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The Correlation between Java Programming and BSICT Graduate Attributes of Information Technology Students at Surigao del Norte State University

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ABSTRACT

This study examines the relationship between graduate attributes of 150 Bachelor of Science in Information Technology (BSIT) students and Java programming. The study focuses on graduate-level skills like problem-solving abilities, communication, and problem analysis in relation to Java programming elements like classes, file handling, and methods. A 5-point Likert scale rating is incorporated into the survey questionnaire design in order to quantitatively evaluate the responses. The study makes use of the Jamovi application as a statistical spreadsheet. The outcome shows a good relationship between the characteristics of BSIT graduates, such as communication, problem-solving skills, and problem analysis, and Java programming elements like classes, file handling, and methods. Additionally, some BSIT students find it difficult to use complicated methods, indicating the necessity for instructional strategies, practical projects, assessments, and peer programming exercises.

Key words : classes, communication, computing problems, file handling, Java programming, methods, problem analysis, students, technology.

1. INTRODUCTION

The difficulty of building an efficient pedagogy for teaching computer programming languages to students is one that universities in developing and some industrialized nations are currently facing [4]. In recent years Java programming a popular programming language is used in computing education [2] and is rated as the second most active language in the world based on GitHub active repository statistic [3]. Although, Java programming is perceived to be a difficult subject. The educated programmer is in demand in the local and international market in creating computer application [7]. Teaching Java in educational systems presents challenges for teachers and students due to its complex nature and steep learning curve [1].

As the world becomes more uncertain due to the speed at which technology is developing and the nature of employment, combined with other equally, if not more, worrisome social and political disturbances, the assurance of graduate traits crucial to citizenship and employability becomes even more crucial [9]. The increasing demand for Information Technology (IT) professionals including Java programmers is rising and hence the pressure on IT institutions to train more and more students in this technical area is becoming crucial [13]. For information systems engineers, software engineers, and programmers in general, having strong technical programming skills is essential. Nevertheless, in order to succeed in the workplace, individuals also need to have the necessary soft skills, such as communication, problem-solving, and teamwork [11].

Developing programming skills is not an easy task for teaching and learning. Recently, research has been made in order to study the difficulties that students have for learning programming [8]. Programming is one of the essential and most difficult skills to learn in the computer field and other disciplines. Programming can seem more troublesome for novices who have not learned programming concepts, usage and other basic programming skills [14]. Programming is a difficult task that requires the creation of new ideas, thinking, and creative skills [5]. There is no doubt that learning computer programming at a young age is helpful for all students at least in their everyday life. The benefits of learning programming help young students to gain advantages in thinking, processing and communication [10].

Acquiring computer programming knowledge necessitates having complex and challenging problem-solving, coding, and computational skills [6]. Problem analysis is crucial for creating solutions to complex issues, but students face

challenges in identifying classes, characteristics, methods, and associations, and mapping them to program code [12]. These challenges are also obvious in the Bachelor of Science in Information Technology (BSIT) degree at Surigao del Norte State University (SNSU), where students struggle to master computer programming like Java programming language despite the school's emphasis on the matter. Presently, research on correlation between Java Programming and BSIT Graduate Attributes in university has not yet been conducted. This prompted the researcher to conduct the study on determining the correlation of BSIT Graduate Attributes such as communication, knowledge for solving computing problems, and problem analysis versus classes, file handling, and methods of Java Programming language. Furthermore, the study's findings provide a clear framework for taking the required steps and recommendations to guarantee that the undesirable gap will be closed in order to maintain the university's BSIT program's high standard of education.

1.1 Conceptual Framework

Figure 1 depicts the association between BSIT graduate attributes in terms of communication, knowledge for solving computing problems and problem analysis as related to classes, file handling, and methods. The study's conclusion will depend on how the features of the Java programming language relate to the traits of a BSIT graduate. The components of the Java programming language and the characteristics of graduates determine whether or not BSIT students are ready for the demands of the workforce.

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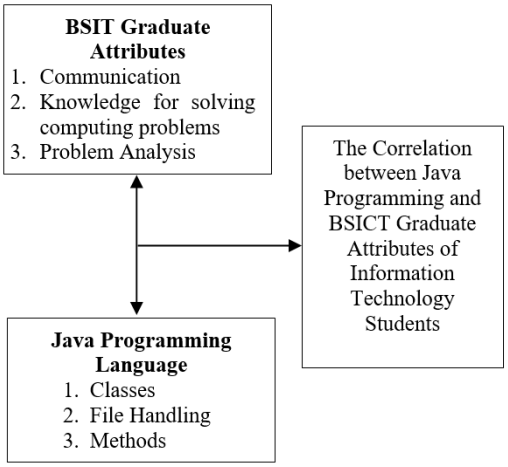

Figure 1: Conceptual Framework of the Study

2. METHODOLOGY

The questionnaire was designed to examine the relationship between the graduate attributes of 150 Bachelor of Science in Information Technology (BSIT) students and Java programming. The study focuses on graduate-level skills like problem-solving abilities, communication, and problem analysis in relation to Java programming elements like classes, file handling, and methods. There were 150 students from the Bachelor of Science in Information Technology program are selected as the respondents of the study. A Likert scale rating is used to quantitatively assess the responses of the students. It is made up of 5 scales: (1) agree, (2) strongly agree, (3) maybe, (4) disagree, and (5) strongly disagree. Google Forms was used for the administration of the survey. The collected responses were tallied, and the data were downloaded to Jamovi, a new "3rd generation" statistical spreadsheet designed from the ground up to be easy to use. The mean, median, standard deviation, skewness, and kurtosis were calculated using descriptive statistics.

3. RESULTS AND DISUSSION

The following table and graphs below illustrate descriptive statistics regarding the correlation of students' Java programming across four categories: classes, file handling, and methods versus BSIT graduate attributes such as communication, knowledge for solving computing problems, and problem analysis.

Descriptives

								Skewness		Kurtosis	
	N	Missing	Mean	Median	SD	Minimum	Maximum	Skewness	SE	Kurtosis	SE
Knowledge for solving computing problems	150	0	1.87	1.80	0.808	1.00	4.00	0.586	0.198	-0.686	0.394
Problem Analysis	150	0	2.03	2.00	0.881	1.00	4.00	0.338	0.198	-1.031	0.394
Classes	150	0	2.15	2.08	0.798	1.00	4.60	0.467	0.198	-0.540	0.394
File Handling	150	0	2.01	1.92	0.837	1.00	4.00	0.406	0.198	-0.990	0.394
Methods	150	0	1.85	1.78	0.611	1.00	3.40	0.540	0.198	-0.603	0.394

Figure 2: Descriptive Analysis Result

Figure 2 contains the descriptive analysis in which it clearly states that all variables have means and medians relatively close to each other, indicating symmetric distributions. The standard deviations are relatively low, indicating the data points are close to the means. All variables show positive skewness, with values ranging from 0.338 to 0.586, indicating that the right tail is longer or fatter than the left. All variables have negative kurtosis, ranging from -0.467 to -1.031, suggesting that the distributions are flatter than a normal distribution.

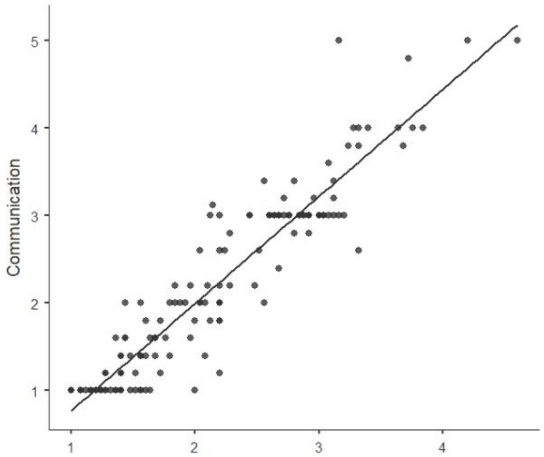

Figure 3: Classes and Communication

Figure 3 shows a scatter plot which demonstrates a strong positive correlation between "Classes" and "Communication" with a linear trend line. As the number of "Classes" increases, the "Communication" scores also tend to increase. The data points are distributed evenly along the trend line, but there is variability within each class level. The "Classes" variable may represent different levels of education, training, or experience. The strong linear relationship suggests a high positive correlation coefficient (close to +1).

Figure 4 shows the scatter plot which reveals a positive correlation between communication and file handling skills, suggesting that as individuals improve their communication skills, their file handling skills also improve. This suggests that better communication skills are linked to better organizational and technical skills, such as file handling. Further statistical analysis could provide more detailed insights into this relationship.

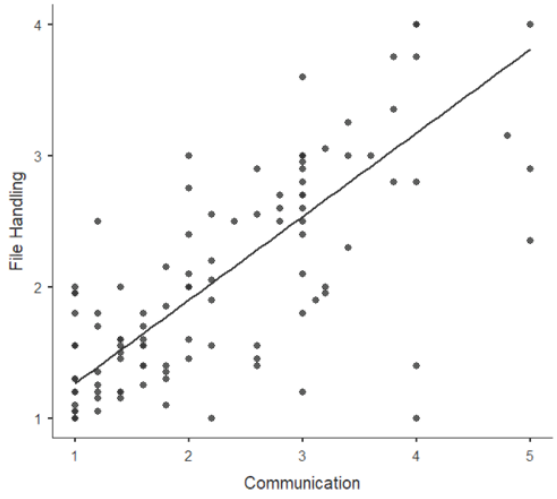

Figure 4: File Handling and Communication

Figure 5 shows a scatter plot which suggests that there is a positive relationship between Communication and Methods, meaning that as Communication increases, Methods tends to increase as well. However, the spread of the points around the trend line indicates that this relationship is not very strong, and there may be other factors influencing the Methods variable.

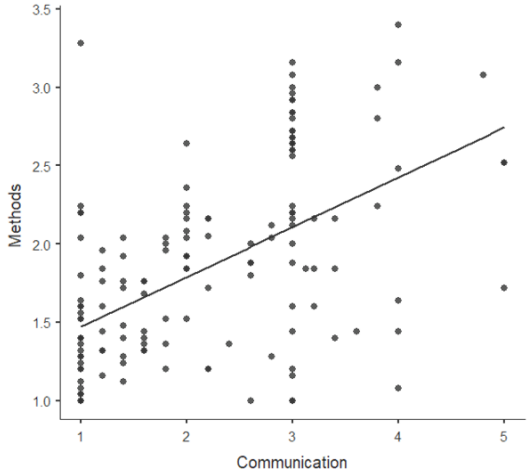

Figure 5: Methods and Communication

Figure 6 shows a scatter plot which suggests that there is a positive relationship between Knowledge for solving computing problems and the number of Classes, meaning that as Knowledge increases, the number of Classes tends to increase as well. However, similar to the first plot, the spread of the points around the trend line indicates that this relationship is not very strong, and there may be other factors influencing the Classes variable.

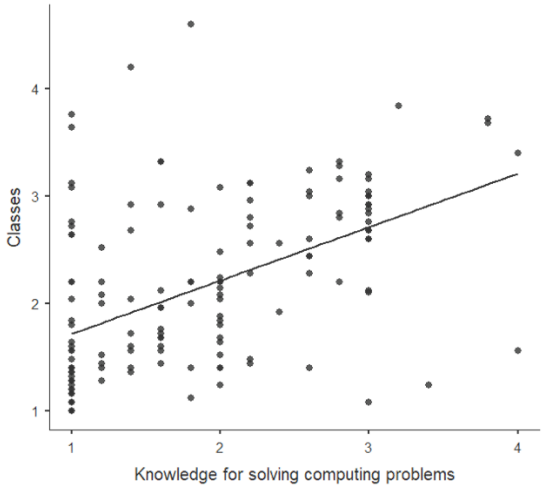

Figure 6: Knowledge for solving computing problems and Classes

Figure 7 shows a scatter plot which suggests that there is a positive relationship between Knowledge for solving computing problems and File Handling, meaning that as Knowledge increases, File Handling tends to increase as well. However, similar to the previous plots, the spread of the points around the trend line indicates that this relationship is not very strong, and there may be other factors influencing the File Handling variable.

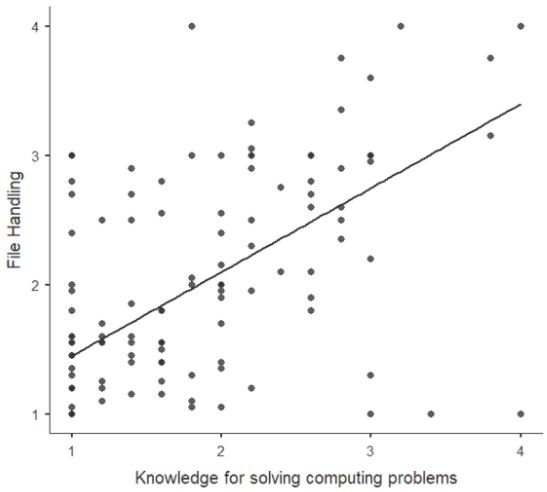

Figure 7: Knowledge for solving computing problems and File Handling

Figure 8 shows a trend line which suggests a positive correlation, indicating that as the knowledge for solving computing problems increases, the use or variety of methods also increases. There is some dispersion around the trend line, with points scattered above and below it. However, the overall trend remains upward. There is a higher density of points around the middle of the x-axis (around 2 to 3) and the y-axis (around 2 to 2.5), indicating that most observations fall within this range. The scatter plot indicates that individuals with higher knowledge for solving computing problems tend to utilize more methods. This positive correlation suggests that enhancing one's problem-solving knowledge could lead to a broader application of methods. However, there is variability in the data, as not all individuals with the same level of knowledge use the same number of methods.

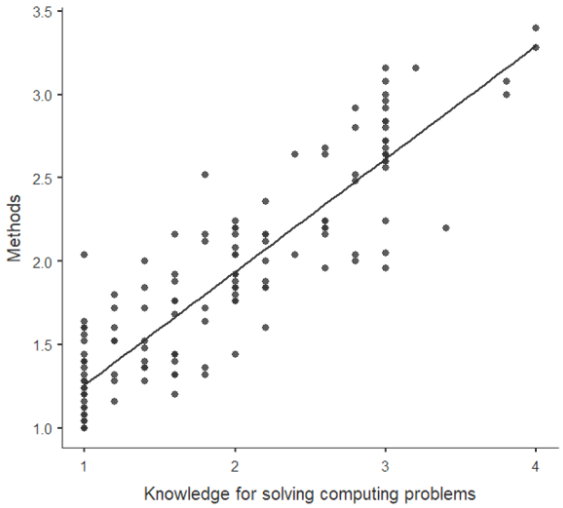

Figure 8: Knowledge for solving computing problems and Methods

Figure 9 shows a scatter plot which suggests that individuals with better problem analysis skills tend to use more classes. This positive correlation indicates that enhancing problem analysis abilities could lead to a more sophisticated or numerous uses of classes. However, as with the previous plot, there is variability in the data, meaning not all individuals with the same level of problem analysis skill use the same number of classes. This variability is reflected in the dispersion of points around the trend line.

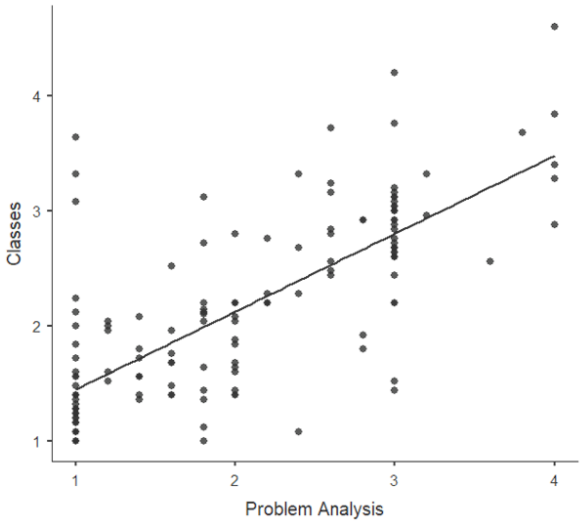

Figure 9: Classes and Problem Analysis

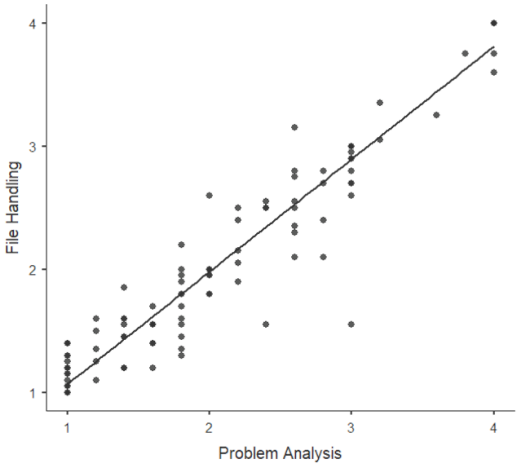

Figure 10: File Handling and Problem Analysis

Figure 10 shows a scatter plot that indicates a strong positive correlation between problem analysis skills and file handling capabilities. Individuals with better problem analysis skills tend to have better file handling abilities. This strong correlation suggests that enhancing problem analysis skills can lead to significant improvements in file handling. The relatively tight dispersion around the trend line indicates that this relationship is more consistent and less variable compared to the previous plots.

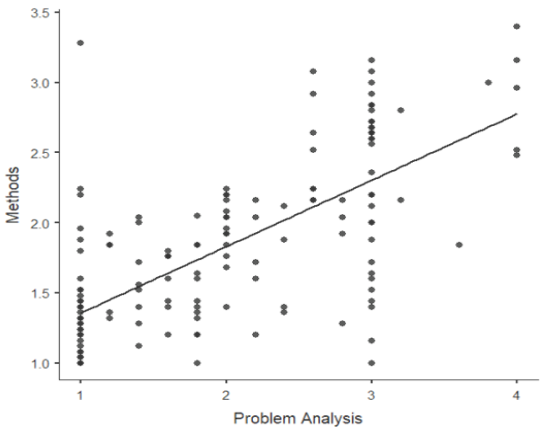

Figure 11: Methods and Problem Analysis

Figure 11 shows a scatter plot shows the relationship between "Problem Analysis" and "Methods". There is a trend line indicating a positive correlation between the two variables. As "Problem Analysis" scores increase, "Methods" scores also tend to increase. The data points are scattered around the trend line, indicating some variability but a generally positive relationship. There is a wide range of "Methods" scores for each "Problem Analysis" score, suggesting that other factors might also influence the "Methods" scores.

4. CONCLUSION AND RECOMMENDATION

Conclusion

The survey findings provide valuable insights into the programming capabilities of 150 BSIT students across these areas. While many students agree they have basic knowledge, others may struggle with more complex method utilization. Targeted instructional strategies could help bridge this gap and improve overall competency in method usage. There is a need for further emphasis on class implementation in java programming language to ensure students gain a more robust and uniform understanding of this critical programming concept. Enhancing instructional support in file handling techniques could help standardize students' proficiency in this area.

Recommendation

To improve Java class implementation competency, instructors should assign practical projects, provide regular assessments, and incorporate real-world file operations projects. Additional learning resources, tutorials, peer programming exercises, and interactive coding sessions can help students identify and overcome challenges, enhance their understanding of object-oriented programming principles, and improve their proficiency in various methods.

REFERENCES

1. Kayumov, A., & Mirzakarimov, B. **Problems of Teaching the JAVA Programming Language in Educational Systems.** *The Descendants of Al-Farghani, 1(2), 23–26,* 2023
2. Neil C. Brown, Pierre Weill Tessier, Maksymillian Sekula, and Alexandra-Lucia Costache. **Novice Use of the Java Programming Language**, *ACM Transactions on Computing Education*, DOI:10.1145/3551393 August 2022
3. Idongesit Eteng, Sylvia Akpotuzor, Solomon O. Akinola, Iwinosa Agbonlahor. **A review on effective approach to teaching computer programming to undergraduates in developing countries,** *Scientific African*, Volume 16, July 2022
4. Leon Christopher and Alexander Waworuntu. **Java Programming Language Learning Application Based on Octalysis Gamification Framework,** *IJNMT (International Journal of New Media Technology), 8*(1),pp. 65-69, 2021
5. Ogunlade Bamidele Olusola , Benedict Samaila Bahago , Aderemi Sunday Ogunmodede, **Strengthen First-Computer-Based Computer-Based Student Programming Skills,** *European Journal of Education and Pedagogy, 2(6), 68–74,* 2017
6. Nerico L. Mingoc, Erik Louwe R. Sala. **Design and Development of Learn Your Way Out: A Gamified Content for Basic Java Computer Programming,** https://doi.org/10.1016/j.procs.2019.11.211, July 2019
7. Devine Grace D. Funcion. **Development of Random Tree Based Student Competency Model in Java Programming,** *Indian Journal of Science and Technology*, Vol 12(6), February 2019
8. Reyes Juárez-Ramírez; Christian X. Navarro; Verónica Tapia-Ibarra; Ricardo Macías-Olvera; César Guerra-García. **What is Programming? Putting all Together - A Set of Skills Required,** *2018 6th International Conference in Software Engineering Research and Innovation (CONISOFT), San Luis Potosi, Mexico, pp. 11-20,* 2018
9. Beverley Oliver, Trina Jorre de St Jorre. **Graduate attributes for 2020 and beyond: recommendations for Australian higher education providers,** *Higher Education Research & Development, 37(4), 821–836. https://doi.org/10.1080/07294360.2018.1446415,* 2018
10. Jancheski, Metodija. **Improving Teaching and Learning Computer Programming in Schools through Educational Software.** *Olympiads in Informatics*, July 2017
11. Bojan Tomić, Jelena Jovanović, Nikola Milikić, Vladan Devedžić, Sonja Dimitrijević, Dragan Đurić, Zoran Ševarac. **Grading students' programming and soft skills with open badges: A case study.** *https://doi.org/10.1111/bjet.12564*, 28 June 2017
12. K. M. M. Rajashekharaiah, M. Pawar, M. S. Patil, N. Kulenavar and G. H. Joshi. **Design Thinking Framework to Enhance Object Oriented Design and Problem Analysis Skill in Java Programming Laboratory: An Experience,** *IEEE 4th International Conference on MOOCs, Innovation and Technology in*

Education (MITE), Madurai, India, 2016, pp. 200-205, doi: 10.1109/MITE.2016.048. 2016

13. Murtala Mohammed1, Abdulwahab Lawan2, Bashir S. Galadanci3, Mijinyawa1 M.K. **Detection and Categorization of Errors by Novice Programmers in a First Year Java Programming Class: A Comparative Analysis,** *Proceedings of the The Third International Conference on Digital Enterprise and Information Systems, Shenzhen, China,* 2015
14. Seyyed Meisam Taheri, Minoru Sasaki, Harrison Thuku Ngetha. **Evaluating the effectiveness of problem solving techniques and tools in programming,** *Science and Information Conference (SAI),* London, UK, pp. 928-932, 2015,