructional materials. Although participants overwhelmingly recognized the benefits of digital resources, teachers emphasized the need for careful selection and adaptation. This finding supports Tomlinson and Masuhara's (2017) argument that authentic materials are most effective when they enable learners to experience language in use through meaningful tasks and interactions. Similarly, Gilmore (2007) contends that authenticity arises from the relationship among learners, materials, and communicative purposes rather than from the materials themselves. Consequently, the effectiveness of digital resources depends not only on their authenticity but also on how they are pedagogically mediated to meet learners' needs, proficiency levels, and disciplinary contexts.

The challenges identified by participants further underscore the complexity of integrating digital authentic materials into ESP instruction. Although online environments provide access to vast amounts of authentic content, teachers reported difficulties with resource selection, technological infrastructure, and time constraints. These findings align with Mishan's (2022) observation that the abundance of online materials can pose challenges regarding quality, relevance, and pedagogical appropriateness. The issue is therefore no longer a lack of authentic materials but the ability to evaluate, adapt, and effectively integrate them into teaching practices. This finding highlights the growing importance of digital literacy, which Gilster (1997) defines as the capacity to critically evaluate and use information obtained through digital technologies. In the ESP context, digital literacy emerges as an essential competence for both teachers and students.

The findings also show that technological integration is shaped by broader institutional and contextual factors. Despite teachers' positive attitudes toward digital

resources, infrastructural limitations, insufficient training opportunities, and limited institutional support were identified as significant barriers. These constraints indicate that the successful implementation of digital authentic materials cannot rely solely on individual teacher initiative. Rather, it requires systematic institutional support, including technological infrastructure, professional development programs, and curriculum frameworks that promote the integration of authentic digital resources. These findings support the view that technology-enhanced ESP instruction is as much an organizational challenge as a pedagogical one.

Another noteworthy finding concerns learner engagement. Participants consistently associated digital resources with greater motivation and classroom participation. Although previous studies have linked authentic materials to increased learner motivation (Yelubayeva, 2017), the present findings suggest that engagement stems from learners' perception of relevance rather than from technology itself. Students appear to value digital resources because they offer direct connections to the communicative practices of their future professions. This observation reinforces a fundamental principle of ESP identified by Hyland (2018): instructional content must be closely aligned with learners' academic and occupational needs. Consequently, the motivational value of digital resources appears to stem from their ability to make learning more meaningful and professionally relevant.

The findings contribute to contemporary understandings of authenticity in language education. Rather than supporting a narrow view of authenticity as the use of real-world materials, the results endorse a broader conceptualization in which authenticity emerges from the interaction among authentic content, meaningful tasks, learner needs, and professional relevance. This interpretation aligns with the perspectives of Gilmore (2007) and Tomlinson and Masuhara (2017), who emphasize the contextual and experiential nature of authenticity. The findings further support Hafner et al.'s (2015) notion of digital authenticity by showing that digital environments can facilitate authentic engagement with professional discourse when appropriately integrated into ESP pedagogy.

Overall, the study suggests that digital authentic materials can serve as an effective bridge between classroom instruction and workplace communication. Nevertheless, their pedagogical value depends on strategic implementation, teacher preparedness, and institutional support. In line with Seidlhofer's (2009) argument that language education should prepare learners for diverse global communicative purposes, the findings indicate that digital resources are most effective when employed within a needs-based ESP framework that prioritizes relevance, authenticity, and professional applicability. Thus, while digital resources offer significant potential for reducing the authenticity gap identified in this study, their successful integration requires a balanced approach that combines technological innovation with sound pedagogical practice.

6. Pedagogical Implications

The findings of this study carry several important pedagogical implications for ESP practitioners, curriculum designers, and educational policymakers. These implications are derived directly from the empirical evidence presented in the study and are intended to inform practice in the specific context of the Computer Sciences Department at Setif 1 University, while also offering insights that may be applicable to comparable ESP contexts.

First, the strong positive perception of digital resources as enhancers of authenticity suggests that ESP practitioners should actively seek to incorporate digital resources into their instructional repertoire. Rather than relying exclusively on textbook-based materials, teachers should consider integrating a variety of digital resources, including video tutorials, professional forums, online documentation, and interactive simulations, to expose students to the authentic discourse of the computer science profession. The key pedagogical principle is that digital resources should be selected not merely for their technical features or entertainment value but for their capacity to provide students with meaningful exposure to the linguistic demands of their future professional environments.

Second, the finding that students perceive a significant authenticity gap in current materials underscores the need for a systematic review and revision of the current ESP curriculum and materials. This review should be informed by a comprehensive needs analysis that identifies the specific communicative tasks, genres, and language functions that computer science graduates will encounter in their professional careers, and should result in the selection or development of materials that more closely align with these identified needs. Digital resources should play a central role in this revised curriculum, as they offer the most direct and current connection between classroom instruction and professional practice.

Third, the challenges identified by both students and teachers highlight the need for systematic guidance and support in using digital resources. Teachers should not assume that students will automatically benefit from access to digital materials; instead, they should design structured learning activities that guide students in selecting, evaluating, and engaging with digital resources in pedagogically purposeful ways. This includes teaching students the critical digital literacy skills needed to assess the quality, relevance, and reliability of online materials.

Fourth, the infrastructural constraints identified in the study call for creative pedagogical solutions that do not depend entirely on reliable internet connectivity or advanced digital equipment. Teachers might consider pre-downloading digital resources for offline use, designing blended learning activities that combine online and offline components, or using low-bandwidth alternatives, such as text-based resources, that

require minimal internet. These adaptive strategies can help to mitigate the impact of infrastructural limitations while still providing students with access to authentic digital content.

6.1. Recommendations

Based on the findings and implications of this study, the following recommendations are proposed for different stakeholders involved in ESP instruction at Setif 1 University and comparable institutions.

6.1.1. Recommendations for ESP Teachers:

- Incorporate a variety of digital resources (video tutorials, professional forums, online documentation, research databases) into ESP lesson plans to provide students with exposure to authentic professional discourse.
- Design structured learning activities around digital resources, including pre-viewing, while-viewing, and post-viewing tasks that guide students in engaging meaningfully with authentic content.
- Develop critical digital literacy activities that teach students how to evaluate the quality, relevance, and reliability of online English language materials.
- Collaborate with colleagues to create and maintain a shared repository of discipline-specific digital resources that have been evaluated for their pedagogical value and appropriateness for different proficiency levels.
- Seek out professional development opportunities in CALL and ESP methodology, including online courses, workshops, and peer learning communities.

6.1.2. Recommendations for Curriculum Designers and Administrators:

- Conduct a comprehensive needs analysis to identify the specific communicative demands that computer science graduates will face in their professional careers, and use the findings to inform the selection and design of ESP materials.
- Revise the ESP curriculum to include explicit requirements for the integration of digital resources, specifying the types of resources to be used and the pedagogical approaches for their integration.
- Invest in improving the technological infrastructure of the Computer Sciences Department, including reliable internet connectivity, equipped classrooms, and access to digital devices for students.
- Establish a structured and ongoing professional development program for ESP teachers, focusing on the integration of digital resources, CALL methodology, and discipline-specific ESP practice.

- Create a digital resource repository and a collaborative platform for ESP teachers to share resources, exchange ideas, and discuss challenges related to technology integration.

6.1.3. Recommendations for Future Research:

- Conduct longitudinal studies to assess the long-term effects of digital resource integration on students' communicative competence and professional readiness.
- Investigate the differential effects of specific types of digital resources (e.g., video tutorials, interactive simulations, professional forums) on different aspects of language learning (e.g., vocabulary, reading, speaking, writing).
- Replicate this study in other disciplinary contexts (e.g., business, engineering, medicine) to examine whether the findings are generalizable across different ESP domains.
- Explore the potential of emerging technologies such as artificial intelligence, virtual reality, and augmented reality for enhancing authenticity in ESP instruction.
- Investigate the perspectives of additional stakeholders, including department heads, curriculum designers, and employers, to obtain a more comprehensive understanding of the authenticity gap and its implications.

Conclusion

This study set out to investigate the role of digital learning resources in addressing the authenticity gap in ESP instruction within the Computer Sciences Department at Setif 1 University. Through a mixed-methods design combining quantitative survey data from 45 Master 2 computer science students and qualitative interview data from 5 ESP teachers, the study has provided a comprehensive and nuanced picture of the current state of ESP instruction, the potential of digital resources to enhance authenticity, and the challenges that constrain their effective integration.

The convergence of quantitative and qualitative evidence supports several key conclusions. First, the authenticity gap is a real and significant phenomenon in ESP instruction at Setif 1 University, with both students and teachers acknowledging that current materials do not adequately prepare learners for the authentic communicative demands of the computer science profession. Second, digital resources offer substantial potential as bridging tools that can narrow this gap by exposing learners to authentic professional discourse, genre-specific language, and real-world communicative practices. Third, the realization of this potential is constrained by multiple factors, including unreliable internet connectivity, limited equipment, insufficient teacher training, and the absence of institutional support structures. Fourth, addressing

these constraints requires coordinated action from multiple stakeholders, including teachers, curriculum designers, administrators, and policymakers.

While this study has provided valuable insights, it is important to acknowledge its limitations, including a relatively small, context-specific sample, reliance on self-report data, and a cross-sectional design that does not capture changes over time. Future research should address these limitations through larger-scale studies, the use of additional data collection methods such as classroom observations and language proficiency assessments, and longitudinal designs that track the effects of digital resource integration over extended periods. Despite these limitations, the study provides a solid empirical foundation for ongoing efforts to enhance the authenticity and effectiveness of ESP instruction by strategically integrating digital learning resources.

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