RELIABILITY AND VALIDITY OF THE MALAY LANGUAGE VERSION OF THE ATTITUDES TOWARDS STATISTICS (ATS) SCALE

Kian-Sam Hong,
University Malaysia Sarawak, Malaysia
Kwok-Wing Lai,
Derek Holton
University of Otago, Dunedin, New Zealand
and
Tet-Loke Liau
SEAMEO RECSAM, Penang, Malaysia

This paper reports a reliability and validity study of the Malay Language version of Wise's Attitudes towards Statistics (ATS) scale, used in the measurement of students' attitudes toward statistics. Results showed that the Malay Language version of the scale has two subscales identified as Attitudes toward Course (COURSE) and Attitudes toward Field (FIELD), respectively as reported by Wise in 1985. These subscales were also demonstrated to have high internal consistency, with values within ranges reported by previous researchers of the ATS scale.

INTRODUCTION

Statistics now occupies a central role in a number of areas. For instance, Hinkle, Wiersmaz, & Jurs (1988:2) noted that, "Often statistics provides the basic rationale behind planning and decision making by educators, counselors, and others whose work is tied to the behavioral sciences." Further, "Statistical thinking is a major part of scientific thinking, particularly in psychology, education, and all social sciences" (Hilderbrand, 1986:1). However, as (Mattson, 1981:vii) noted, typical students in a statistics class "are persons who have struggled as average students in mathematics classes" (p. vii) and are both intimidated and confused by mathematical

Key words: Attitudes measures; Statistics; Student attitudes; Higher Education; Malay Language

concepts. There is therefore a concern for students' attitudes toward statistics and this has been evident for some time.

Several scales have been devised to measure students' attitudes, as aids to discover methods of altering their attitudes toward this crucial topic. Most of these scales have been tied closely to particular courses or intended for use with undergraduate students (Wise, 1985). However, Wise (1985) has designed a more general scale to measure attitudes toward statistics. He designed this scale with three goals in mind: (a) items had to be attitudinal, not addressing students' success or problems with statistics; (b) items had to be answerable on both the first and last days of a class; and (c) two dimensions were to be assessed, statistics as a field and the particular class being taken (Wise, 1985). As a result, Wise devised a 29-item scale (Attitudes toward Statistics (ATS) scale) that met the preceding criteria and yielded acceptable internal consistency and test-retest reliability, as well as evidence of factorial and criterion-related validity.

THE PURPOSE OF THE STUDY

The purpose of the present study was to translate Wise's ATS scale into the Malay Language and to examine the translated scale in relation to its internal consistency, and its factor structure.

THE ATTITUDES TOWARD STATISTICS (ATS) SCALE

The ATS scale consists of 29 items measured on a 1-5 point rating scale anchored by "Strongly Agree" and "Strongly Disagree". These items are divided into two subscales, based on factor analytic results (Wise, 1985). COURSE (9 items) is designed to measure students' attitudes toward the course in which they are enrolled, e.g. "The thought of being enrolled in a statistics course makes me nervous." The other is attitude towards the FIELD of statistics (20 items) which measures students' attitudes toward the use of statistics in their field of study, e.g. "I feel that statistics will be useful to me in my profession." The ATS has been widely used in studies involving undergraduates and graduates during and after completion of statistics courses (e.g. Shultz & Koshino, 1998; Araki & Shultz, 1995; Elmore, Lewis, & Bay, 1993; Green, 1992; Elmore & Lewis, 1991; Waters, Martelli, Zakrajsek, & Popovich, 1988; Wise, 1985). These researchers have reported high internal consistencies for the ATS, with Cronbach alpha values ranging from 0.85 to 0.93 for COURSE and 0.82 to 0.94 for FIELD.

The ATS scale was translated to the Malay Language independently by the first author and a lecturer in introductory statistics at the Faculty of Cognitive Sciences and Human Development (FCSHD), University Malaysia Sarawak (Unimas). Then the translators worked on the Malay version of the scale together. Another lecturer teaching research methodology at FCSHD then translated this Malay version back to English. The first author and the two lecturers then based on this version, the original instrument, and the Malay Language version, came up with the final Malay Language instrument. A lecturer at the Centre for Language Study in Unimas then edited the Malay Language instrument.

SAMPLE

A total of 261 undergraduates at Unimas in Malaysia served as the sample in this study. The undergraduates were third year students and had taken at least one introductory statistics course.

DATA ANALYSES

The reliability of the Malay Language version of the ATS scale was evaluated using Cronbach alpha values. The factorial validity of the translated scale was investigated using a principal component analysis followed by a varimax rotation.

RESULTS AND DISCUSSION

The responses from the 261 undergraduates indicated a relatively high reliability for each of the two subscales for the Malay Language version of the ATS scale. The coefficient alphas were found to be 0.8215 for the COURSE subscale and 0.8889 for the FIELD subscale respectively. These coefficient alphas values were within the range reported by previous researchers (Shultz & Koshino, 1998; Araki & Shultz, 1995; Elmore, Lewis, & Bay, 1993; Green, 1992; Elmore & Lewis, 1991; Waters, Martelli, Zakrajsek, & Popovich, 1988; Wise, 1985). This study also found the translated ATS scale to have an overall coefficient alpha of 0.8925.

From the standpoint of factorial validity, high degrees of validity were found for the Malay Language ATS scale. Factors that emerged were identical to those derived by Wise (1985), identifiable as COURSE and FIELD subscales.

Table 1
Factor pattern structure for the Malay Language version of ATS

	Factor	
	1	2
Q1	**.622**	.135
Q2	.008	**.703**
Q3	**.517**	.007
Q4	.009	**.576**
Q5	**.476**	.130
Q6	**.453**	.401
Q7	.362	**.675**
Q8	.272	**.503**
Q9	**.641**	.162
Q10	**.137**	.119
Q11	**.551**	.294
Q12	.396	**.659**
Q13	**.646**	.269
Q14	**.321**	.003
Q15	.221	**.757**
Q16	**.464**	.188
Q17	**.471**	.001
Q18	.217	**.749**
Q19	**.452**	.435
Q20	**.491**	.451
Q21	**.640**	.009
Q22	**.569**	.002
Q23	**.715**	.002
Q24	**.643**	.151
Q25	.206	**.723**
Q26	**.556**	.001
Q27	.220	**.642**
Q28	**.450**	.357
Q29	**.495**	.005
Variances explained	21.202	17.523

Factor 1 and factor 2 in Table 1 refer to the FIELD and COURSE subscales, respectively.

CONCLUSION

One common problem that instructors in the area of statistics face is that many, if not most, of the students are wary of taking such courses. It is not unusual for students to delay taking statistics in their programmes for as long as possible. Many wait until the last term when it then becomes a situation with not much choice. In some ways, it is unbelievable how fearful students become when faced with the reality of finally having to take statistics. The affective component presents a real barrier to a potentially successful experience with such content material.

The results of this study indicate that the Malay Language ATS reliably measures two distinct aspects of student attitudes toward statistics. The COURSE subscale is concerned with student attitudes toward their statistics course, whereas the FIELD subscale pertains to student attitudes toward the usefulness of statistics, either in general or in terms of their field of study.

Hopefully, the Malay Language ATS scale can assist instructors in Malaysia in detecting those students who may be apprehensive of statistics. With such information, instructors can help students overcome their fear by implementing positive steps such as making sure students can use calculators and computer software efficiently or immediately providing them with a tutor to build up their confidence and prerequisites for studying statistics.

REFERENCES

Araki, L. R., & Shultz, K. S. (1995, April). *Students' attitudes towards statistics and their retention of statistical concepts.* Paper presented at the annual meeting of the Western Psychological Association, Los Angeles, CA.

Elmore, P. B., Lewis, E. L., & Bay, M. L. G. (1993, April). *Statistics achievement: A function of attitudes and related experience.* Paper presented at the annual meeting of the American Educational Research Association, Atlanta, GA.

Elmore, P. B., & Lewis, E. L. (1991, April). *Statistics and computer attitudes and achievement of students enrolled in applied statistics: Effect of computer laboratory.* Paper presented at the annual meeting of the American Educational Research Association, Chicago.

Green, K. E. (1992, April). *One year later: Students' attitudes toward statistics.* Paper presented at the annual meeting of the American Educational Research Association, San Francisco.

Hildebrand, D. K. (1986). *Statistical thinking for behavioral scientists.* Boston: Duxbury Press.

Hinkle, D. E., Wiersmaz, W., & Jurs, S. G. (1988). *Applied statistics for the behavioral sciences.* (2nd Ed.). Boston: Houghton Mifflin.

Mattson, D. E. (1981). *Statistics: Difficult concepts, understandable explanations.* St Louis: C. V. Mosby.

Shultz, K. S., & Koshino, H. (1998). Evidence of reliability and validity for Wise's Attitude toward Statistics Scale. *Psychological Reports, 82,* 27-31.

Waters, L. K., Martelli, A., Zakrajsek, T., & Popovich, P. M. (1988). Attitudes toward statistics: An evaluation of multiple measures. *Educational and Psychological Measurements, 48,* 513-516.

Wise, S. L. (1985). The development and validation of a scale measuring attitudes toward statistics. *Educational a Psychological Measurement, 45,* 401-405.

ACKNOWLEDGEMENT

The authors would like to thank Tet-Loke Liau, Ph.D., Abang Ridzuan Ph.D., Fitri Suraya, and Angela Anthonysami for helping in translating the ATS into the Malay Language.