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**Test-Taking Strategies Used in the Reading  
Section of the Test of English for Thai Engineers  
and Technologists: A Computer-based ESP Test**

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**Thanaporn Waiprakhon**

School of Liberal Arts, King Mongkut's University  
of Technology Thonburi, Thailand

**Natjiree Jaturapitakkul**

School of Liberal Arts, King Mongkut's University  
of Technology Thonburi, Thailand

E-mail: natjiree.jat@kmutt.ac.th

**Abstract**

This study aims to investigate test takers' strategies for the reading section of the Test of English for Thai Engineers and Technologists, or TETET, which is an innovative computer-based English for Specific Purposes (ESP) proficiency test. Five fourth-year undergraduate students who obtained overall high scores, particularly in the reading section, were selected to participate in the study. A stimulated recall interview and the reading section of the TETET were used as the two main instruments. The strategy rubric by Cohen and Upton (2006) was adopted in order to analyse the data. The results revealed that test-management strategies were the most frequently used strategy type across all sub-sections of the TETET reading section, while test-wiseness strategies were the least frequently used strategy type. In addition,

there was concordance between the types of strategies used and the item types in the sub-sections. These results provide evidential base for the construct validity of the TETET reading section and can be used as insights for further test development and revision.

**Keywords:** computer-based testing, reading strategies, test-taking strategies, test-wiseness strategies

## **Introduction**

In a new trend of testing and as part of a prestigious science and technology university, the School of Liberal Arts, King Mongkut's University of Technology Thonburi (KMUTT) has launched a new version of its test called the "Test of English for Thai Engineers and Technologists", or "TETET". It is an innovative computer-based English for Specific Purposes (ESP) proficiency test designed to measure all four English skills needed by engineers and technologists in workplace environments in Thailand. It was developed to serve university students and people working or seeking work particularly in the engineering, science and technology fields. The TETET has been declared the KMUTT English test brand and has been claimed to serve as a workplace English test with its own identity, reflecting actual English language use.

The TETET was developed based on the results of a needs analysis from different groups of stakeholders, such as university administrators, human resource managers from leading companies in Thailand, experienced engineers, and engineering students. All needs were analysed and are reflected in the test's tasks, which cover the main work requirements for Thai engineers and technologists. The test content is engineering-oriented but is not biased towards any particular discipline. The test includes four language skills and is composed of 12 sections using the variety of test item types, which computer-based testing makes possible, for example, multiple choice, table filling (drag and drop information), matching, drag and drop objects, dictation, short answer, recording of steps (inputting numbers), gap-filling, sequencing, composition

and leaving a message (voice-recording). All test input is delivered via computer, and all the test takers' responses are recorded on a computer. It takes approximately 2 to 2.5 hours to complete the TETET.

In recent years, the TETET has been a primary choice as one of the English test alternatives for KMUTT undergraduate and graduate students, and in 2013, it was adopted by some national organizations in Thailand, including the Provincial Electricity Authority. The increasing numbers of TETET users and test administration have sparked a great effort by the test developing team to produce more item banks as well as continue the process of further proving the test's validity. Even though the TETET has been proven through multiple research studies to be a reliable and valid test (Watson Todd, 2007; Pathumthong & Jaturapitakkul, 2012), there remains a need for more investigation in relation to test development concerns.

The main concerns of the test development include not only the reliability of the test score but also the validity of the test results and their interpretation. According to Bachman (1990), construct validity has been recognized by the profession as important to the test scores' interpretation and is perceived as providing a fundamental view of validity. Based on Bachman and Palmer (1996), construct validity pertains to the extent to which we can interpret the test scores as an indicator of the test takers' ability or constructs we would like to measure. This concept is useful for the test developers or test users to be able to provide an adequate justification for any interpretation that is applied to a given test score. To justify a particular score interpretation, it is crucial to provide some evidence that is related to the construct we want to measure. Messick (1989, as cited in Bachman, 1990) asserted that most approaches to the construct validity of a test focused only on evidence from the products of the test taking process, which are the test scores, but little attention was paid to examining the processes of test taking themselves.

To fill this gap, investigating the test-taking processes (focusing on test-taking strategies) of the test takers could

potentially reveal evidence to support the construct validity of a test. Therefore, it is more interesting and potentially beneficial to investigate strategies that the test takers employ while taking the TETET, the computer-based test. However, the researcher decided to initially investigate test-taking strategy use only in the reading section of the TETET for three main reasons: its status as a core skill in education and work; a sufficient framework as a guideline for investigating test-taking strategies in reading; and the variety of innovative item types in the TETET, such as matching, drag and drop information and drag and drop objects. Those item types are interesting for their potential to reveal previously undiscovered test-taking strategies. It is hoped that the findings of this present study could contribute evidence supporting the construct validity of the TETET reading section and could be used as insights for further test development and revision. In addition, prospective test takers could benefit from these strategies in taking other tests as well.

### ***Test validation***

In examining the construct validity of the test, the test developers should engage in the process of construct validation by collecting several types of empirical evidence, such as the examination of patterns of correlations among item scores and test scores and between characteristics of items and tests and scores on items and tests, the analysis and modelling of the processes underlying the test performance, and studies of group differences; studies of changes over time or an investigation of the effects of experimental treatment (Messick, 1989, as cited in Bachman, 1990). Nevertheless, most approaches to construct validation have focused only on the products of the test taking process, which are the test scores, but little attention has been paid to investigating the processes of test taking themselves (Bachman, 1990). The importance of examining these processes has been noted by Messick (1989, as cited in Bachman, 1990) as follows:

“...in numerous applications of techniques for studying the process, it became clear that different individuals performed the

same task in different ways and that even the same individual might perform in a different manner across items or on different occasions...that is, individuals differ consistently in their *strategies* and *styles* of task performance (p. 269).

Consequently, there has been growing interest in the importance of gaining a better understanding of strategies used by respondents in the process of taking the test. Cohen (1998, as cited in Salehi, 2011) noted that test-taking strategies can be used for validation purposes, noting that “While there is nothing new in pointing out that certain instruments used in SLA research are lacking in validity, it is a relatively new undertaking to use data on test-taking strategies to validate such tests” (p. 92). To date, the research literature on test-taking strategies has entered into a number of topics related to the validation of the language assessment measures, and the assumption behind the more recent studies was that the test is a valid measure of the construct (Cohen, 2012b). Thus, test-taking strategies could provide evidence for a process of construct validation that, according to Bachman (1990), incorporates the evidential bases for validity, while construct validity is seen as a unifying concept. Investigating test-taking strategies could also provide insightful information about construct validity by reflecting upon what the test purports to measure and how the test takers actually take the test, for example, if a guessing strategy is used on inference items, this undermines the validity of the item because there is a mismatch between the intentions of the test makers and the test takers (Cohen, 1984, as cited in Salehi, 2011).

### ***Test-taking strategies***

Test-taking strategies are those test-taking processes that the test takers have selected and consciously operationalized, at least to some degree, to answer questions on a test. Many scholars, for example, Bachman (1990), Bachman and Palmer (1996), Oxford (1990), Cohen (1998), and Cohen and Upton (2006), have defined this term and classified it into different sub-categories.

Most relevant to the present study, Cohen and Upton (2006) set out to study verbal reports to determine whether the new TOEFL, which claims to evaluate academic reading ability, is actually measuring what it purports to measure. Rubrics for reading and test-taking strategies: test-management and test-wiseness were developed to code the verbal reports. The findings showed that as a whole the reading section of the new TOEFL did require test takers to use academic reading skills to gain both a local and a general understanding of the test passages. Moreover, the test takers were found to use an array of test-taking strategies, mostly test-management strategies rather than test-wiseness strategies. In addition, Cohen (2012a, p.97) recently suggested that strategies in taking language tests actually involve three strategy types:

- **Language learner strategies**—the ways that respondents operationalize the basic skills of listening, speaking, reading, and writing as well as the related skills of vocabulary learning, grammar, and translation. For example, with regard to reading skills associated with summarizing, strategies would include distinguishing key points from lesser ones as well as being able to reconceptualize or paraphrase material at a higher level of generality.

- **Test-management strategies**—strategies for responding meaningfully to the test items and tasks. Therefore, strategies in a reading test could address how respondents return to the question to obtain more information, how they compare multiple-choice options rigorously to determine the most plausible response, and how they crosscheck with the reading text to make sure their choice seems appropriate.

- **Test-wiseness strategies**—strategies for using knowledge of test formats and other peripheral information to answer test items without going through the expected linguistic and cognitive processes. Again, with regard to reading tests, this would mean using the process of elimination rather than choosing blindly (i.e.,

selecting an option without really understanding it at all but rather out of a vague sense that the other options are unlikely to be correct), using clues in other items to answer an item under consideration, and selecting an option because it appears to have a word or phrase from the passage in it—a possible key word.

With the evidence from Cohen and Upton (2006) and the suggestion from Cohen (2012a) above, it can be concluded that in responding to a reading item the respondents may be drawing from their repertoire of these three types of strategies: reading strategies, test-management strategies and test-wiseness strategies. Hence, the present study aims to investigate test takers' strategy use for the reading section of the TETET by adopting the strategy rubric of Cohen and Upton (2006) in order to analyse the data.

### **Previous studies on test-taking strategies**

In earlier studies, verbal reports were used in order to gain an understanding of the testing process, starting from simply describing and codifying the strategies that test takers use to respond to different item types and testing procedures to more sophisticated research efforts, such as identifying learners' use of test-taking strategies to validate test formats and specific tests, investigating how proficiency level and other learner characteristics relate to strategy use and test performance, and studying the impact of strategy instruction on learners' performance on standardized tests (Cohen, 2007). For example, Cohen (1984) reported on the examination of perceived strategies employed by language test takers and their reactions to different items and test types. Based on the verbal self-report data, it was found that students at different ability levels reported using different strategies. In addition to these differences in processing strategies, students had different reactions to different tests. The main conclusion of his study was that a closer fit should be achieved between how test constructors intend for their tests to be taken and how respondents actually take the tests. In another study, Storey (1997) attempted to uncover whether a protocol analysis could provide insights into the validity of a cloze test. The study revealed

the findings of the processes employed by subjects engaged in a cloze test. Think aloud protocols were obtained by test-takers reporting on the reasons for selecting items to complete gaps in a cloze passage and the strategies employed in doing so. This introspective validation procedure revealed the test-taking behaviour of subjects engaged in cloze tasks and provides a cognitive perspective on the vexing question of what “cloze” actually measures. Kashkouli, Barati, & Nejad Ansari (2015) also conducted a validation study to investigate test-taking strategies’ effect on adult EFL learners’ reading test performance. It was found that test-taking strategies affected the reading skills test performance of all groups of participants significantly, and it revealed that low-proficiency test takers used test-wiseness strategies significantly more frequently than other participants. In addition, Cohen and Upton (2006) investigated strategies used to respond to more traditional single-selection multiple-choice formats and the new selected-response ‘Reading to Learn’ items in the reading section of LanguEdge courseware. Verbal report data were collected from 32 students. The findings provided insights into the response behaviours prompted by the reading tasks on the new TOEFL. The study showed that working through the reading section of the LanguEdge test did not fully constitute an academic reading task for these respondents but rather a test-taking task with academic-like aspects to it. While the respondents were found to use an array of test-taking strategies, these were primarily test-management strategies. Last but not least, Salehi (2011) recently conducted a validation study on test-taking strategies to see whether there was concordance between the type of strategy and the item type in reading comprehension passages. It was found that, for the most part, the right strategies were used with the right item types. His conclusion drew upon the validity issue, stating that “The more frequently the proper strategies were used on the right types of item types, the more valid inferences were” (p.857).

All in all, most studies investigated test-taking strategy use in paper-based tests. However, in language testing today, there is a shift in assessment tools from paper-based testing to computer-



based testing (CBT). That could make the investigation of test-taking strategies for the computer-based approach become even more interesting.

### **Purpose of the Study**

The purpose of this study was to investigate test takers' strategy use in the reading section of the TETET in order to answer the research question: What test-taking strategies do undergraduate students use to complete the reading tasks in the Test of English for Thai Engineers and Technologists (TETET)?

### **Research Methodology**

#### ***Participants***

Since this study aims to examine the test taking strategies used, particularly the most effective ones, in the reading section of the TETET, a decision was made to use a qualitative method by recruiting a small number of participants in order to gain insightful data.

Five fourth-year undergraduate students, between the ages of 21 to 22 years old, were purposively selected to participate in the study. The students chosen included four males and one female. All participants were Thais whose English is a second (foreign) language. The participants studied in a regular programme in which Thai is mainly used as a medium of instruction, and they came from four different departments: Electronic and Telecommunication Engineering, Applied Computer Science, Environmental Engineering, and Control System and Instrumentation Engineering at King Mongkut's University of Technology Thonburi. The participants had taken the TETET once in October of the 2015 academic year, and they had earned overall high scores, particularly in the reading section. It is believed that those who obtained high scores seemed to use strategies that are more effective and are considered informative (Cohen & Upton, 2006). In making use of the two types of scores, which were used as the proficiency indicator, the researchers first noted the overall high scores and then focused on the high scores in the reading section

since it appeared that the test takers who obtained overall high scores may not have received high scores in the reading section. The participants who were considered to have high language proficiency, therefore, were selected based on the top 10 scores both overall and for the reading section. All of the participants were asked to take the reading section of the TETET again and then stay for a stimulated recall interview in order to determine their strategy use when taking the TETET reading section. All the participants had no objection since they were informed about the research objectives, the significance of the study and their contribution to the university, which could help improve the test quality. In addition, the date for the data collection was negotiated based on the participants' availability.

### ***Research instruments***

In this study, there were two main research instruments that were used to answer the research question: the reading section of the TETET and stimulated recall interviews.

#### ***- TETET Reading Section***

In the reading section of the TETET, there are four sub-sections: Survival Reading, Internet Reading, Technical Manuals and Email Reading. This section is designed to evaluate reading ability, and it is expected that the test takers will use reading strategies in responding to all items. It takes approximately 40 minutes to finish all of the sub-sections in the reading section. To prove the reliability of the TETET, Cronbach's alphas for the whole test and the reading section alone were 0.928 and 0.848, respectively. This implies that the TETET's reliability is high. The table below shows the details of all the sub-sections in the reading section.

**Table 1:** Details of all the sub-sections in the TETET reading section

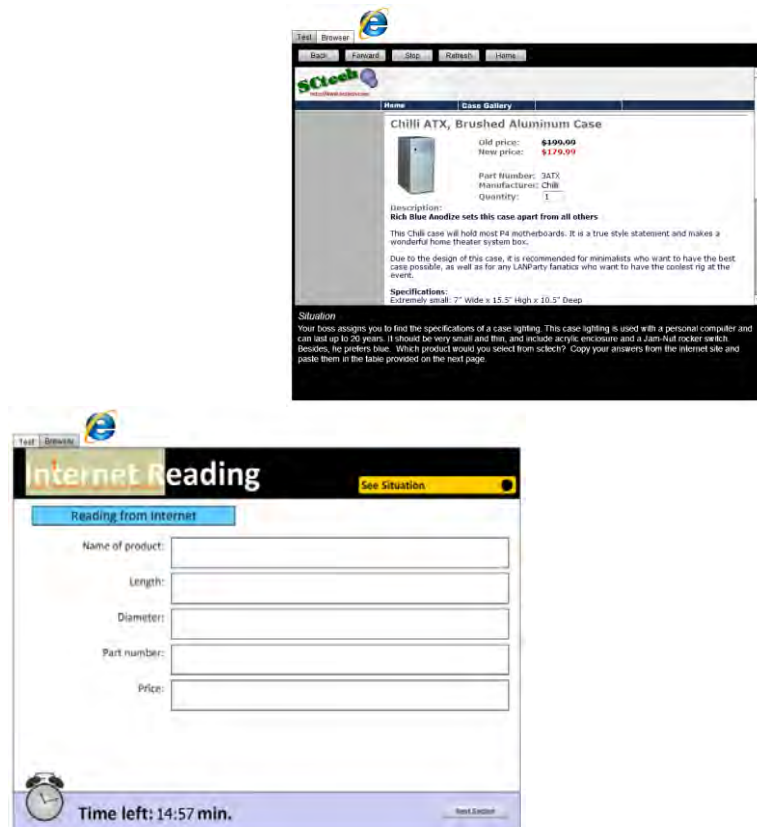
<b>TETET Reading Section</b>	<b>Item type</b>	<b>No. of items</b>	<b>Time</b>
1. Survival Reading	Multiple choice	5	3 minutes
2. Internet Reading	Table-filling (Drag and drop information)	10	15 minutes
3. Technical Manuals	Matching/ Drag and drop objects	10	15 minutes
4. Email Reading	Multiple choice	5	10 minutes

The details of each sub-section in the TETET reading section are as follows. The first sub-section is the **Survival Reading** part. Its objective is to measure basic reading abilities. The test takers need to read through drop-down information such as a company telephone directory and respond within three minutes according to the five multiple-choice questions or situations given (namely, which telephone number would you call if you want to collect some money from the company?) (see **Figure 1**).

**Figure 1:** Screenshot of Survival Reading sub-section

The next sub-section is **Internet Reading**. It aims to measure reading comprehension and evaluation. This section is in the form of drag-and-drop texts. There are two situations in this section. Each requires test takers to go through information in an off-line webpage provided and select (copy) only key texts to put (paste) in a table on a test page. For example, the test takers need to find the

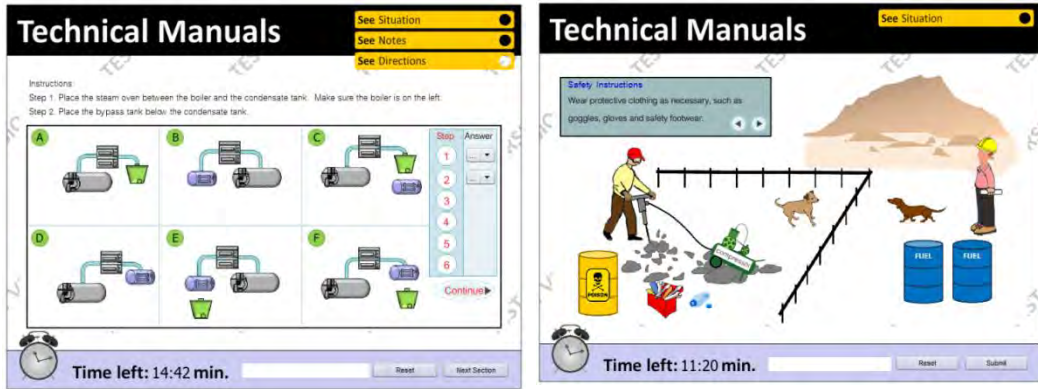
right case lighting using some details regarding its specification in relation to conditions/situations indicated on a test page. The test takers can move between the test page and the webpage by clicking on “Test” or “Browser”. This part takes approximately 15 minutes to complete (see **Figure 2**).



**Figure 2:** Screenshot of Internet Reading sub-section

The third sub-section is **Technical Manuals**. This section is aimed at measuring the ability to read instructions. It consists of two situations. The first situation requires the test takers to follow instructions and set up a device or some kind of equipment. The test takers need to match the pictures with the step-by-step instructions given by clicking on the answer and selecting the letter (A to F) that represents each instruction. For the second situation, the test takers have to read and follow workplace safety regulations. The test takers need to read each regulation and move an object

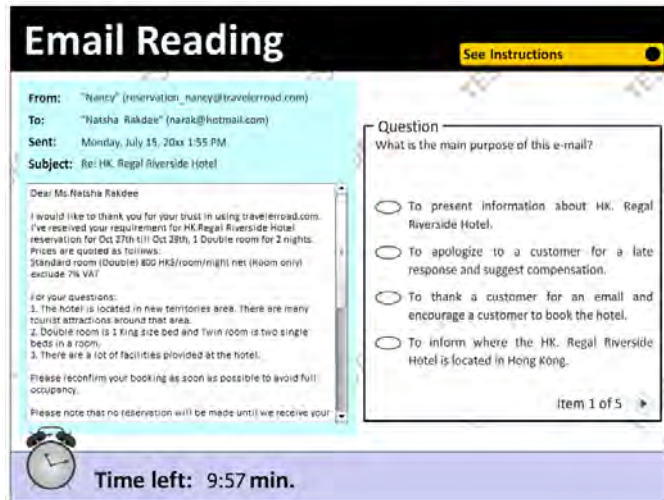
that is against the regulation to its proper place. It takes 15 minutes to complete these two situations on technical manuals (see **Figure**



3).

**Figure 3:** Screenshot of Technical Manuals sub-section

In the last part of the reading section, **Email Reading** measures the ability to read for communication. It requires the test takers to read the email provided and answer five multiple-choice questions. Questions are asked about the main idea, details and inferences. It takes approximately 10 minutes to complete this part (see **Figure 4**).



**Figure 4:** Screenshot of Email Reading sub-section

### ***Stimulated Recall Interview***

Verbal protocol is an instrument that can reveal insightful information from the test takers. In addition, verbal protocol can take the form of some sort of retrospective introspection, for example, a stimulated recall (Swain, 2006). Therefore, a stimulated recall was used to gain insights about the test taking strategies. In the present study, the stimulated recall interview was conducted in Thai with the participants after they had completed the TETET reading section in order to avoid misunderstandings and to obtain the best picture of what the test takers did as they took the reading test. Screen recorder software was used to record all on-screen actions. Then, the screen record videos were shown to the participants as a prompt while they were asked to report on their answers. The interview questions focused on how the participants got the answers, for example, “Why did you choose this answer?”, “What are your reasons for selecting the option that you considered to be the correct or best answer and for eliminating the other options?”, or “What did you do before arriving at this answer?”. It took approximately 40 to 90 minutes for each participant to complete the stimulated recall interview. The interview was also recorded on an audio-recorder. Then, the data from the interview was transcribed and categorized based on the strategy rubric by Cohen and Upton (2006). The following are extracts to illustrate how the data were categorized into test- management (T), reading (R) and test-wisness (TW) strategies, respectively. Original extracts with their translations are presented below.

#### *Extract 1 (Student 3)*

“ตรงนี้ก็กำลังหา front USB อยู่ครับว่ามีไหม คือผมจะอ่านจากตัว specification ก่อน คือตัวแรกไม่ได้บอกเป็น Front บอกแค่ว่ามี USB ก็เลยยังไม่ซัวร์ ก็เลยไปดูอีกอันหนึ่งด้วย ซึ่งทั้งสองตัวมันก็ไม่มีความเหมือนกัน”

“Right here, I was looking for the one with front USB. I mean I started by reading the given specification first. The first one

(option) didn't talk about front (USB). It only said that there was USB, so I was not sure. Then, I went on to another one (option)."

(Strategy Code: T16; Considers the options and postpones consideration of the option.)

*Extract 2 (Student 5)*

“เค้าจะมี situation มาให้ สิ่งที่เราต้อง...ผมก็ skim เลยครับ แต่ที่  
นี้เรา skim ว่าสิ่งที่เค้าต้องการเนี่ย เค้าต้องการอะไร เค้าต้องการ  
ให้เราทำอะไร เช่นอันดับแรกเลยก็คือ case lighting ...”

“there was a given situation. The thing we must...I skimmed.  
When we skim, we skim for what it (the instruction) needed or  
what it wanted us to look for. At first, it was the case lighting....”

(Strategy Code: R7; Reads a portion of the passage rapidly, looking for specific information.)

*Extract 3 (Student 1)*

“...เพราะเราก็ไม่ชัวร์เหมือนกัน เลือกตอบอะไรที่มันมีในนี้ดีกว่า ก็เลย  
เลือกตอบหัวหิน”

“...because I was not sure. It's better to answer using language  
from the passage, so I chose to answer Huahin.”

(Strategy Code: TW3; Selects the option because it appears to have a word or phrase from the passage in it, possibly a key word.)

***Research procedures***

The study was divided into three stages: research instrument preparation, recruitment of participants and data collection.

**Stage 1: Research Instrument Preparation**

In terms of research instrument preparation, the questions for the stimulated recall interview were prepared and, to support validity of research tool, a pilot session was conducted to test the interview questions and technical support with one fourth-year

undergraduate student majoring in mechanical engineering, and he was not a participant in the main study.

### **Stage 2: Recruitment of Participants**

Regarding the recruitment of participants, five out of 70 students who took the TETET in October of the first semester of the 2015 academic year were invited to participate in the study. All of the participants were selected based on their overall high scores and high scores in the TETET reading section. None of the participants knew that they would eventually retake the test, so this should have avoided the issue of test memorization. The researcher then made an appointment with each participant to retake the same reading section of the TETET in December 2015, which is considered an adequate time break (more than 45 days) when repeating a test, as suggested by Pearson Education (2017). It was a challenge to schedule all of the selected test takers to retake the test and have their interview at the same time, so the researchers decided to make an appointment with the participants on different dates and at times, and four different days in December 2015 were used to schedule all of the participants to retake the test and participate in the interview.

### **Stage 3: Data Collection**

A 10- minute orientation was conducted with each participant to inform them of the purpose of the study and to instruct them about how to give verbal reports. After the orientation, the participants were asked to retake only the same TETET reading section. The researchers also asked the test takers to stay for the stimulated recall interview right after the completion of the reading test. This was because the participants' memory of the test would still be fresh, and they would better recall what they had done during the test. Screen recorder software was used during the test to record all on-screen actions. After that, the stimulated recall interview was conducted immediately after the participants finished the test with prompting from the screen record videos. In addition, the interview was audio-recorded.



### **Data analysis**

The data was benefited by the fact that the stimulated recall interview was first transcribed and then grouped into three strategy categories (reading strategies as language learner strategies, test-management strategies, and test-wiseness strategies) by using the strategy coding rubric developed by Cohen and Upton (2006). Additional strategies were also included. The additional strategies were the strategies that the test takers reported when they took the TETET reading section but were not in Cohen and Upton's strategy coding rubric (2006). Moreover, the number of occurrences of each strategy were counted and calculated for percentages. The analysed data yielded high levels of inter-coder reliability. Most of the results were agreed upon while a small number were reanalysed due to the misinterpretation of the data. Thus, all the results were agreed upon and are presented in the next section.

### **Results of the Study**

This section presents the results of the study in order to answer the research question; what test-taking strategies do undergraduate students use to complete the reading tasks in the Test of English for Thai Engineers and Technologists (TETET)? It is important to note that the data and the way in which the data were collected are considered qualitative-oriented. However, the presentation of the results is quantitative in nature. The results are sequenced from the most- to least-frequently used strategy.

**Table 2:** Strategy use across all sub-sections in the TETET reading section

<b>Type of strategy</b>	<b>Number of occurrences of strategy use</b>	<b>Percentage of strategy use</b>
Test-management strategies	276	65.87
Reading strategies	95	22.67
Additional strategies	38	9.07
Test-wiseness strategies	10	2.39
<b>Total</b>	419	100.00

N = 5

Table 2 presents the strategy use across all four subsections in the TETET reading section. It shows that the strategy type most frequently used for all sections is test-management strategies, followed by reading strategies, and additional strategies. It should be noted that the additional strategies were not in Cohen and Upton's strategy coding rubric (2006) and were later re-categorized by the researchers under three strategy types. It was found that 34 instances of additional strategies fell into the test-management category, and four instances fell into the test-wiseness category. The least frequently used strategy type is test-wiseness strategies.

**Table 3:** Strategy use in the 'Survival Reading' section

<b>Strategy code</b>	<b>Strategy description</b>	<b>No. of occurrences of strategy use</b>	<b>Percentage of strategy use</b>
T21	Selects options through background knowledge.	21	28.77
T5	Reads the question and then reads the passage/ portion to look for clues to the answer either before or while considering the options.	11	15.07
T27	Discards option(s) based on background knowledge.	9	12.33
T3	Goes back to the question for clarification: Wrestles with the question intent.	5	6.85
T12	Considers the options and selects preliminary option(s) (a lack of certainty is indicated).	4	5.48
T6	Predicts or produces own answer after reading the portion of the text referred to by the question.	3	4.11
T9	Considers the options and identifies an option with an unknown vocabulary.	3	4.11
T16	Considers the options and postpones consideration of the option.	2	2.74
T19	Reconsiders or double-checks the response.	2	2.74
T23	Selects options through the elimination of other option(s) as unreasonable based on background knowledge.	2	2.74
R5	Reads the whole passage rapidly.	1	1.37

<b>Strategy code</b>	<b>Strategy description</b>	<b>No. of occurrences of strategy use</b>	<b>Percentage of strategy use</b>
R7	Reads a portion of the passage rapidly looking for specific information.	1	1.37
R10	Identifies an unknown word or phrase.	1	1.37
T4	Reads the question and considers the options before going back to the passage/portion.	1	1.37
T22	Selects options based on vocabulary, sentence, paragraph, or passage overall meaning.	1	1.37
TW1	Uses the process of elimination (i.e., selecting an option, even though it is not understood, out of a vague sense that the other options could not be correct).	1	1.37
<p style="text-align: center;"><b>Additional strategies</b> (Not in Cohen and Upton's strategy coding rubric (2006))  <b>Test-management strategies:</b>  Manages time before doing the section of the test. (1)  Skips item. (1)  <b>Test-wiseness strategies:</b>  Discards option(s) since it was already chosen in previous item(s). (3)</p>		5	6.85
<b>Total</b>		<b>73</b>	<b>100.00</b>

Note: R = Reading strategy; T = Test-management strategy; TW = Test-wiseness strategy

Table 3 shows that *selecting options through background knowledge* (T21) is the most frequently used strategy in responding to the items in the Survival Reading section. Other test-management strategies such as *reading the question and then reading the passage/portion to look for clues to the answer, either before or while considering options* (T5), and *discarding option(s) based on background knowledge* (T27) are also often employed by the test takers. Moreover, they often have to *wrestle with the question intent* (T3).

**Table 4:** Strategy use in the 'Internet Reading' section

<b>Strategy code</b>	<b>Strategy description</b>	<b>No. of occurrences of strategy use</b>	<b>Percentage of strategy use</b>
T22	Selects options based on vocabulary, sentence, paragraph, or passage overall meaning.	17	18.28
T28	Discards option(s) based on vocabulary, sentence, paragraph, or passage overall meaning as well as the discourse structure.	11	11.83
T1	Goes back to the question for clarification: Rereads the question.	10	10.75
R19	Identifies and learns the key words of the passage.	10	10.75
R7	Reads a portion of the passage rapidly looking for specific information.	9	9.68
T16	Considers the options and postpones consideration of the option.	9	9.68
T19	Reconsiders or double-checks the response.	6	6.45
T12	Considers the options and selects preliminary option(s) (a lack of certainty is indicated).	5	5.38
T18	Makes an educated guess (e.g., using background knowledge or extra-textual knowledge).	4	4.30
R10	Identifies an unknown word or phrase.	2	2.15
R24	Uses other parts of the passage to help in understanding a given portion: Reads ahead to look for information that will help in understanding what has already been read.	1	1.08
R25	Uses other parts of the passage to help in understanding a given portion: Goes back to the passage to review/understand information that may be important to the remaining passage.	1	1.08
T2	Goes back to the question for clarification: Paraphrases (or confirms) the question or task.	2	2.15
T3	Goes back to the question for clarification: Wrestles with the question intent.	1	1.08
T21	Selects options through background knowledge.	1	1.08
T24	Selects options by eliminating other option(s) as unreasonable based on paragraph/overall passage meaning.	1	1.08

<b>Strategy code</b>	<b>Strategy description</b>	<b>No. of occurrences of strategy use</b>	<b>Percentage of strategy use</b>
TW3	Selects the option because it appears to have a word or phrase from the passage in it, possibly a key word.	1	1.08
	<b>Additional strategies</b> (Not in Cohen and Upton's strategy coding rubric (2006) <b>Test-management strategies:</b> Manages time before doing the section of the test. (1) Skips item. (1)	2	2.15
	<b>Total</b>	<b>93</b>	<b>100.00</b>

Note: R = Reading strategy; T = Test-management strategy; TW = Test-wisness strategy

Table 4 illustrates that the test takers mostly employ the following strategies: *selecting option(s)* (T22) and *discarding option(s)* (T28) based on vocabulary, sentence, paragraph, or passage overall meaning in answering the items of the Internet Reading section. The reading strategies such as *identifying and learning the key words of the passage* (R19) and *reading a portion of the passage rapidly looking for specific information* (R7) also occur often in this test section.

**Table 5:** Strategy use in the 'Technical Manuals' section

<b>Strategy code</b>	<b>Strategy description</b>	<b>No. of occurrences of strategy use</b>	<b>Percentage of strategy use</b>
R9	Repeats, paraphrases, or translates words, phrases, or sentences – or summarizes paragraph/passage – to aid or improve understanding.	53	32.92
T22	Selects options based on vocabulary, sentence, paragraph, or passage overall meaning.	33	20.50
T12	Considers the options and selects preliminary option(s) (a lack of certainty is indicated).	11	6.83
T28	Discards option(s) based on vocabulary, sentence, paragraph, or passage overall meaning as well as the discourse structure.	11	6.83

<b>Strategy code</b>	<b>Strategy description</b>	<b>No. of occurrences of strategy use</b>	<b>Percentage of strategy use</b>
T24	Selects options through the elimination of other option(s) as unreasonable based on paragraph/overall passage meaning.	9	5.59
T19	Reconsiders or double-checks the response.	8	4.97
R10	Identifies an unknown word or phrase.	3	1.86
T21	Selects options based on background knowledge.	2	1.24
TW1	Uses the process of elimination (i.e., selecting an option, even though it is not understood, out of a vague sense that the other options could not be correct).	2	1.24
TW2	Uses clues in other items to answer an item under consideration.	2	1.24
T25	Selects options through the elimination of other option(s) as similar or overlapping and not as comprehensive.	1	0.62
<p style="text-align: center;"><b>Additional strategies</b> (Not in Cohen and Upton's strategy coding rubric (2006))</p> <p><b>Test-management strategies:</b> Selects any option(s) since they are not relevant to question/statements or text. (8) Goes back to the prereading/note. (7) Skips item. (7) Manages time before doing the section of the test. (2) Considers more than one item at the same time. (1)</p> <p><b>Test-wisness strategies:</b> Discards option(s) since they were already chosen in previous item(s). (1)</p>		26	16.15
<b>Total</b>		<b>161</b>	<b>100.00</b>

Note: R = Reading strategy; T = Test-management strategy; TW = Test-wisness strategy

Table 5 above shows that *repeating, paraphrasing, or translating words, phrases, or sentences, or summarizing paragraph/ passage to aid or improve understanding* (R9) is a prominent strategy that is most often used by the test takers in responding to the items in the Technical Manuals section. *Selecting options based on vocabulary, sentence, paragraph, or passage overall meaning* (T22) is ranked as the second most-often used strategy. In addition, *considering the options and selecting*

*preliminary option(s) (lack of certainty indicated) (T12) together with discarding option(s) based on vocabulary, sentence, paragraph, or passage overall meaning as well as the discourse structure (T28) are also often employed by the test takers.*

**Table 6:** Strategy use in the 'Email Reading' section

<b>Strategy code</b>	<b>Strategy description</b>	<b>No. of occurrences of strategy use</b>	<b>Percentage of strategy use</b>
T22	Selects options based on vocabulary, sentence, paragraph, or passage overall meaning.	13	14.13
T5	Reads the question and then reads the passage/portion to look for clues to the answer, either before or while considering options.	10	10.87
T4	Reads the question and considers the options before going back to the passage/portion.	9	9.78
T16	Considers the options and postpones consideration of the option.	8	8.70
T28	Discards option(s) based on vocabulary, sentence, paragraph, or passage overall meaning as well as the discourse structure.	8	8.70
T24	Selects options by eliminating other option(s) as unreasonable based on paragraph/overall passage meaning.	7	7.61
R7	Reads a portion of the passage rapidly looking for specific information.	5	5.43
T19	Reconsiders or double-checks the response.	4	4.35
R6	Reads a portion of the passage carefully.	3	3.26
T12	Considers the options and selects preliminary option(s) (a lack of certainty is indicated).	3	3.26
T17	Considers the options and wrestles with the option meaning.	3	3.26
T18	Makes an educated guess (e.g., using background knowledge or extra-textual knowledge).	3	3.26
R12	During reading, rereads to clarify the idea.	2	2.17
TW1	Uses the process of elimination (i.e., selecting an option, even though it is not understood, out of a vague sense that the other options could not be correct).	2	2.17

<b>Strategy code</b>	<b>Strategy description</b>	<b>No. of occurrences of strategy use</b>	<b>Percentage of strategy use</b>
TW3	Selects the option because it appears to have a word or phrase from the passage in it, possibly a key word.	2	2.17
R5	Reads the whole passage rapidly.	1	1.09
R17	Confirms final understanding of the passage based on the content and/or the discourse structure.	1	1.09
R19	Identifies and learns the key words of the passage.	1	1.09
T6	Predicts or produces own answer after reading the portion of the text referred to by the question	1	1.09
T11	Considers the options and focuses on a familiar option.	1	1.09
<b>Additional strategies</b> (Not in Cohen and Upton's strategy coding rubric (2006)) <b>Test-management strategies:</b> Skips item. (2) Considers the option(s) and skips the lengthy ones first. (1) Reads the instructions of all items in the section. (1) Jumps to consider options without reading a question and checks options with the passage/portion. (1)		5	5.43
<b>Total</b>		<b>92</b>	<b>100.00</b>

*Note: R = Reading strategy; T = Test-management strategy; TW = Test-wiseness strategy*

As displayed in Table 6 above, *selecting options based on vocabulary, sentence, paragraph, or passage overall meaning (T22)* is ranked as the most frequently used strategy in the Email Reading section and is followed by the strategy *reading the question and then reading the passage/portion to look for clues to the answer, either before or while considering options (T5)*. *Reading the question and considering the options before going back to the passage/portion (T4)* is ranked as the third most-frequently used strategy. Furthermore, *considering the options and postponing consideration of the option (T16)* along with *discarding option(s) based on vocabulary, sentence, paragraph, or passage overall meaning as well as the discourse structure (T28)* also occur often in this section.



## Discussion and Implications

The discussion and implications gained from the results of the present study include three main points as follows:

First, it was found that test-management strategies appeared as the strategy type most frequently used for most sub-sections of the TETET reading section, and there was a concordance between this type of strategy and the item types and tasks in the reading comprehension passages that demonstrate the construct validity of the TETET reading section. For example, when the test takers tried to determine the right answers to complete the TETET reading section, they used test-management strategies to respond meaningfully to test items and tasks. These were supported by Cohen (2012b) in that the processes were consciously selected to assist in producing a correct answer responsibly.

To elaborate upon how the types of strategies used in the TETET reading section were concordant with the item types, some of the following examples were provided. First, in the **Survival Reading** section, the test takers were required to select a telephone number of a particular department based on a given situation. As the item type in this section was multiple-choice, the test takers had to *select options based on background knowledge* (T21). The use of this type of strategy on the multiple-choice items was justifiable because the test takers needed to use clues or keywords in the test as well as their background knowledge of departments in a company in order to select the right answers from the alternatives.

The second example was from the **Internet Reading** section. This section was intended to measure test takers' reading comprehension and evaluation. The items in this section were of the supply type, and the test takers were expected to pick some specific information from the reading texts in order to supply the answers in the tables. To do so, the test takers first needed to refer to the situation, questions and keywords; discard irrelevant information; and then select the proper information based on the vocabulary, paragraph or the overall meaning of the texts. Thus, the reported use of *discarding irrelevant information* (T28) and *selecting proper*

*information through inference* (T22) were concordant with these supply-type items.

The next example was from the **Technical Manuals** section. The item types in this section were matching and drag-and-drop object types. These two item types had the same goal of measuring the test takers' ability to read instructions. For matching items, the test takers had to first understand an instruction and a picture before finally matching them. Similarly, for drag-and-drop object items, the test takers were expected to understand an instruction before they could move the proper item. Thus, the reported use of *translating and summarizing to aid the understanding of instruction* (R9) and then *selecting a match or moving an item based on the inference of instruction overall meaning* (T22) was applicable to these item types.

The last example was from the **Email Reading** section. This was intended to measure the test takers' ability to read for communication. It required the test takers to read the email provided and answer multiple-choice questions. As the item type in this section was multiple-choice, the test takers had to *select options based on vocabulary, sentence, paragraph, or passage overall meaning* (T22). The use of this strategy on this item type was concordant because the test takers had to use the keywords or clues in the test as well as their understanding of and inferences from vocabulary, sentence, paragraph, or passage overall meaning in order to select the right answer from among the alternatives.

All in all, it was obvious that the test takers tried to get the right answers through the use of appropriate strategies. The concordance between the types of strategies and the item types in the TETET reading section could be crucial information concerning construct validity for computer-based ESP test developers when designing and developing a test. As Cohen (1984) mentioned, "A closer fit should be obtained between how the test constructors intend for their tests to be taken and how test takers actually take them" (p. 70). The consequential implication of this is that when the test developers construct each test question there should be careful concern about what the test purports to measure and how

the test takers are supposed to accomplish it. This can be implemented by the use of a table of test specifications where a key purpose, a strategy use, and an item type of each test item are summarized and reflected upon based on the intended construct. By doing so, this can help increase the quality of the test construction, including the construct validity of the test, as suggested by DiDonato-Barnes, Fives, & Krause (2014).

Second, in this present study, it has been indicated that the most frequently used strategies were test-management strategies and reading strategies, respectively. Hence, by looking at how the proficient test takers approached computer-based testing such as the TETET reading section, this could serve as a message to those involved in test preparation to implement strategy training in order to enhance test takers' performance. The training should put more emphasis on commonly used test-management and reading strategies, such as *selecting options based on background knowledge; selecting options based on vocabulary, sentence, paragraph, or passage overall meaning; repeating, paraphrasing, or translating words, phrases, or sentences; or summarizing paragraph/ passages to aid or improve understanding, and identifying and learning the key words of the passage*. In addition, among the three types of strategies, the use of test-management strategies and reading strategies by test takers should be encouraged when responding to the TETET reading section, rather than test-wiseness strategies, since Cohen (2012b) suggested that test-management and reading strategies contribute to construct-relevant variance, while the use of test-wiseness strategies suggests that the test takers are answering items without real competence in the targeted language skill.

Third, it was found that test-wiseness strategies were not frequently used by the test takers in the present study. In fact, the limited use of test-wiseness strategies could have a positive effect on construct validity because, according to Cohen (2012b), test-wiseness strategies would be represented as construct-irrelevant strategies since they assist the test takers in answering test items without engaging their language knowledge and performance

ability. In other words, when the test takers use test-wiseness strategies, the constructs that the test intends to measure are not elicited, which thus jeopardizes the construct validity of a test. This was also in line with Allan's assertion (1992, as cited in D'Este, 2012). Allan noted that test-wiseness is an important source of test construct invalidity since it may subvert the purpose of a test, and it also highlights students' ability to answer correctly by exploiting weaknesses in the test design. Therefore, the less often test takers use test-wiseness strategies the higher construct validity a test has.

### ***Limitations of the Study***

Since the study data were collected using a qualitative method, with a limited number of participants, the results may not be generalizable. In addition, the way the data were analysed using the strategy coding rubric developed by Cohen and Upton (2006) is considered a quantitative oriented, which helps make the data presentation easier to understand and more straightforward. However, some excerpts might be uncounted or unclassified, which might result in some test taking strategies not being included. Furthermore, the data were predominantly obtained from male students. The results might be influenced by the strategy use of males rather than females. Last but not least, the TETET, one of the key research instruments, was a computer-based reading test designed to measure test takers' workplace English ability. The revealed test taking strategies might not be applicable to other computer-based academic tests.

### ***Recommendation for Future Research Studies***

It is suggested that more research studies need to be conducted to investigate test-taking strategy use in the TETET with more participants. A new instrument such as the think aloud protocol is also suggested to obtain more fruitful data. Furthermore, new target groups such as graduate students could be included as an alternative, and the strategy uses of graduate students could be compared with those of undergraduates. In addition, test-taking strategy use in other sections of the TETET, such as the writing

section, can also be investigated. Moreover, the results from this study can be compared with the results of studies of other computer-based reading tests to see if there are any similarities or differences. Such studies could provide additional useful information about test-taking strategy use, especially in computer-based testing.

### **The Authors**

Thanaporn Waiprakhon is a graduate student in Applied Linguistics (English Language Teaching) at King Mongkut's University of Technology Thonburi (KMUTT). She is currently working as an English teacher at Ban Tasoh School, an opportunity expansion school in Surin province. Her interests include the study of English assessment and evaluation, autonomous learning and second language acquisition.

Natjiree Jaturapitakkul, Ph.D., is an assistant professor at the School of Liberal Arts, King Mongkut's University of Technology Thonburi (KMUTT), Thailand. She is currently in charge of English language testing for the university. Her research interests include English language teaching, language assessment and evaluation, test development, and ESP testing.

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