# Srinakharinwirot Scholastic Aptitude Tests Score : SWU-SAT54 of Undergraduate Students

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## Abstract

This study aimed to examine relationships between Srinakharinwirot University Scholastic Aptitude Tests 54 (SWU-SAT54) score which used to select students to study in the university, and compare the aptitude scores between male and female students. The tests were separated to two programs, Scienctific-related and Artistic-related program. There were four qualified subtests for each program which composed of Verbal , Numerical, Reasoning, and Spatial aptitude test. Each test was of 30 multiple – choice item with five alternatives and analyzed by item response theory method . The sample consisted of 1,794 first – year undergraduate students in academic year 2011 from the faculty of Engineer, Health Science, Nurse, Physical Education, and Fine Arts in Srinakharinwirot University. The result found that the Numerical test is the highest difficulty, Reasoning test is moderate, and Spatial test is easy. The coefficient of variation of Numerical test is the highest both of programs and the lowest is Verbal test of Scientific-related program and Spatial test of Artistic-related program. The correlation between subtests were positively significant at the level of 0.01. Furthermore, the average of the aptitude test score between male and female student is significantly different in Verbal, Numerical and Spatial I test and no different in Reasoning and spatial II test.

**Keyword :** Aptitude Test, Scholastic Aptitude Test

## Background

Scholastic aptitude test is a tool for measuring one's brain ability, in regards with accumulation of knowledge both in classroom and daily routine. It is useful as a guide line for a person to choose for the right field of study, in order to be successful in the life. Many theories concerning proficiency and intelligence have been raised. Anyhow,Thurstone's theory is one who considered on 7 major influences for human's ability: numbers, reasoning, language,spatial, recognition, proficiency of word use, and memory. The theory has been widely referred in researches relating with scholastic aptitude test. In Thailand, related researches have been conducted from 1968 – 2008 in many contexts. The studies have been involved with formation and development of Scholastic aptitude test, and the study of relationship between score and test of primary to university students. In higher education, several studies have been contributed to scholastic aptitude: the study of the relationship of test score as a determination to education success [e.g. study from Charkpet Petsuk. (1973). Somsak Lila (1979), Suwaporn Semheng. (1979), Kukiat Aeocharoen. (1985), Janvit Krongton. (1993), Titirut Thannawat. (1999), Buarew Kaewmuang. (2000), Udomsak Naruang. (2001). Prapa Sawangjit.(2007). Those mentioned researchers had studied the relationship between scholastic aptitude and education achievement. They have found that such variables as verbal, numerical, reasoning and spatial are significant to education accomplishment. Moreover Latcha Chunwijitra (2002) has studied and concluded that the score of scholastic aptitude test of verbal, numerical, and analytical thinking also have the contribution to the score of main subjects in university admission examination.

Hence, the direct admission examination of Srinakharinwirot University has been using this type of examination for a long period of time. Educational and Psychological Test Bureau of Srinakharinwirot University, which has the major role in creating and developing educational measurement instruments, has formally invented the scholastic aptitude test called 'SWUSAT' since 2008-2011. With Thurstone's concept created the test in the sections of verbal , numerical , reasoning and spatial. For direct admission test from the university, students have to take exams of many subjects. However, time becomes a limitation as all 4 factors of Thurstone cannot be tested in all applied subjects. Therefore, the researcher is interested to study on the score of SWUSAT; how the four influences are related to each other. The result from this study will be subsequently used to manage the admission examination of the university. In addition, the research is also aimed to study whether male and female college students will score the aptitude test differently.

## Research Purpose

- To study the relationship between SWUSAT54 test scores used for selecting students in academic year 2011
- To compare the score of SWUSAT54 test between male and female, 1st year undergraduate students of Srinakharinwirot University

## Research Methodology

The group of samples in this research topic were 1st year bachelor degree students, who currently studying 1st semester, academic year 2011 at Srinakharinwirot University. Representative groups were students from Faculty of engineering, Faculty of health science, Faculty of physical education, Faculty of fine arts and College of social communication innovation. Total number of participants is 1,794 persons.

The tools applied for the research comprised of 10 versions of SWUSAT54 aptitude test. All issues are used for entrance examination, both for artistic-related and scientific-related faculties. Each version contains 30 questions; each question has 5 alternative answers. Students were allowed for 15 – 40 minutes to complete the tests. The confidence level is ranged from 0.47 – 0.93. Set 1 and 2 are assigned for students who wanted to apply for scientific-related faculties. Each of them composed of questions in verbal, numerical, reasoning and spatial. Apart from spatial, other parts of exam are the same for both versions. For set 3 and 4 are for artistic-related faculties, the tests are common to ones of scientific faculties.

To perform the examination, the sample group will receive one set of exam per person. The examination procedure will be the same for every participant. The test score will be used to analyze for statistics as: Mean, Standard deviation, Coefficient variation, Correlation and Multivariate Analysis of Variance (MANOVA).

## Result

The researcher analyzed for correlation between the score from each version of SWUSAT54. The analysis has been discovered as displayed in Table 1, refers to all versions of SWUSAT54 each of them had 4 sets, which had positive relationship among each other with statistical significance at level of 0.01. Considering the level of relationship, the correlation of aptitude test score in numerical and reasoning had the highest correlation; however, verbal and spatial had the lowest correlation.

**Table 1** Intercorrelation between subtests in each set of SWUSAT54

| Test | SWUSAT54-1 | SWUSAT54-2 | SWUSAT54-3 | SWUSAT54-4 |
|---|---|---|---|---|
| **V and N** | .335** | .396** | .285** | .297** |
| **V and R** | .272** | .377** | .272** | .310** |
| **V and S** | .199** | .176** | .180** | .109** |
| **N and R** | .413** | .573** | .595** | .592** |
| **N and S** | .311** | .316** | .245** | .276** |
| **R and S** | .489** | .440** | .307** | .363** |

For the comparison of 1st year, male and female students' aptitude test score; following conditions have been checked prior to analysis of MANOVA: 1) Box's test 2) Bartlet's test Sphericity and 3) test of error variance, which according to the assumption excepted in verbal test which showed a slightly different. Afterward, the difference of SWUSAT54 aptitude test score are as shown in Table 2 – 4.

**Table 2** Mean, standard deviation and coefficient of variation of SWUSAT54 scores

| | | SWUSAT54: scientific-related faculties | | | SWUSAT54: artistic-related faculties | | |
|---|---|---|---|---|---|---|---|
| Test | Sex | M | S | CV | M | S | CV |
| Verbal | Male | 13.458 | 3.671 | 0.273 | 11.586 | 3.844 | 0.332 |
| | Female | 14.236 | 3.683 | 0.259 | 12.880 | 3.566 | 0.277 |
| Numerical | Male | 10.597 | 4.931 | 0.465 | 12.060 | 5.074 | 0.421 |
| | Female | 9.347 | 4.458 | 0.477 | 11.437 | 4.537 | 0.397 |
| Reasoning | Male | 15.281 | 5.003 | 0.327 | 12.686 | 4.955 | 0.391 |
| | Female | 14.775 | 4.871 | 0.330 | 12.342 | 4.724 | 0.383 |
| Spatial I | Male | 20.529 | 5.271 | 0.257 | 23.055 | 6.297 | 0.273 |
| | Female | 17.182 | 6.638 | 0.386 | 21.064 | 7.106 | 0.337 |
| Spatial II | Male | 16.359 | 5.347 | 0.327 | 21.577 | 7.137 | 0.331 |
| | Female | 16.596 | 4.902 | 0.295 | 21.582 | 6.691 | 0.310 |

Table 2 indicated the overall mean of SWUSAT54 score from both scientific-related and artistic-related faculties. The overall result showed mean of less 60% of total score except the mean score of Spatial test for artistic-related students. The coefficient of variation in Numerical test of male and female students had the highest value. When comparing the overall difference between male and female students of each study direction, there were differences in some versions of numerical and spatial tests. In order to understand clearly in each versions of test, the researcher analyzed to compare the difference of score in each SWUSAT54 test, as indicated in Table 3 and 4.

**Table 3** Comparison difference scores of SWUSAT54-1, SWUSAT54-2 between male and female students

| | | SWUSAT54-1 (N=440) | | | | SWUSAT54-2 (N=348) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Test | Sex | M | S | CV | Sig. | M | S | CV | Sig. |
| Verbal | Male | 13.6715 | 3.5402 | 0.2589 | .000** | 16.1154 | 2.6919 | 0.1670 | .761 |
| | Female | 15.0368 | 3.1307 | 0.2082 | | 16.2481 | 3.5596 | 0.2191 | |
| | total | 14.1773 | 3.4543 | 0.2436 | | 16.2184 | 3.3813 | 0.2085 | |
| Numerical | Male | 10.0722 | 3.9575 | 0.3929 | .083 | 16.9615 | 5.8675 | 0.3459 | .000** |
| | Female | 10.7607 | 4.1229 | 0.3831 | | 13.0667 | 5.2615 | 0.4027 | |
| | total | 10.3273 | 4.0286 | 0.3901 | | 13.9397 | 5.6343 | 0.4042 | |
| Reasoning | Male | 15.2022 | 4.6791 | 0.3078 | .064 | 19.7179 | 4.5553 | 0.2310 | .001** |
| | Female | 16.0491 | 4.5308 | 0.2823 | | 17.6963 | 4.8322 | 0.2731 | |
| | total | 15.5159 | 4.6376 | 0.2989 | | 18.1494 | 4.8393 | 0.2666 | |
| Spatial | Male | 20.9783 | 5.1323 | 0.2446 | .546 | 17.0897 | 5.9220 | 0.3465 | .363 |
| | Female | 20.6748 | 5.0196 | 0.2428 | | 17.6889 | 4.8662 | 0.2751 | |
| | total | 20.8659 | 5.0872 | 0.2438 | | 17.5546 | 5.1188 | 0.2916 | |

According to Table 3, the information was derived from the mean of SWUSAT54, scientific-related faculties, set 1, the sample group was students from Faculty of engineering. The result showed the hightest mean at spatial; the latter were reasoning, verbal and numerical at the lowest point. However, health science students who took set 2 of examination gained the greatest score in reasoning; while lowest score went to numerical as well. When consider coefficient variation of both examination versions, numerical part indicated the highest coefficient variation for both versions; on the other hand, verbal part also had the lowest coefficient variation rate for both versions. In comparing skills between male and female students, students in Faculty of engineering scored differently in verbal part. Likewise, health science and pharmacy students got the different score in test of numerical and reasoning at the level of significant of 0.01

**Table 4** Comparison difference scores of SWUSAT54-3and SWUSAT54-4 between male and female students

| | | SWUSAT54-3 (N=373) | | | | SWUSAT54-4 (N=613) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Sex | M | S | CV | Sig. | M | S | CV | Sig. |
| Verbal | Male | 11.7023 | 3.8518 | 0.3291 | .000* | 13.1943 | 3.4703 | 0.2630 | .001** |
| | Female | 13.6962 | 3.2550 | 0.2377 | | 14.1567 | 3.2344 | 0.2285 | |
| | total | 12.5469 | 3.7389 | 0.2980 | | 13.8254 | 3.3461 | 0.2420 | |
| Numerical | Male | 13.2558 | 5.2262 | 0.3943 | .061 | 13.4360 | 5.5325 | 0.4118 | .892 |
| | Female | 14.2658 | 4.9769 | 0.3489 | | 13.3756 | 5.0657 | 0.3787 | |
| | total | 13.6836 | 5.1396 | 0.3756 | | 13.3964 | 5.2267 | 0.3902 | |
| Reasoning | Male | 13.4558 | 4.7818 | 0.3554 | .030* | 16.6398 | 5.7655 | 0.3465 | .148 |
| | Female | 14.5570 | 4.8644 | 0.3342 | | 15.9403 | 5.6446 | 0.3541 | |
| | total | 13.9223 | 4.8412 | 0.3477 | | 16.1811 | 5.6915 | 0.3517 | |
| Spatial | Male | 25.7535 | 5.0446 | 0.1959 | .222 | 25.4929 | 4.0887 | 0.1604 | .421 |
| | Female | 26.3481 | 4.0078 | 0.1521 | | 25.7736 | 4.1126 | 0.1596 | |
| | total | 26.0054 | 4.6374 | 0.1783 | | 25.6770 | 4.1033 | 0.1598 | |

From Table 4, the samples groups were students from artistic-related faculties. Version 3 of examination paper was distributed to students from Faculty of physical education and Faculty of public health. Version 4 was done by student from Faculty of fine arts and College of social communication innovation. The outcome replied the highest mean at spatial test, while the lowest mean scored at verbal part. Regarding coefficient of variation, numerical examination had the highest level of coefficient of variation; while spatial test showed the lowest degree as well. Moreover, the diversity of score by male and female students from Faculty of physical education and Faculty of public health was different at the level of significant of 0.01 and 0.05 for verbal and reasoning part respectively. The result differed in fine arts and social communication innovation students only for verbal test; the results from other sections remained similar.

# Discussion

As a result from different versions of SWUSAT54 scholastic aptitude test for scientific students: Faculty of engineering, Faculty of health science, Faculty of nursing, Faculty of pharmacy; and artistic students: Faculty of physical education, Faculty of public health, Faculty of fine arts, and College of social communication innovation. The result signified that correlation coefficient among all sections of the examination had positive relationship at the level of significant of 0.01. The degree of correlation coefficient between numerical and spatial aptitude test was proved as higher than the relationship of other pairs. Their relationship was considered to be in average, of which aligned to the study from Latcha Chunwijitra (2002). Her research paper was focused on the relationship among scholastic aptitude test score, GPA and score from major subjects. A part of the study has found that score of verbal, numerical, and analytical scholastic aptitude test shared a relationship with the level of statistical significant; in other word, the correlation coefficient between verbal and numerical part was 0.510, between verbal and analytical was 0.522, and between numerical and analytical was 0.626, which is the relationship in the middle. Although it was remarkably noted that the correlation coefficient of verbal aptitude test and numerical aptitude test, and between verbal and analytical aptitude test of this study gained the lower score, comparing to one of Latcha Chunwijitra (2002) and Udomsak Naruang (2001). However, it was possibly due to formats of question used in posing questions for verbal aptitude test were dissimilar according to characteristics of question, and the setting of definition to create measuring tool. The verbal aptitude test of Udomsak Naruang (2001). comprised of questions regarding welder's thesaurus, and spatial test with pictures (3 pictures are given; the goal is to find the right answer which should be the featuring of all 3 pictures). The questions were quite particular well understood among students of specific field of study. Thus, it would contribute to the higher level of correlation coefficient than this study (this study was aimed at measuring high school graduates of both scientific and artistic field, not only at particular one).

In the case of relationship between verbal and spatial aptitude test, even though their relationship appeared to have statistical significance; it was somehow according to the large size of samples used in this research. The possibility of significance was also higher. Nevertheless, the correlation level was lower than 0.200 probably because the verbal part was made of questions which required comprehension in language and analysis. While spatial section related to watching figures; students needed to be fast and imaginative as to consider those figures in varied perspectives, with no requirement of language ability. Therefore, the correlation coefficient was low.

Besides, the evaluation of mean and distribution of score for each part of examination was found mostly no more than 60%. Only one version that has got more than 60%: spatial section. It is normally perceived as an easy section, just a look into figures of different dimensions or look into details of same or different figures. No complicated thinking needed, but the speed. Coefficient variation of numerical aptitude test portrayed as most valuable because of small level of distribution, because it was considered the toughest one.

In overall comparison of SWUSAT54 scholastic aptitude test of scientific and artistic field between male and female students, the dissimilarity occurred in verbal, numerical and spatial in some versions. Anyhow, the evaluation of examination has found that male and female students who took SWUSAT54 set 1, 3 and 4 had different level of language competency. Female usually acquired higher mean than male students, corresponded to the fact that female naturally has better language ability than male. Though male and female students who did set 2 of the examination did not show

diversity in verbal ability, but did for the ability in numbers and reasoning. The rationale behind this result is probably because the students assigned for this version were from Faculty of health science, Faculty of nursing, Faculty of medicine and Faculty of pharmacy. There were many faculties, which had different natures of their subject. It could probably contribute to the dissimilar result comparing with students who took other versions of examinations.

## Suggestions

The research result has discovered that all 4 sections of aptitude test are not always necessarily to be applied to the entrance examination of bachelor degree students. Only one skill can be selected for the test, in regard to the save of time and expense of examination. In addition, the study may face some limitations due to sample groups, as some version of examinations were completed by students from many faculties, while some was done by only one faculty. Thus, the future researches should apply to cover all sample groups, to represent the population more precisely. Moreover, there should be the study in formats and patterns of questions to be measured in more variety of dimensions. To conclude which aptitude or ability are related or not, the study should be as deep as the question to be measured which ability. For example, the measure of verbal aptitude could be alternated into different kinds of measuring tools. It could be the test regarding to vocabulary ability, language use, language comprehension, or language analysis. There should also be causal research model with these variables, as well as the difference of causal research models of diverse groups (e.g. gender, faculty of study, for instance).

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