

NEED ANALYSIS REPORT FOR SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS FOR STUDENTS OF DEPARTMENT REGIONAL AND CITY PLANNING

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Abstract

Needs analysis plays a crucial role in designing effective instructional programs, particularly in disciplines that require interdisciplinary competence such as Science, Technology, Engineering, and Mathematics (STEM). For students of the Department of Regional and City Planning, STEM-related knowledge and skills are essential to support analytical thinking, problem-solving, and professional readiness in addressing urban and regional development issues. However, the specific STEM needs of these students have not been sufficiently explored. This study aims to investigate the STEM needs of Regional and City Planning students by applying the needs analysis framework proposed by Hutchinson and Waters. Employing a quantitative descriptive method, data were collected through a questionnaire distributed to students of the Department of Regional and City Planning. The data were analyzed using frequency and percentage distribution to identify students' necessities, lacks, and wants related to STEM competencies. The findings indicate that students perceive STEM skills as highly important for their academic and future professional needs, while also revealing gaps between the required competencies and their current level of mastery. The results of this study are expected to provide empirical input for curriculum development and instructional planning in STEM-related courses for Regional and City Planning programs.

Keywords: Needs Analysis; STEM; ESP; Regional and City Planning Students

INTRODUCTION

In higher education, learning programs are expected to meet institutional objectives as well as students' learning needs. This is especially important in interdisciplinary fields such as Regional and City Planning, where students are required to combine knowledge from science, technology, engineering, and mathematics to solve urban and regional problems. Therefore, effective learning depends on how well the curriculum matches students' academic and professional needs (Richards, 2001).

Needs analysis is a concept that has been widely discussed in English for Specific Purposes (ESP). Hutchinson and Waters (1987) explain that needs consist of necessities, lacks, and wants. Necessities refer to the knowledge and skills required in the target situation, lacks show the gap between students' current abilities and the expected level, and wants describe students' own views about what they need to learn. This perspective highlights that learners should be actively involved in determining learning priorities. Other scholars, such as Brown (1995) and Dudley-Evans and St. John (1998), also emphasize that needs analysis is an important basis for curriculum and instructional planning.

Although this framework was originally developed for language learning, its principles can also be applied to other fields, including STEM education. Needs analysis is considered essential in higher education because learning outcomes are closely related to students' future academic and professional demands (Nation & Macalister, 2010). This indicates that the concept is relevant for interdisciplinary programs beyond language education.

In the field of Regional and City Planning, STEM skills are not only supporting abilities but essential competencies. These skills help students analyze spatial information, use planning-related technologies, and understand quantitative data. According to the National Research Council (2012) and Bybee (2013), STEM education supports problem-solving and analytical thinking needed to address complex real-world issues. Without understanding students' STEM needs, learning programs may not fully support academic requirements or professional expectations.

In Indonesia, Regional and City Planning programs are expected to prepare graduates who can respond to rapid urban development and technological change. However, studies that specifically examine students' STEM needs in this department are still limited. Most research focuses more on curriculum outcomes rather than students' learning difficulties and perspectives (UNESCO, 2017).

Therefore, this study aims to conduct a quantitative needs analysis of STEM for students of the Department of Regional and City Planning using the framework proposed by Hutchinson and Waters. By identifying students' necessities, lacks, and wants related to STEM competencies, this study is expected to provide useful input for curriculum development and the improvement of STEM learning in the department.

METHOD

This study employed a quantitative descriptive research design to investigate the STEM-related needs of students of the Department of Regional and City Planning. The quantitative approach was selected to systematically measure students' perceptions and needs through numerical data, allowing the identification of tendencies related to their learning requirements.

The participants of this study consisted of 16 students from the Department of Regional and City Planning. The respondents were selected as representatives of students who are currently engaged in academic activities requiring interdisciplinary competencies related to science, technology, engineering, and mathematics. The participants served as the primary source of data for identifying learning needs in the context of ESP-oriented STEM instruction.

The data were collected using a questionnaire designed based on the principles of needs analysis proposed by Hutchinson and Waters. The questionnaire consisted of eight sections, each addressing different aspects of students' needs and learning context. These sections included:

- a) professional information of the students,
- b) personal information of the students,
- c) information on students' English language ability,
- d) students' lacks,
- e) information on language learning strategies,
- f) professional communication needs,
- g) students' needs related to ESP courses, and

h) environmental and situational factors influencing learning.

All questionnaire items were measured using a Likert scale, enabling respondents to express their level of agreement or perception toward each statement. The structure of the questionnaire allowed the identification of students' necessities, lacks, and wants in relation to their academic and professional needs.

The questionnaire was administered to the respondents in one data collection phase. The participants were informed of the purpose of the study and were asked to respond to all items honestly based on their learning experiences and perceptions. The completed questionnaires were then collected and prepared for analysis.

The collected data were analyzed using frequency and percentage distribution. This technique was employed to describe the overall tendencies of students' responses and to identify dominant patterns related to their STEM and ESP needs. The results were then interpreted by referring to the needs analysis framework of Hutchinson and Waters, focusing on students' necessities, lacks, and wants.

RESULTS AND DISCUSSION

This section presents the quantitative findings obtained from the questionnaire and discusses them based on the needs analysis framework proposed by Hutchinson and Waters. To ensure clarity and systematic presentation, the results are displayed in tabular form. The tables summarize students' responses measured through a Likert scale and highlight dominant tendencies related to professional needs, language ability, learning preferences, and ESP course expectations. This presentation allows major patterns concerning students' necessities, lacks, and wants to be clearly identified and interpreted.

Table 1. Professional Needs for English

Statement	1	2	3	4
Often use English in my studies or work.	0%	6%	44%	50%
Need English to write reports, papers, or official correspondence.	0%	31%	38%	44%
English should include technical or field-specific vocabulary.	0%	6%	31%	50%

Table 1 shows information on students' English language needs based on 16 respondents. The percentages in the second statement (119%) and the third statement (106%) exceed 100% because respondents selected more than one option. Most respondents' answers fall into the Agree category.

Table 2. Personal Factors Influencing Learning

Statement	1	2	3	4
I had a good experience learning English.	0%	6%	19%	50%
Cultural background influences English learning	0%	19%	44%	31%

I hope this course will help me communicate better in my field.	0%	0%	13%	63%
I prefer to learn through discussions or group work.	0%	6%	56%	38%
I am motivated to master English for my future.	0%	0%	19%	50%

Table 2 shows that students generally demonstrate positive attitudes and motivation toward learning English. However, the dominance of Neutral responses regarding cultural influence and collaborative learning suggests variation in learning preferences. These findings align with Hutchinson and Waters' concept of wants, as learners' express expectations and preferences that should be considered in course design.

Table 3. Students' English Language Ability

Statement	1	2	3	4
Able to understand academic texts in English.	0%	13%	56%	31%
able to write reports, essays, or formal emails in English.	0%	31%	50%	19%
Sufficient vocabulary in the field of study or work	0%	6%	44%	50%

The results in Table 3 indicate that students perceive their English proficiency as moderate. The prevalence of Neutral responses reflects uncertainty regarding their actual competence, particularly in reading and writing academic texts. This condition suggests a gap between current ability and target needs, which corresponds to students' lacks within the needs analysis framework.

Table 4. Students' Lacks in English Proficiency

Statement	1	2	3	4
Difficulty speaking English fluently	0%	12%	44%	25%
Writing skills are not yet sufficient	0%	6%	44%	56%
Need to improve grammar and vocabulary	0%	0%	13%	63%

Table 4 highlights writing skills, grammar, and vocabulary as major areas of difficulty. The dominance of Agree responses confirms the presence of significant lacks, indicating that current instruction has not fully met students' academic and professional language demands.

Table 5. Learning Preferences

Statement	1	2	3	4
I prefer to learn through real-life activities and simulations.	0%	6%	25%	56%
frequently use videos, apps, or the internet to learn English.	0%	0%	19%	62%
I hope lecturers use interactive teaching methods.	0%	0%	25%	50%

Better understand the material when the lecturer gives real examples	0%	0%	12%	62%
Need to understand how to write reports or formal documents in English.	0%	0%	31%	50%
I need to master the technical terms used in my field.	0%	0%	12%	69%
Need to understand how professionals in my field interact using English	0%	6%	13%	63%

The data in Table 5 reveal a strong preference for interactive, technology-supported, and contextualized learning. These findings emphasize students' wants, suggesting that ESP instruction should integrate practical tasks and real-world examples aligned with their disciplinary context.

Table 6. Needs for ESP Course

Statement	1	2	3	4
Course should focus on field-relevant skills.	0%	0%	25%	69%
Course topics should reflect real professional situations.	0%	0%	38%	56%
ESP course will benefit future career.	0%	0%	19%	50%

The results in Table 6 indicate strong agreement regarding the relevance and usefulness of ESP courses. These responses clearly represent students' wants and expectations, supporting the necessity of designing ESP courses that directly address professional contexts.

Table 7. Learning Environment

Statement	1	2	3	4
Classroom environment supports learning.	0%	13%	38%	56%
Learning facilities are adequate.	0%	6%	31%	44%
Class schedule is appropriate.	0%	6%	25%	56%
Duration of meetings is sufficient.	0%	13%	31%	44%
Opportunities to practice English outside class exist.	0%	6%	25%	50%

Table 7 shows that the learning environment is generally supportive, although facilities and instructional time may require further improvement. Environmental factors, as emphasized by Hutchinson and Waters, play an important role in shaping learning effectiveness and should be considered in course planning.

CONCLUSION

This study aimed to identify the English for Specific Purposes (ESP) needs of students in the Department of Regional and City Planning through a quantitative needs analysis framework proposed by Hutchinson and Waters. The findings indicate that the students demonstrate clear necessities in using English for academic and professional purposes,

particularly in writing formal documents and mastering technical terminology related to their field. The dominance of agreement responses in these areas highlights the importance of English as a key supporting competence in Regional and City Planning studies.

The results also reveal notable lacks in students' current English proficiency. Although students perceive their overall ability as moderate, significant gaps are evident in writing skills, grammar, and vocabulary. These deficiencies suggest that existing English instruction has not fully met the academic and professional demands faced by the students.

In addition, the study identifies strong wants related to learning preferences and course expectations. Students express a preference for interactive, practical, and technology-supported learning activities, as well as ESP course content that reflects real-world professional situations. Environmental factors, such as classroom conditions and learning facilities, are generally perceived as supportive, although further improvement may enhance learning effectiveness.

Overall, the findings confirm the relevance of Hutchinson and Waters' needs analysis framework in identifying ESP needs beyond language education contexts. The results provide empirical support for the development of ESP-oriented English courses that are tailored to the specific academic and professional needs of Regional and City Planning students. Future research involving a larger number of participants and more varied data analysis techniques is recommended to strengthen the generalizability of the findings.

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REFERENCES

- Brown, J. D. (1995). *The elements of language curriculum: A systematic approach to program development*. Boston, MA: Heinle & Heinle.
- Bybee, R. W. (2013). *The case for STEM education: Challenges and opportunities*. Arlington, VA: NSTA Press.
- Dudley-Evans, T., & St. John, M. J. (1998). *Developments in English for specific purposes: A multi-disciplinary approach*. Cambridge: Cambridge University Press.
- Graves, K. (2000). *Designing language courses: A guide for teachers*. Boston, MA: Heinle & Heinle.
- Hutchinson, T., & Waters, A. (1987). *English for specific purposes: A learning-centred approach*. Cambridge: Cambridge University Press.
- Nation, I. S. P., & Macalister, J. (2010). *Language curriculum design*. New York, NY: Routledge.
- National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas*. Washington, DC: National Academies Press.
- Richards, J. C. (2001). *Curriculum development in language teaching*. Cambridge: Cambridge University Press.

UNESCO. (2017). Cracking the code: Girls' and women's education in science, technology, engineering and mathematics (STEM). Paris: UNESCO Publishing.