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Determinants of Statistical Literacy among College Students at Wesleyan University-Philippines

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ABSTRACT

This study examined the determinants of perceived statistical literacy among college students at Wesleyan University-Philippines. A quantitative descriptive-correlational and predictive research design was employed, involving 125 college students selected through stratified random sampling. Data were collected using a validated and reliability-tested structured questionnaire and analyzed using descriptive statistics, Spearman's rank-order correlation, independent-samples *t*-test, analysis of variance, Tukey HSD post hoc test, and multiple linear regression. The respondents generally perceived themselves as having adequate prior mathematical knowledge and agreed that they possessed favorable attitudes, statistical self-efficacy, access to learning technology, positive faculty teaching practices, and statistical literacy. However, they also reported experiencing statistics anxiety. Age was not significantly associated with the study variables. Significant differences according to sex were found in prior mathematical knowledge, attitude toward statistics, statistics anxiety, and technology use. College program was associated with attitude toward statistics, statistical self-efficacy, statistics anxiety, and technology use. Nevertheless, perceived statistical literacy did not significantly differ according to sex or college program. Multiple regression analysis revealed that attitude toward statistics and perceived faculty teaching practices significantly predicted perceived statistical literacy, with faculty teaching practices emerging as the strongest predictor. The findings highlight the importance of effective instruction and positive attitudes in developing students' ability to understand, interpret, and evaluate statistical information.

Keywords: attitude toward statistics, college students, faculty teaching practices, statistical literacy, statistics education

INTRODUCTION

The increasing use of data in education, business, government, and digital media has made statistical literacy an essential competence among college students. It involves not only performing calculations but also understanding, interpreting, evaluating, and communicating statistical information (Sharma, 2017). Statistical literacy helps students assess data-based claims and make informed academic, professional, and personal decisions (Engel, 2017).

Statistical literacy is closely associated with problem-solving skills. Statistical problems require students to identify relevant information, select appropriate procedures, analyze data, and interpret results within a specific context. However, students may perform calculations correctly while experiencing difficulty explaining their meaning or applying them to real-life situations. Kurnia et al. (2024) found that many students demonstrated statistical knowledge but lacked critical interpretation and evaluation skills. Similarly, Phadke et al. (2024) reported that the context in which statistical problems were presented influenced students' performance.

Students' statistical literacy may be shaped by prior mathematical knowledge, attitudes toward statistics, statistical self-efficacy, learning engagement, statistics anxiety, technology use, and teaching practices. Statistics anxiety may reduce students' confidence and willingness to engage in numerical tasks (Nielsen &

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Kreiner, 2018). In contrast, effective teaching practices and appropriate technology use may strengthen conceptual understanding, data interpretation, and statistical reasoning (Suhermi & Widjajanti, 2020).

At Wesleyan University-Philippines, statistics is commonly offered during the third year of college. At this stage, students begin preparing for research, and feasibility studies requirements that require data analysis and interpretation. However, students enter statistics classes with different levels of mathematical preparation, confidence, attitudes, and learning experiences. These differences may affect their ability to understand statistical information and solve statistical problems.

Therefore, this study aims to determine the factors associated with the statistical literacy of college students at Wesleyan University-Philippines. Identifying the significant determinants may provide a basis for improving teaching strategies, learning materials, technology-based activities, and student-support programs in statistics.

Objectives of the Study

This study aimed to determine the factors that influenced the statistical literacy of college students at Wesleyan University-Philippines. Specifically, it sought to describe the respondents' profiles in terms of age, sex, and college program; assess the determinants in terms of prior mathematical knowledge, attitude toward statistics, statistical self-efficacy, statistics anxiety, technology use, and perceived teaching practices; examine the significant relationship between the identified determinants and their statistical literacy and identify which determinants significantly predicted the students' statistical literacy skills.

METHODOLOGY

The study employed a quantitative descriptive-correlational and predictive research design to determine the factors associated with the statistical literacy of college students at Wesleyan University-Philippines. The respondents consisted of selected college students who had completed or were currently enrolled in a statistics subject, which was commonly offered during the third year of their respective programs. Stratified random sampling was used to ensure appropriate representation from the participating colleges and academic programs.

Data were gathered using a structured questionnaire composed of four parts. The first part obtained the respondents' demographic profiles. The second assessed prior mathematical knowledge, attitude toward statistics, statistical self-efficacy, statistics anxiety, technology use, and perceived teaching practices. The third measured statistical literacy. The instrument was reviewed by experts in statistics, research, and educational measurement to establish content validity. It was pilot-tested among students who were not included in the main study, and its reliability was assessed using Cronbach's alpha.

Before data collection, permission was obtained from the concerned university officials. The respondents were informed about the purpose of the study, the voluntary nature of their participation, and the confidentiality of their responses. Informed consent was secured before administering the questionnaire, and no personally identifying information was disclosed.

The collected data were analyzed using frequency and percentage to describe the respondents' profiles and weighted mean and standard deviation to assess the identified determinants, statistical literacy, and problem-solving skills. Pearson's correlation coefficient was used to determine the relationships between the identified determinants and the outcome variables. Multiple linear regression analysis was employed to identify which factors significantly predicted students' statistical literacy skills. All hypotheses were tested at the 0.05 level of significance.

RESULTS AND DISCUSSIONS

This section presents and discusses the findings of the study based on the research objectives. It begins with the respondents' demographic profile, followed by the descriptive and inferential analyses of the factors associated with their perceived statistical literacy.

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Table 1 presents the respondents' demographic characteristics in terms of age, sex, and college program. These characteristics provide context for interpreting the succeeding findings of the study.

As shown in Table 1, most of the 125 respondents were 20–21 years old (n = 93, 74.4%), followed by those aged 22–23 years (n = 16, 12.8%), 19 years old and below (n = 10, 8.0%), and 24 years old and above (n = 6, 4.8%). The concentration of respondents in the 20–21 age group indicates that the findings largely represent students within the conventional college-age population.

In terms of sex, female students comprised the majority of the respondents (n = 78, 62.4%), while male students accounted for 37.6% (n = 47). The unequal distribution should be considered when interpreting the findings because students' experiences with statistics may differ according to individual and educational factors. Macher et al. (2015) observed that affective factors, including statistics anxiety, can influence students' learning and performance in statistics. However, the demographic distribution alone does not establish whether male and female respondents differed in statistical literacy.

Table 1 Demographic Profile of the Respondents

Profile Variable	**Category**	**Frequency (f)**	**Percentage (%)**
Age	19 years old and below	10	8
	20–21 years old	93	74.4
	22–23 years old	16	12.8
	24 years old and above	6	4.8
	Subtotal	**125**	**100**
Sex	Male	47	37.6
	Female	78	62.4
	Subtotal	**125**	**100**
College program	Bachelor of Science in Accountancy (BSA)	46	36.8
	Bachelor of Science in Management Accounting (BSMA)	57	45.6
	Bachelor of Science in Business Administration (BSBA)	22	17.6
	Subtotal	**125**	**100**

Regarding college program, BSMA students constituted the largest group (n = 57, 45.6%), followed by BSA students (n = 46, 36.8%) and BSBA students (n = 22, 17.6%). Thus, the findings primarily reflect the perspectives of students enrolled in accounting-related programs. This consideration is important because statistical literacy is shaped by the context in which learners interpret, evaluate, and apply statistical information (Sharma, 2017). Differences in curricular exposure and the use of quantitative concepts across programs may therefore be relevant to students' statistical learning.

Assessments of the proposed determinants of statistical literacy and their perceived statistical literacy. The results are presented using the mean, standard deviation, and corresponding verbal description.

Table 2 Descriptive Statistics for the Statistical Literacy Skills Variables (N = 125)

Study Variable	M	SD	Verbal Description
Statistical Literacy Skills			
Perceived prior mathematical knowledge	3.33	0.3	Strongly Agree
Attitude toward statistics	3.22	0.35	Agree
Statistical self-efficacy	3.12	0.31	Agree
Statistics anxiety	3.17	0.29	Agree

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Use of technology in learning statistics	3.11	0.32	Agree
Perceived faculty teaching practices	3.12	0.35	Agree
Outcome variable			
Perceived statistical literacy	3.18	0.38	Agree

As shown in Table 2, perceived prior mathematical knowledge obtained the highest mean (M = 3.33, SD = 0.30), verbally described as Strongly Agree. This indicates that the 125 respondents generally believed they possessed the foundational mathematical knowledge needed to learn statistics.

Attitude toward statistics obtained a mean of 3.22 (SD = 0.35), while statistical self-efficacy obtained a mean of 3.12 (SD = 0.31). Both were described as Agree, indicating that the respondents generally recognized the value of statistics and felt reasonably capable of completing statistical tasks. However, these ratings also suggest room for strengthening students' confidence and interest in statistical learning.

Statistics anxiety registered a mean of 3.17 (SD = 0.29), verbally described as Agree. Since the statements measured nervousness, worry, and discomfort, this result indicates that respondents generally experienced statistics-related anxiety. Thus, this rating should not be interpreted as a favorable result. Anxiety may create difficulties in students' engagement with quantitative tasks even when they possess adequate foundational knowledge.

The use of technology in learning statistics received the lowest mean among the proposed determinants (M = 3.11, SD = 0.32), although it was still described as Agree. This suggests that respondents generally used technological tools and online resources in learning statistics, but such practices were not as strongly evident as their prior mathematical knowledge and attitudes. Perceived faculty teaching practices obtained a mean of 3.12 (SD = 0.35), also described as Agree, indicating that students generally viewed their instructors' teaching practices positively.

Perceived statistical literacy obtained a mean of 3.18 (SD = 0.38), verbally described as Agree. This finding indicates that the respondents generally perceived themselves as capable of understanding, interpreting, and evaluating statistical information. Nevertheless, the result also shows that their statistical literacy had not yet reached the highest level of the measurement scale. Statistical literacy requires not only knowledge of statistical concepts but also the capacity to evaluate data-based claims and use statistical information in relevant contexts (Schield, 2018). Accordingly, statistics instruction should provide opportunities for students to interpret authentic data, examine the credibility of statistical claims, and communicate evidence-based conclusions. Ben-Zvi et al. (2018) similarly emphasized that statistical learning should develop reasoning and meaningful engagement with data rather than focus solely on computational procedures.

Relationship between the respondents' age and the statistical literacy variables. Spearman's rank-order correlation was used to determine whether age was significantly associated with each variable.

Table 3 Relationship Between Age and the Statistical Literacy Skills Variables (N = 125)

Study Variable	**Spearman's ρ**	**p-value**	**Decision**
Perceived prior mathematical knowledge	−.108	0.232	Fail to reject H_0
Attitude toward statistics	0.002	0.979	Fail to reject H_0
Statistical self-efficacy	0.005	0.959	Fail to reject H_0
Statistics anxiety	−.018	0.843	Fail to reject H_0
Use of technology in learning statistics	−.125	0.163	Fail to reject H_0

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Perceived faculty teaching practices	0.087	0.337	Fail to reject H_0
Perceived statistical literacy	0.087	0.337	Fail to reject H_0
Note. Spearman's rank-order correlation was used. The null hypothesis was tested at the .05 level of significance. H_0 = null hypothesis.			

The results shows that age was not significantly related to perceived prior mathematical knowledge ($\rho = -.108$, $p = .232$), attitude toward statistics ($\rho = .002$, $p = .979$), statistical self-efficacy ($\rho = .005$, $p = .959$), statistics anxiety ($\rho = -.018$, $p = .843$), use of technology in learning statistics ($\rho = -.125$, $p = .163$), perceived faculty teaching practices ($\rho = .087$, $p = .337$), or perceived statistical literacy ($\rho = .087$, $p = .337$).

All computed correlation coefficients were weak, and all p-values exceeded the .05 level of significance. Therefore, the null hypotheses were not rejected. These results indicate that the respondents' age was not significantly associated with their perceptions of the factors examined in the study or with their perceived statistical literacy. In practical terms, older and younger respondents within the sample tended to provide comparable assessments.

The absence of significant relationships may partly be attributed to the limited variation in the respondents' ages, since 74.4% were between 20 and 21 years old. A relatively homogeneous age distribution provides limited evidence for determining whether statistical learning experiences vary across wider age groups. Moreover, statistical literacy involves more than age-related differences; it includes the ability to understand, critically evaluate, and use data within meaningful contexts (Gal, 2019). Gould (2017) likewise explained that statistical literacy is closely connected to students' ability to work with and interpret data. Thus, students' exposure to statistical concepts, learning activities, and data-based tasks may be more relevant than age alone. Nevertheless, this explanation requires further investigation because the present correlations did not directly test these possible mechanisms.

Differences in the respondents' assessments of the statistical literacy variables according to sex. An independent-samples t-test was used to determine whether the assessments of male and female respondents differed significantly.

Table 4 Difference in the Respondents' Assessments According to Sex

Variable	**Male Mean**	**Female Mean**	***t***	**df**	***p*-value**	**Cohen's *d***	**Decision**
Perceived Prior Mathematical Knowledge	3.402	3.29	2.033	123	0.044	0.375	Reject H_0
Attitude Toward Statistics	3.42	3.098	5.598	123	< .001	1.034	Reject H_0
Statistical Self-Efficacy	3.178	3.087	1.602	123	0.112	0.296	Fail to reject H_0
Statistics Anxiety	3.279	3.098	3.509	123	0.001	0.648	Reject H_0
Use of Technology in Learning Statistics[1]	3.388	2.949	9.13	81.625	< .001	1.778	Reject H_0
Perceived Faculty Teaching Practices[1]	3.059	3.159	−1.388	69.796	0.17	−0.284	Fail to reject H_0
Perceived Statistical Literacy[1]	3.059	3.159	−1.388	69.796	0.17	−0.284	Fail to reject H_0
Note. Male: $n = 47$; Female: $n = 78$. Significance level: $\alpha = .05$.							
[1]Welch's *t*-test results were reported because Levene's test was significant, indicating unequal variances.							

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As shown in Table 4, male respondents reported significantly higher perceived prior mathematical knowledge ($M = 3.402$) than female respondents ($M = 3.290$), $t(123) = 2.033$, $p = .044$, Cohen's $d = 0.375$. Although the difference was statistically significant, its effect size was small.

A significant difference was also found in attitude toward statistics, $t(123) = 5.598$, $p < .001$. Male respondents obtained a higher mean ($M = 3.420$) than female respondents ($M = 3.098$). The corresponding effect size ($d = 1.034$) indicated a large difference, suggesting that sex was associated with a practically meaningful variation in students' attitudes toward statistics.

For statistical self-efficacy, male respondents obtained a slightly higher mean ($M = 3.178$) than female respondents ($M = 3.087$). However, the difference was not statistically significant, $t(123) = 1.602$, $p = .112$, $d = 0.296$. Therefore, the null hypothesis was not rejected. This indicates that male and female respondents had generally comparable perceptions of their ability to understand and perform statistical tasks.

A statistically significant difference was observed in statistics anxiety, $t(123) = 3.509$, $p = .001$, $d = 0.648$. Male respondents recorded a higher mean ($M = 3.279$) than female respondents ($M = 3.098$), with a moderate effect size. Assuming that higher scores represent greater anxiety, the result indicates that male respondents experienced higher statistics anxiety. This finding should be interpreted cautiously because anxiety is influenced by several interacting personal and educational conditions rather than sex alone. Luttenberger et al. (2018) explained that anxiety toward mathematics-related subjects may be associated with previous learning experiences, self-perceptions, instructional conditions, and social expectations.

Welch's t-test showed a significant difference in the use of technology in learning statistics, $t(81.625) = 9.130$, $p < .001$. Male respondents reported a higher mean ($M = 3.388$) than female respondents ($M = 2.949$). The effect size was particularly large ($d = 1.778$), indicating that the difference was substantial in practical terms. Among all variables examined, technology use demonstrated the largest difference according to sex.

No significant difference was found in perceived faculty teaching practices, $t(69.796) = -1.388$, $p = .170$, $d = -0.284$. Female respondents obtained a slightly higher mean ($M = 3.159$) than male respondents ($M = 3.059$), but the difference was small and statistically nonsignificant. Similarly, perceived statistical literacy did not differ significantly between male and female respondents, $t(69.796) = -1.388$, $p = .170$, $d = -0.284$. Thus, despite significant differences in selected learning-related variables, male and female students reported comparable levels of perceived statistical literacy.

Sex-based differences were found in perceived prior mathematical knowledge, attitude toward statistics, statistics anxiety, and technology use. However, no significant differences emerged in statistical self-efficacy, perceived faculty teaching practices, or perceived statistical literacy. The effect sizes provide important context because statistical significance alone does not indicate the practical magnitude of a group difference (Funder & Ozer, 2019).

Differences in the respondents' assessments of the statistical literacy variables according to college program. Tukey HSD post hoc comparisons were used to determine which program groups differed in their assessments.

Table 5 Differences in the Respondents' Assessments According to College Program

Variable	College program comparison	Mean difference	p-value	Overall decision
Perceived Prior Mathematical Knowledge	BSA–BSMA	0.105	0.179	Fail to reject H_0
	BSA–BSBA	0.158		
	BSMA–BSBA	0.053		

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Attitude Toward Statistics	BSA–BSMA	0.392	< .001	Reject H_0
	BSA–BSBA	0.179		
	BSMA–BSBA	−0.213		
Statistical Self Efficacy	BSA–BSMA	0.16	0.022	Reject H_0
	BSA–BSBA	−0.068		
	BSMA–BSBA	−0.228		
Statistics Anxiety	BSA–BSMA	0.243	< .001	Reject H_0
	BSA–BSBA	0.033		
	BSMA–BSBA	−0.211		
Use of Technology in Learning Statistics	BSA–BSMA	0.457	< .001	Reject H_0
	BSA–BSBA	0.391		
	BSMA–BSBA	−0.066		
Perceived Faculty Teaching Practices	BSA–BSMA	−0.061	0.658	Fail to reject H_0
	BSA–BSBA	−0.190		
	BSMA–BSBA	−0.129		
Perceived Statistical Literacy	BSA–BSMA	−0.061	0.658	Fail to reject H_0
	BSA–BSBA	−0.190		
	BSMA–BSBA	−0.129		

Note. *The table reports the Tukey HSD comparisons at α = .05. A positive mean difference indicates that the first program obtained a higher mean; a negative value indicates that the second program obtained a higher mean.*

Table 5 presents the differences in the respondents' assessments according to college program. No significant overall difference was found in perceived prior mathematical knowledge (p = .179). Although BSA students obtained higher estimated means than BSMA students (MD = 0.105) and BSBA students (MD = 0.158), these differences were not statistically significant. The null hypothesis was therefore not rejected.

Attitude toward statistics differed significantly across the three college programs (p < .001). The reported mean differences show that BSA students obtained higher scores than BSMA students (MD = 0.392) and BSBA students (MD = 0.179), whereas BSMA students obtained a lower score than BSBA students (MD = −0.213). Thus, BSA students appeared to have the most favorable attitude toward statistics. However, the significance of each program comparison cannot be confirmed unless the separate Tukey-adjusted p-values are reported.

A significant difference was also reported in statistical self-efficacy (p = .022). BSA students scored higher than BSMA students (MD = 0.160) but lower than BSBA students (MD = −0.068). BSMA students also scored lower than BSBA students (MD = −0.228). These results suggest that BSBA students had the highest statistical self-efficacy, followed by BSA and BSMA students. Nevertheless, the individual comparisons responsible for the overall difference must be identified using their corresponding Tukey HSD p-values.

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Statistics anxiety also differed significantly across programs ($p < .001$). BSA students obtained higher scores than BSMA students (MD = 0.243) and BSBA students (MD = 0.033), while BSMA students scored lower than BSBA students (MD = −0.211). Assuming that higher scores represent greater anxiety, BSA students had the highest statistics anxiety, whereas BSMA students had the lowest. The interpretation should be reversed if negatively worded items were reverse-coded so that higher scores represent lower anxiety.

A significant difference was likewise found in the use of technology in learning statistics ($p < .001$). BSA students obtained higher scores than BSMA students (MD = 0.457) and BSBA students (MD = 0.391), while the difference between BSMA and BSBA students was relatively small (MD = −0.066). These results indicate that BSA students reported the greatest use of technology in learning statistics.

No significant differences were found in perceived faculty teaching practices ($p = .658$) or perceived statistical literacy ($p = .658$). Therefore, the corresponding null hypotheses were not rejected. Despite differences in some learning-related factors, students from the three programs reported generally comparable faculty teaching practices and levels of perceived statistical literacy.

Overall, college program was associated with attitude toward statistics, statistical self-efficacy, statistics anxiety, and technology use, but not with prior mathematical knowledge, faculty teaching practices, or perceived statistical literacy. These variations may reflect differences in curricular content, quantitative requirements, and opportunities to analyze data across the programs. Statistical literacy develops through engagement with data and its application to authentic academic and social contexts (Engel, 2017). Moreover, the growing availability of complex data highlights the importance of providing students with meaningful opportunities to interpret and critically evaluate statistical information across disciplines (Ridgway, 2016).

Factors that significantly predicted students perceived statistical literacy using multiple linear regression analysis.

Table 6 Factors Predicting Students’ Perceived Statistical Literacy

Predictor	B	SE	β	t	p-value
Perceived Prior Mathematical Knowledge	0.11	0.095	0.118	1.149	0.253
Attitude Toward Statistics	0.2	0.085	0.248	2.335	0.021
Statistical Self-Efficacy	−0.039	0.064	−0.043	−0.607	0.545
Statistics Anxiety	−0.054	0.109	−0.056	−0.493	0.623
Use of Technology in Learning Statistics	−0.035	0.082	−0.041	−0.424	0.672
Perceived Faculty Teaching Practices	0.566	0.048	0.717	11.829	< .001
Note. Dependent variable: Perceived Statistical Literacy; α = .05.					

Table 6 presents the results of the multiple linear regression analysis conducted to determine which factors significantly predicted students perceived statistical literacy. Among the six predictors entered into the model, attitude toward statistics and perceived faculty teaching practices were statistically significant at the .05 level.

Attitude toward statistics significantly and positively predicted perceived statistical literacy ($B = 0.200$, $SE = 0.085$, $\beta = .248$, $t = 2.335$, $p = .021$). Holding the other predictors constant, a one-unit increase in attitude toward statistics was associated with a 0.200-unit increase in perceived statistical literacy. This suggests that students with more favorable attitudes toward statistics tended to report higher statistical literacy.

Perceived faculty teaching practices emerged as the strongest significant predictor ($B = 0.566$, $SE = 0.048$, $\beta = .717$, $t = 11.829$, $p < .001$). Controlling for the other variables, a one-unit increase in perceived faculty teaching practices was associated with a 0.566-unit increase in perceived statistical literacy. Its standardized coefficient indicated that it made the largest unique contribution among the predictors included in the model. This finding highlights the importance of teaching practices that actively engage students in interpreting, analyzing, and applying statistical information. Theobald et al. (2020) similarly showed that active-learning approaches can

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improve student outcomes, although their study addressed science, technology, engineering, and mathematics courses more broadly.

In contrast, perceived prior mathematical knowledge did not significantly predict perceived statistical literacy ($B = 0.110$, $\beta = .118$, $p = .253$). Statistical self-efficacy ($B = -0.039$, $\beta = -.043$, $p = .545$), statistics anxiety ($B = -0.054$, $\beta = -.056$, $p = .623$), and the use of technology in learning statistics ($B = -0.035$, $\beta = -.041$, $p = .672$) were also nonsignificant predictors. Therefore, the null hypotheses were not rejected for these variables.

The negative coefficients for self-efficacy, anxiety, and technology use should not be interpreted as evidence that these factors reduced students' statistical literacy because their effects were not statistically significant. Their coefficients represent their unique relationships with perceived statistical literacy after the overlapping effects of the other predictors were controlled. In particular, the nonsignificant result for technology use suggests that the availability or frequency of technology use alone may not be sufficient to enhance learning. The educational value of technology depends on how it is integrated into instruction and learning activities (Bond et al., 2020).

The findings indicate that perceived faculty teaching practices and attitude toward statistics were the significant predictors of students perceived statistical literacy. Perceived faculty teaching practices had the strongest standardized effect. Nevertheless, because the study used perceptual and cross-sectional data, the coefficients indicate predictive associations and should not be interpreted as proof of causal effects.

CONCLUSIONS

Based on the findings, the following conclusions were drawn:

1. The respondents were predominantly 20–21 years old, female, and enrolled in the BSMA program. Consequently, the findings primarily represented the perceptions of students belonging to these demographic and academic groups.

2. The respondents perceived themselves as having adequate prior mathematical knowledge and generally positive attitudes and self-efficacy toward statistics. They also reported using technology and experiencing generally positive faculty teaching practices. However, their agreement with the statistics-anxiety statements indicated that nervousness and discomfort remained present during statistical activities.

3. The respondents generally perceived themselves as statistically literate, particularly in understanding and interpreting statistical information. Nevertheless, their rating indicated that their perceived statistical literacy had not yet reached the highest level of the measurement scale, leaving room for further development.

4. Age was not significantly associated with the proposed determinants or perceived statistical literacy. Within the relatively limited age range represented in the sample, age did not meaningfully explain differences in students' statistical learning experiences or perceived competence.

5. Sex was associated with perceived prior mathematical knowledge, attitude toward statistics, statistics anxiety, and technology use. However, male and female respondents demonstrated comparable statistical self-efficacy, perceptions of faculty teaching practices, and perceived statistical literacy.

6. College program was associated with attitude toward statistics, statistical self-efficacy, statistics anxiety, and technology use. Nevertheless, students from the BSA, BSMA, and BSBA programs reported comparable prior mathematical knowledge, faculty teaching practices, and perceived statistical literacy.

7. Attitude toward statistics and perceived faculty teaching practices significantly predicted perceived statistical literacy. Among the variables examined, perceived faculty teaching practices made the

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strongest unique contribution. Prior mathematical knowledge, statistical self-efficacy, statistics anxiety, and technology use did not significantly predict perceived statistical literacy after the effects of the other predictors were controlled.

8. The findings support the conclusion that developing statistical literacy depends not merely on students' mathematical background or access to technology. How statistics is taught and how students view the subject appear to be particularly important. However, the predictive relationships should not be interpreted as causal effects because the study employed a cross-sectional design and relied on self-reported perceptions.

RECOMMENDATIONS

Based on the conclusions, the following recommendations are proposed:

1. Statistics instructors should use clear explanations, authentic datasets, guided practice, timely feedback, and activities that require students to interpret and communicate statistical results. Instruction should emphasize conceptual understanding and practical application rather than formula memorization alone.

2. Faculty members should provide learning activities that develop positive attitudes toward statistics. These may include discipline-specific examples, real-life decision-making problems, collaborative data investigations, and research-related statistical tasks relevant to BSA, BSMA, and BSBA students.

3. The university may provide faculty development programs focusing on student-centered statistics instruction, authentic assessment, data visualization, statistical software, and strategies for teaching statistical reasoning and literacy.

4. Statistics-anxiety support should be incorporated into instruction through scaffolded activities, low-stakes exercises, constructive feedback, peer assistance, and gradual exposure to increasingly complex statistical problems. Such support should be made available to all students rather than based solely on sex or college program.

5. Technology should be integrated purposefully into statistics courses. Students should be taught not only how to generate statistical output but also how to verify results, select appropriate procedures, interpret findings, and identify potentially misleading data presentations.

6. Program heads and statistics instructors should review differences in attitudes, self-efficacy, anxiety, and technology use across college programs. Learning materials and examples may be contextualized according to each program while maintaining common statistical-literacy outcomes.

7. Statistical-literacy assessment should include objective performance tasks in addition to self-report questionnaires. Students may be asked to interpret tables and graphs, assess the representativeness of samples, distinguish correlation from causation, detect misleading claims, and explain statistical findings in their own words.

8. Future researchers should include students from more academic programs, year levels, and institutions to improve the generalizability of the findings. Longitudinal, experimental, or mixed-method studies may also be conducted to examine how teaching practices and attitudes influence the development of statistical literacy over time.

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