

Analysis of Student Needs in the Development of TPACK-Based English Syllabus and Learning Plans

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Abstract

The use of digital tools in English as a foreign language (EFL) classrooms is growing rapidly, but systematic evidence of what students really need from technology-based learning is still limited. As a result, curriculum developers often choose digital resources based on availability, rather than the results of the diagnosis. This study analyzes the need to prepare a syllabus and lesson plan based on the Technological Pedagogical Content Knowledge (TPACK) framework. Using an exploratory sequential mixed-methods design, data were collected through a Likert scale questionnaire of 214 EFL high school students, a focus group discussion with 18 student representatives, a semi-structured interview with nine English teachers, and a document analysis of twelve syllabus and forty-five lesson plans. Quantitative data are analyzed with descriptive statistics (mean, frequency, percentage); Qualitative data were analyzed using Miles and Huberman's interactive model in the form of data reduction, data presentation, and conclusion drawn. Results showed prominent difficulties in listening and speaking skills ($M = 4.21$ and 4.05 on a difficulty scale of 1-5), strong preference for interactive video and mobile-based learning (61% combined), as well as large gaps between teachers' current TPACK practices and student expectations, especially in the integrated TPACK dimension (teachers $M = 2.2$ versus student expectations $M = 4.7$). These findings are synthesized into a curriculum blueprint that positions technology as a pedagogical mediator, not a substitute for content. This study contributes a replicable empirical procedure for translating needs analysis data into a TPACK-based curriculum document, while offering methodological templates and substantive design principles for EFL syllabus developers.

Keywords: needs analysis, TPACK, EFL syllabus design, development of learning plans, Mixed-Methods Research

INTRODUCTION

The integration of technology in English teaching is now an expected feature in learning design, not just a complement. But the way technology enters the syllabus and learning plan is still determined by what is available, not by the needs of students. Institutions adopt learning management systems, applications, and multimedia resources based on institutional trends or policies, rather than based on documented linguistic and digital profiles of students (Instefjord & Munthe, 2017; Tondeur et al., 2018). This inequality has consequences:

when technology is added to existing content without a clear diagnosis of learners' lacks, wants, and needs, it risks repeating the same pedagogical weaknesses, only in digital form.

The Technological Pedagogical Content Knowledge (TPACK) framework, developed by Mishra and Koehler (2006) as an extension of Shulman's (1986) Pedagogical Content Knowledge, explains how technology, pedagogy, and content intersect in teaching practice. TPACK has since become a standard reference for assessing teachers' readiness to integrate technology meaningfully, not just a sticker

(Chai et al., 2013). However, most TPACK research in the context of EFL focuses on measuring teachers' TPACK competence through a validated self-report scale (Farhadi & Öztürk, 2023; Mahdum, 2015), with much less attention to whether the technology-content-pedagogy configuration reported by the teacher is really according to the needs of the students.

This inequality is the main gap that this study tries to answer. Needs analysis, as formulated by Waters (2009) and refined by Long (2005), distinguishes between target needs, i.e. what learners must be able to do in the target situation, with learning needs, which include lacks (the gap between current and needed competencies), wants (priorities according to the learner's perception, which can differ from lacks), and necessities (what is objectively needed to function effectively). Needs analysis has been a cornerstone of the design of the English for Specific Purposes (ESP) curriculum, but its application to the integration of EFL technology in general, particularly as an empirical step prior to the development of the TPACK-based syllabus, has been rarely worked on. Existing TPACK studies tend to assume, rather than prove, that students' technological needs are aligned with the tools chosen by teachers (Mahdum, 2015), while EFL needs analysis studies rarely bring their findings down to operational curriculum forms such as lesson plans (Pradana & Awanda, 2025).

Three gaps drove this study. First, most TPACK research treats teacher competence as a bound variable, so that learners, who should be the main reference for assessing technology integration, are instead marginalized. Second, needs analysis research in the context of EFL tends to address language skills deficits separately from digital tool preferences and access constraints, so the picture is incomplete for curriculum developers who want to design technology-based learning. Third, few studies have translated the results of the needs analysis into prototypes of syllabus or concrete learning plans; That analytical step often stops as a list of recommendations, not

a design blueprint. This study answers these three gaps through three objectives: (a) identify students' lacks, wants, and necessities related to technology-based English learning; (b) analyze the gap between students' current digital literacy and the competencies required for English language learning objectives; and (c) translate the findings into a draft syllabus and a prototype of a lesson plan that explicitly integrates the components of TPACK.

The TPACK model from Mishra and Koehler (2006) proposes that effective technology integration does not arise from technological knowledge, pedagogy, or content separately, but from the convergence point of the three, which are contained in seven constructs: Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), as well as the combined constructs of TPK, TCK, PCK, and TPACK integrated. In addition, the target-situation analysis of Waters (2009) and Long's (2005) distinction between perceived and objective needs provide the diagnostic vocabulary that this study uses to question what 'integration' actually means in a particular class.

Reading the current literature comparatively, there is one methodological pattern that is noteworthy. Farhadi and Öztürk (2023) examined the level and TPACK needs of prospective EFL teachers in Turkey and found that their competencies varied between components, but the study did not juxtapose those findings with data from the learner's side, so it is not clear whether measured teacher competence actually translates into teaching that students perceive to be useful. Mahdum (2015) examined the TPACK of English teachers in Indonesia and found similar variations between components, also without a baseline from the student side. On the other hand, studies departing from needs analysis, such as Tanjung (2021) and Pradana & Awanda (2025), have succeeded in identifying learners' shortcomings and wants, the first on listening skills, the second on learners' digital needs more broadly, but neither of them extend the

analysis to the framework of technology integration, let alone TPACK in particular. Cakrawati (2017) approach the bridge between these two research traditions by examining students' perceptions of digital media in English language learning, but their study describes an already running practice, rather than deriving a new design from a diagnosed need. This study differs from all others in that it explicitly places needs analysis as the empirical foundation on which the prototype syllabus and TPACK-based learning plan are derived, instead treating needs analysis and TPACK evaluation as two activities running independently.

The contribution of this study, when viewed from its position on the above literature, is methodological as well as substantive: it shows a replicable procedure, namely a needs analysis that directly provides input on the TPACK-coded curriculum artifacts, while reporting substantive findings on where the greatest TPACK lacks, wants, and gaps lie in the context studied.

METHOD

This study uses an exploratory sequential mixed-methods design (Creswell & Plano Clark, 2018), positioned in the analysis phase of the ADDIE instructional design model. Quantitative data establishes the scale and distribution of student needs, while qualitative data provides interpretive depth about why certain deficiencies and wants arise, as well as how teachers experience difficulties integrating technology with pedagogy and content. The two data strands are combined at the interpretation stage to produce a needs-based blueprint, following the convergence logic described by Creswell and Plano Clark (2018) for exploratory sequential design adapted for instructional development purposes.

Participants consisted of 214 grade XI students from three high schools in Lampung Province, Indonesia, selected through stratified random proportional sampling so that representation across ability levels was maintained. Eighteen

students, purposively selected from high, middle, and low ability groups, participated in three directed group discussions (FGDs). Nine English teachers from the same school were interviewed one by one. In addition, twelve syllabus and forty-five lesson plans in use were collected for document analysis, as a comparative baseline for the proposed TPACK-based prototype.

Data was collected through four complementary techniques. First, a 32-item Likert scale questionnaire (1 = strongly disagree/very easy to 5 = strongly agree/very difficult) measured students' perceptions of difficulties in five skill areas (lacks), preferences of digital learning tools and formats (wants), and device ownership and access conditions (necessities). Second, semi-structured interviews (six core questions with follow-up questions) were conducted with teachers to explore pedagogical and content constraints in technology integration. Third, FGD with students explores, more deeply than can capture which questionnaires, apps, platforms, or digital activities they feel are really useful for learning English. Fourth, document analysis of existing syllabus and lesson plans is carried out using a TPACK-coded checklist, to see which technology integration is superficial (e.g. technology is just a medium of delivery) and which is substantive (e.g. technology changes the form of its own pedagogical task).

The quantitative data from the questionnaire were analyzed with descriptive statistics, namely mean, frequency, and percentage, to identify priority areas of need. For example, the mean high difficulty of listening, combined with a strong preference for audio-visual media, directly informs the choice of technology in the prototype of the learning plan. Qualitative data from interviews, FGDs, and document analysis were analyzed using the interactive model of Miles and Huberman (1994), which consisted of three concurrent stages: data reduction (condensing transcripts into codes relevant to student needs and teacher constraints), data presentation (arranging coded citations into a matrix that juxtaposed

TPACK components with emerging themes), and conclusion extraction and verification (detrigulation of patterns between three qualitative sources and data quantitative). The two data strands are then integrated through a joint display technique, where each identified need is mapped directly to the appropriate TPACK

component, resulting in the design blueprint reported in discussion section.

RESULT AND DISCUSSION

Student Lacks: Perception of Skill Difficulty

Table 1. summarizes the instruments and respondents underlying the needs analysis data reported below

Needs Category	Instruments	Key Focus	Respondents
Lacks	Likert scale questionnaire	Perception of difficulties in Listening, Speaking, Writing, Reading, Grammar	214 students (survey)
Wants	Questionnaire + FGD	Preferred digital tools, platforms, and learning formats	214 students; 18 FGD participants
Requirements	Device ownership/access checklist	Device ownership, internet access, digital literacy level	214 students (survey)
TPACK (teacher) gap	Semi-structured interviews	Barriers to integrating technology with pedagogy and content	9 English teachers
Document baseline	Document analysis	Existing syllabus/RPP, reviewed for technology integration gaps	12 syllabus; 45 RPP

Figure 1 presents the mean of students' perceived difficulties in the five core skill areas measured by the questionnaire.

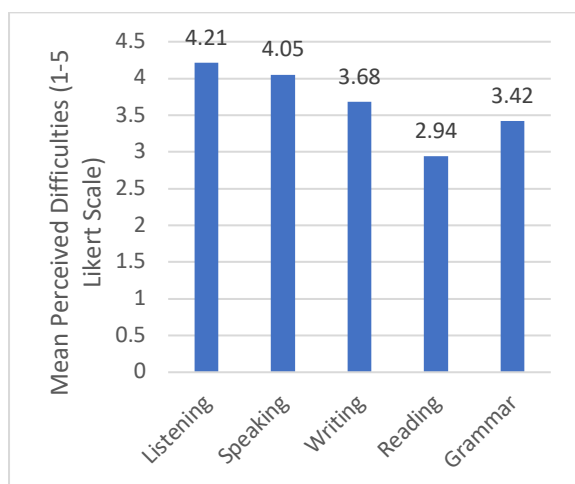


Figure 1 Students' Perceived Difficulty Across English Skill Areas

Listening emerged as the largest area of lack ($M = 4.21$), followed by talking ($M = 4.05$), while reading was reported to be relatively more manageable ($M = 2.94$). This sequence is in line with the findings of Tanjung (2021) that listening difficulties in EFL learners stem largely from speakers' speech speed, unfamiliar vocabulary, and environmental disturbances, factors that remain relevant when exposure to spontaneous spoken English in the classroom is limited. But unlike the study, which highlighted linguistic and environmental factors, our FGD data pointed to another aggravating factor: students described the use of technology in the classroom as 'passive', limited to watching recorded videos without a

structured follow-up of interactions. An FGD participant explained that the video was shown 'to fill the time', not to bridge the next speaking task, the same pattern was also seen in the teacher interview data in Section 3.3. This shows that the lack of listening is not only a lack of skills, but also a lack of design: students lack the opportunity to convert digital inputs into productive outputs, a gap that should be closed through TPK-based updates (Technological Pedagogical Knowledge).

Student Wants: The Preferred Digital Tool

Figure 2 shows the distribution of digital learning tools that students prefer, taken from questionnaire answers and FGD elaboration.

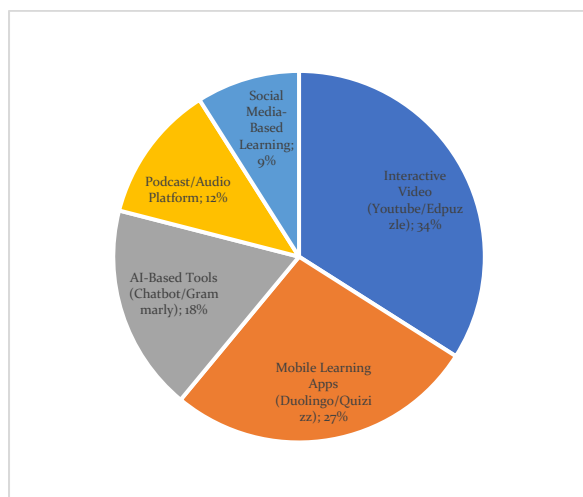


Figure 2 Distribution of Students' Preferred Digital Learning Tools (Wants)

Interactive video platforms and mobile learning apps together account for 61% of stated preferences, far surpassing AI-based tools (18%), podcasts (12%), and social media-based learning (9%). These findings are in line with Cakrawati (2017) who reported students' positive perceptions of digital media in English language learning, but at the same time clarify one thing: FGD transcripts show that students' enthusiasm depends on interactivity, not just multimedia presence. Some students explicitly distinguish between videos as

passive stimuli and videos embedded in tasks that demand response, prediction, or annotation, and they prefer the latter. This distinction is important analytically because it changes the design implications: the priority is not simply to choose a popular platform, but to choose a task, mediated by that platform, that demands productive engagement. This is a direct example of TPK in the Mishra and Koehler (2006) model, where the same tool can produce very different pedagogical outcomes depending on how it is used.

TPACK Gap: Current Practices vs Student Expectations

The most analytically significant findings concern the gap between self-reported teacher practice and student expectations across the seven dimensions of TPACK, presented in Figure 3.

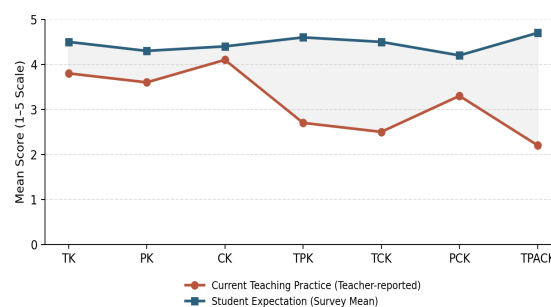


Figure 3. Gap Between Current Practice and Student Expectation Across TPACK Dimensions

Two patterns are noteworthy. First, the smallest gap is in the fundamental single-domain constructs, namely kindergarten, PK, and CK, where teacher practice and student expectations are relatively close (difference of 0.7-0.9 points). Second, the gap widened far in the combined and integrated constructs, namely TPK, TCK, PCK, and especially TPACK itself, with a difference of 2.5 points (teacher $M = 2.2$ compared to student $M = 4.7$). This pattern shows that the teachers in this sample have adequate standalone competencies in technology, pedagogy, and

content, but the difficulties are precisely at the point of encounter, precisely at the point that according to TPACK theory is a typical

contribution of this construct (Mishra & Koehler, 2006).

Table 2 presents excerpts from teacher interviews that represent this pattern

TPACK Components	Interview Quotes (paraphrased)	Emerging Codes
TPK	One teacher said that the available applications are mainly used for vocabulary drills, not communicative tasks.	Tool-based, not pedagogical-based
TCK	Some teachers admit that they are not sure which platform actually supports long writing exercises.	Lack of understanding of specific content
TPACK	Students in the FGD want technology that simulates a real conversation, not just replacing a worksheet.	Demanding authentic, integrated task design

These quotations reinforce the quantitative gap: the teacher is not ignorant of the tool, nor unfamiliar with the content of the language, but the difficulty of deciding how a tool should change the form of a pedagogical task for the purpose of a particular content. This differs from the findings of Farhadi and Öztürk (2023) and Mahdum (2015), who both reported a higher level of TPACK competence using an instrument that asked teachers to assess their own integration abilities in the abstract. The interview approach used here, on the other hand, asks the teacher to explain the specific lesson they have just taught, a method that seems to be better able to reveal the gap between perceived competencies and those that are actually practiced, something that may not be visible on a self-report scale. This is a methodological note worthy of TPACK's research going forward: aggregate self-efficacy scores can mask specific weaknesses per dimension and per real practice, which only emerge through concrete task-based excavation.

Synthesizing Needs into a TPACK-Based Design Blueprint

Combining quantitative and qualitative strands results in a concrete set of design principles rather than generic recommendations. Three of them can be illustrated. First, given the lack of listen-talk and the demand for interactive videos instead of passive, the learning plan prototype embeds the live post-watch speaking task into the video segment (e.g. timed prediction pause followed by paired verbal responses), operationalizing TPK by utilizing technology pause and replay features to directly serve pedagogical purposes, i.e. productive exercise. Second, given the striking dimensional gaps of TPACK, the draft syllabus not only determines what tools are used per unit, but also the pedagogical function of those tools in the order of content, answering teachers' uncertainties about how tools and tasks should shape each other. Third, because the data necessities (device ownership and access, collected through a questionnaire but not shown separately here so as not to be redundant) shows that 88% of students have reliable smartphone access but only 41% have consistent laptop or desktop access, the prototype prioritizes mobile-compatible tools over platforms that require

large screens, a necessity-based constraint that will not be visible from data lacks or wants alone.

This synthesis demonstrates the study's main methodological contribution: the categories of needs analysis (lacks, wants, necessities) map to different and complementary TPACK design decisions, rather than a single recommendation of 'integrate more technologies'. Lacks mainly provides input on the design of pedagogical tasks (PK and TPK dimensions); wants mainly to provide input on the selection of tools and platforms (dimensions of kindergarten and TPK); and necessities serve as a limit that limits which tools are worth using, regardless of their pedagogical advantages (intersecting with all dimensions through practical access). Making this mapping explicit, rather than letting the needs analysis and integration of TPACK be reported as two separate parallel activities, is what distinguishes this study's contribution from the strand of literature reviewed in introduction, which treats both as independent research traditions.

It is worth acknowledging one limitation: the design blueprint reported here is still in the ADDIE analysis phase and has not been implemented and evaluated in classroom practice; Its effectiveness as a real instructional intervention is still an empirical question for the next phase of design and development. In addition, samples were taken from three schools within a single region, so the patterns of lacks, wants, and gaps reported here should not be assumed to be common to EFL contexts with significantly different technological infrastructure or curriculum demands.

CONCLUSION

This study seeks to identify students' lacks, wants, and necessities related to technology-based English language learning, analyze their gaps in current TPACK practices, and translate the findings

into a prototype syllabus and lesson plan. The results show that students' most pressing lack is concentrated on listening and speaking, their preference is inclined towards interactive tools rather than simply multimedia-rich, and the biggest gap between teacher practice and student expectations is not in technological competence, pedagogy, or content separately, but in the point of encounter, i.e. the integrated TPACK construct itself. These findings are synthesized into a design blueprint in which each category of needs analysis is mapped to a different set of curriculum design decisions, offering EFL syllabus developers a replicable procedure to base TPACK integration on diagnosed, rather than assumed learner needs. Further research needs to implement and empirically evaluate this learning plan prototype in a wider range of institutional contexts, in order to test the general applicability of both the substantive findings and the needs-to-TPACK design procedures proposed here.

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