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Navigating teaching performance in the new normal: insights from student ratings

Junrie B. Matias[1], Gladys L. Lagura[2], Grace T. Flores[2], Trixie E. Cubillas[2], Laurence B. Calagui[3], Myron T. Cubillan[2], Ritchfildjay L. Mariscal[4], Erlin S. Rodas[5], Miraluna L. Herrera[3], Renante P. Tabudlong[5]

[1]College of Computing and Information Sciences, Caraga State University-Main Campus, Butuan City, Philippines
[2]College of Education, Caraga State University-Main Campus, Butuan City, Philippines
[3]College of Mathematics and Natural Sciences, Caraga State University-Main Campus, Butuan City, Philippines
[4]College of Tourism and Hospitality Management, Caraga State University-Cabadbaran Campus, Cabadbaran City, Philippines
[5]College of Industrial Technology and Teacher Education, Caraga State University-Cabadbaran Campus, Cabadbaran City, Philippines

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ABSTRACT

The COVID-19 pandemic caused unprecedented disruption worldwide, forcing higher education institutions to adopt blended learning. This sudden shift posed numerous challenges for both students and faculty members, making it essential to accurately evaluate teaching performance and effectiveness. Caraga State University, for instance, assesses teaching performance based on several criteria: communication, instruction, consultation, and assessment, each with varying weights. Concerns have arisen regarding the non-uniform distribution of these weights, and it remains unclear which criterion most significantly impacts overall teaching performance as perceived by students. This study analyzed 22,825 samples from Caraga State University's personnel evaluation system for the first semester of the 2021-2022 academic year using artificial neural networks (ANN). The study sought to uncover patterns in the data and provide insights into faculty performance. The results revealed that in the context of blended learning, assessment and academic integrity (AAI) influence most students' ratings of faculty performance. Engagement and consultation (EC) follow, with communication and instruction having the lowest relative importance. This study contributes to improving teaching strategies and enhancing the student's learning experience in higher education institutions.

Corresponding Author:

Junrie B. Matias
College of Computing and Information Sciences
Caraga State University-Main Campus
Ampayon, Butuan City, Philippines
Email: jbmatias@carsu.edu.ph

1. INTRODUCTION

The COVID-19 pandemic has been one of the most disruptive and life-changing events in recent years. With impacts felt worldwide, higher education institutions were among sectors that were hit the hardest [1]. In response to the crisis, students and faculty urgently adapted to sustain educational activities amid unprecedented challenges. The shift to blended learning necessitated implementing learning management systems (LMS) and virtual classrooms. This transition caught many off guard, forcing school administrators and teachers into a rapid learning curve to acquire new skills quickly [2]. Despite the challenges, students and instructors gradually adapted, demonstrating resilience and adaptability [3].

Advancements in web-based technologies have revolutionized teaching and learning, pushing the boundaries of traditional education. Learning is no longer a passive experience for students, nor a one-way instructional process for teachers. It becomes a dynamic exchange fostering interactions and connections between students and teachers. It becomes a dynamic exchange fostering interactions and connections between students and teachers. This shift to dynamic learning environments necessitates flexible instructional methods, encouraging deeper interpretation and understanding of the teaching and learning processes [4].

As education is continually evolving, teachers must be prepared to adapt their lessons to meet the needs of their students. Even after the 2019 pandemic, blended learning modes are widely used and accepted by educators, students, and universities [5], [6]. One way to evaluate this is through faculty performance evaluation, in which faculty members are rated by their students. Undergraduate student feedback has been a standard practice for over 80 years and has gained importance in recent decades [7].

With Caraga State University as a case in point, faculty performance evaluation was performed at the end of each semester based on five key criteria: communication and information (CI), instruction and learning (IL), engagement and consultation (EC), assessment and academic integrity (AAI), and general assessment (GA). Students rated faculty members using these criteria with a 5-point Likert scale, where 1 signified the lowest and 5 was the highest. Student ratings were then subjected to descriptive analysis and weighted as follows: 15% for CI, 25% for IL, 15% for EC, 25% for AAI, and 20% for GA.

However, concerns arise from the uneven distribution of weights assigned to these constructs, potentially leading faculty members to prioritize instruction and assessment while neglecting other areas such as communication and consultation [8]. The relative importance of each construct remains unclear [9]–[11]. Determining this can guide faculty in allocating appropriate time and resources [9], [12], [13]. Understanding these priorities allows teachers to tailor their methods and strategies to enhance their performance as perceived by students [14]. While various constructs can measure teaching performance, this study focuses on the specified constructs or criteria and existing data from the university [15].

This study sought to identify the most influential criteria affecting overall teaching performance by analyzing faculty ratings stored in the university's database, utilizing artificial neural networks (ANN) as a computational tool to uncover complex relationships within the data [16]–[18]. By focusing on the key factors of CI, IL, EC, and AAI, the study aimed to determine which aspects most significantly impact teaching performance. The findings from this study could offer valuable insights into refining teaching strategies, enabling faculty to allocate their time and resources more effectively. This would also enhance students' learning experiences, foster more engaging academic environments, and help educational institutions to better support their pedagogical objectives. Lastly, the findings could serve as a foundation for informed policymaking and professional development initiatives within higher education institutions.

2. METHOD

2.1. Research model

GA or overall faculty performance can be conceptualized as the quality or quantity of faculty behavior or the degree to which a faculty member has accomplished the goals of teaching, research, or service [19]–[21]. The concept of faculty performance can also be defined as the degree to which faculty members contribute to social support, integration, or coordination of effort within a university. However, in this model, we measured teaching performance, as shown in Figure 1, and it is believed to be influenced by the following criteria:

- Online CI are determining factors for blended teaching-learning activities [22]. With the advent of web 2.0, online communication and interaction have become customary in higher education, potentially signaling a significant change from the traditional learning models previously employed [23]. Online communication and interaction facilitate both real-time and asynchronous connections, enabling individuals to collaborate seamlessly across geographical boundaries [24].
- IL refers to an educational approach that combines traditional face-to-face instruction with online learning activities or resources. Assessments can be conducted either online or in class to create a cohesive learning experience. Patchan *et al.* [25], it was suggested that blended instruction accelerated learning, and similar results were found where students who received blended instruction performed better than those who received face-to-face instruction [26]. Xu *et al*. [27], blended learning showed a substantial and favorable effect on students' course grades and completion rates when compared to traditional face-to-face instruction; however, no study found where students performed worse with blended instruction.
- EC refers to faculty availability for student consultations, responsiveness to queries, and active engagement in academic discussion. Student engagement has been widely discussed and seen as a measure of educational quality, impacting persistence, satisfaction, learning, and degree completion [28]. Due to the impact of COVID-19, most activities have shifted online, facilitating effective student-content interaction [29], and meeting student priorities through synchronous and asynchronous modes [30].

Accordingly, when teachers engage in discussions on online platforms, they tend to exhibit heightened levels of engagement, which, in turn, enhances their learning performance [28].

– AAI are processes of evaluating students' progress and learning. It involves a diverse range of methods and tools designed to gauge the understanding, skills, and knowledge acquisition across various subjects and disciplines. This criterion also examines how faculty design assessments, maintain academic integrity and evaluate student work fairly. Academic integrity involves adhering to essential principles such as honesty, trust, fairness, respect, responsibility, and courage in any academic endeavor [31]. Subsequently, students are drawn to authentic assessment as a learning tool because it encourages active engagement with tasks and fosters motivation [32].

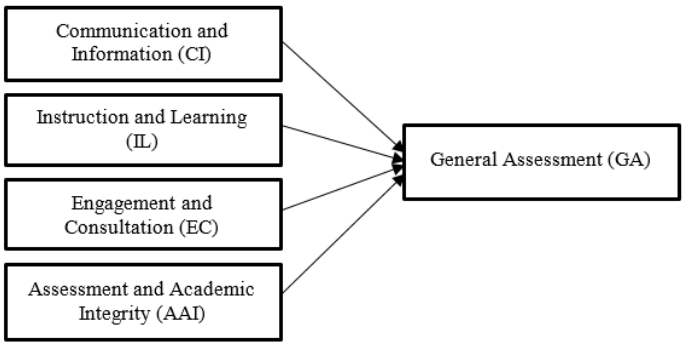

Figure 1. Research model

2.2. Data collection

This study utilized existing data from the personnel evaluation system at Caraga State University during the first semester of the academic year 2021-2022. Permission was granted by the university to use these data. The model was constructed based on existing data, which encompassed several critical dimensions: CI, IL, EC, AAI, and GA.

Moreover, 22,825 usable samples were gathered after removing rows with missing values, identical values, and rows containing redundant information. To protect the identity of the students and faculty, the collected data were restricted to the actual ratings without any additional demographic information. As a result, we could not precisely quantify the demographics based on the given data, and these data were in the form of a 5-point Likert scale and subsequently processed using IBM SPSS, a widely used statistical software package for data analysis and modeling.

2.3. Data analysis

This study utilized an ANN as the computational model. This method is primarily used to uncover relationships between variables rather than explicitly test hypotheses [33], [34]. ANNs perform tasks such as pattern recognition, classification, and regression by learning from data without relying on predefined hypotheses. Unlike traditional statistical methods, which often involve explicit hypothesis testing, ANNs operate by learning complex mappings from input to output based on the available data. Their ability to capture intricate patterns and nonlinear relationships makes them valuable tools for various applications [35].

3. RESULTS AND DISCUSSION

3.1. Descriptive results

The descriptive results offer valuable insights into different constructs and indicators. Table 1 presents the following key observations. Indicators such as the orientation of the course syllabus (4.287), utilization of online platforms for tasks (4.235), and the utilization of a variety of teaching methods and approaches (4.178) are highly rated, indicating effective CI dissemination. Within IL, IL3 indicators for flexible timelines (4.212), IL5 easily accessible online materials (4.258), and IL6 clear instructions on requirements and submission (4.211) are highlighted, suggesting that there is a conducive learning environment. The importance of EC1 announcing consultation hours (4.115), EC2 providing platforms for group interaction (4.174), and EC6 engaging in learning experiences through teacher-student interaction (4.024) is emphasized to foster good student engagement. Reasonable timeframes for assessment tasks (AAI1) (4.193), AAI2 detailed guidance on assessment formats and expectations (4.155), and AAI6 preservation of academic integrity (4.216) during

assessments are highlighted, indicating that students are committed to fair evaluation practice. Finally, the results suggest strong satisfaction with faculty teaching performance across all assessed areas, reflecting positively on the effectiveness of online and blended learning delivery.

Table 1. Descriptive results of indicators

	Constructs and indicators	Mean	Std
CI1	Explaining the course syllabus thoroughly and making it accessible for reference	4.287	.840
CI2	Communicating schedule changes, like makeup classes or rescheduled sessions	3.942	.953
CI3	Utilizing online platforms to inform students about course tasks or reminders	4.235	.871
CI4	Utilizing a variety of teaching methods and approaches to raise awareness	4.178	.896
CI5	Providing necessary guidance for using technology or modules to support self-learning	4.145	.882
CI6	Providing communication channels for faculty-student interaction, including addressing queries and offering feedback outside of class	3.977	.891
IL1	Engaging students by discussing material updates and clarifying course requirements	4.191	.866
IL2	Supplying additional resources to reinforce understanding and encourage independent learning	4.157	.883
IL3	Establishing flexible timelines for assignments to accommodate diverse schedules	4.212	.890
IL4	Delivering clear explanations of course topics to aid comprehension and retention	4.078	.908
IL5	Ensuring online materials are easily accessible for a smooth learning experience	4.258	.855
IL6	Providing detailed instructions and deadlines for assignments, projects, and assessments	4.211	.883
EC1	Communicating faculty availability for student consultations, via virtual or in-person sessions	4.115	.929
EC2	Encouraging collaborative learning through group activities, both online and offline	4.174	.883
EC3	Facilitating group or class interactions interactions effectively with worksheets and supplementary learning materials	4.090	.900
EC4	Engaging in diverse online and offline interactions to enhance student learning experience	4.006	.941
EC5	Responding promptly to student inquiries for academic support via various communication channels	3.984	.980
EC6	Encouraging class interactions and discussions to motivate students to share knowledge and experiences, enhancing understanding of the subject matter	4.024	.951
AAI1	Establishing appropriate deadlines for assessments to allow adequate preparation time	4.193	.881
AAI2	Offering detailed guidance on assessment formats and expectations	4.155	.875
AAI3	Implementing measures to maintain academic integrity during assessments	4.181	.879
AAI4	Designing engaging assessment methods to cater to diverse learning styles	4.103	.904
AAI5	Providing timely and constructive feedback to aid student improvement	4.055	.930
AAI6	Ensuring fairness and ethical conduct throughout the assessment process	4.216	.858
GA1	Overall teaching performance	4.288	.855

As shown in Table 2, the correlation results indicate a strong positive relationship among the various constructs assessed in this study. All predictors of faculty performance were highly correlated, with correlation coefficients ranging from 0.921 to 0.946. This suggests that these constructs are closely intertwined and mutually reinforce each other. Moreover, the GA also shows significant positive correlations with all other constructs, though slightly weaker than the correlations among the other constructs. This indicates that the overall faculty performance is closely related to EC, IL, CI, and AAI.

Table 2. Correlation matrix

Constructs	CI	IL	EC	AAI	GA
CI	1	.940**	.929**	.921**	.848**
IL	.940**	1	.937**	.945**	.858**
EC	.929**	.937**	1	.946**	.859**
AAI	.921**	.945**	.946**	1	.862**
GA	.848**	.858**	.859**	.862**	1

**Correlation is significant at the 0.01 level (2-tailed)

3.2. ANN

Figure 2 illustrates the neural network model where the input features (CI, IL, EC, AAI) are processed through a hidden layer to predict an output (GA), with biases added to adjust the network's predictions. The model has four inputs: EC, IL, CI, and AAI. These inputs are forwarded to a single hidden layer to produce a GA as the output. Here, 70% of the data was allocated for network training, while the remaining 30% served as the testing set [36]. All inputs and outputs were normalized to the range [0, 1] to ensure that all input features have similar scales, stabilize the training process, and give the model an easy interpretation.

Moreover, as shown in Table 3, we implemented a tenfold cross-validation procedure, and the training and testing root mean squared error (RMSE) values are between 0.2 and 0.5 indicating a reliable data prediction. Additionally, this shows that the model accurately captures both linear and nonlinear relationships. The model signifies high accuracy in predicting relationships by having small mean RMSE values and negligible standard deviations during training and testing.

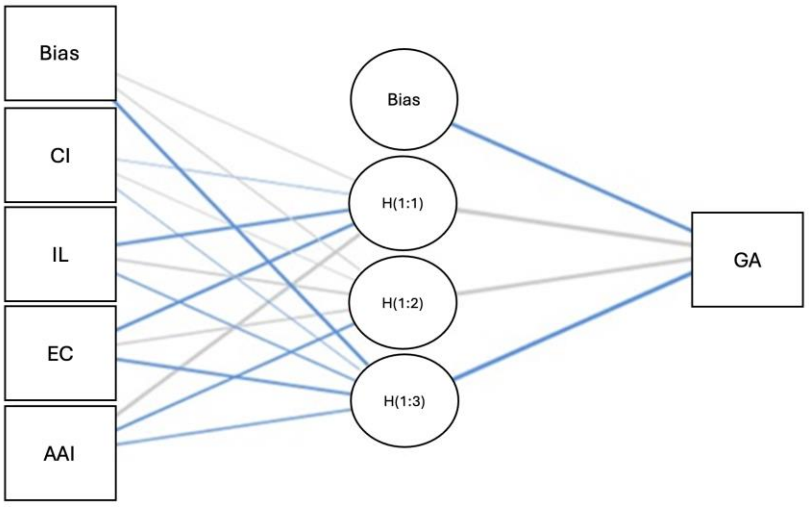

Figure 2. ANN model to determine the most influential construct on teaching performance and effectiveness

Table 3. RMSE values of ANN

Neural networks	RMSE (training)	RMSE (testing)
1	0.381	0.364
2	0.382	0.371
3	0.372	0.393
4	0.389	0.398
5	0.381	0.377
6	0.380	0.379
7	0.388	0.366
8	0.388	0.374
9	0.375	0.407
10	0.384	0.371
Mean	0.382	0.380
Std	0.006	0.014

3.3. The sensitivity analysis

Table 4 presents the relative importance of the constructs derived from ANN sensitivity analysis. AAI emerged as the most influential variable with a mean importance score of 0.550. This result suggests a strong and positive perception among students regarding the faculty's assessment activities in blended learning settings. This insight implies that students are satisfied with online and offline assessment tasks given a reasonable timeframe and clear instructions for each assessment tool. As the most important indicator of faculty performance, faculty members may spend more time preparing for more quality activities or assessment tasks.

Table 4. Relative importance of constructs

Network	Relative importance			
	CI	IL	EC	AAI
1	0.174	0.059	0.361	0.406
2	0.191	0.018	0.213	0.577
3	0.109	0.057	0.331	0.503
4	0.138	0.053	0.167	0.642
5	0.206	0.062	0.281	0.451
6	0.190	0.069	0.181	0.559
7	0.163	0.072	0.116	0.649
8	0.163	0.072	0.116	0.649
9	0.117	0.095	0.252	0.536
10	0.109	0.153	0.208	0.529
Mean importance	0.156	0.071	0.223	0.550
Mean normalized importance (%)	28.4	12.9	40.5	100.0

Moreover, varied and enjoyable activities can enhance student engagement and motivation, especially when accompanied by timely feedback from the instructors. Although feedback has a lower mean

value than other indicators, it remains crucial for student improvement in future tasks [31]. Notably, the high descriptive mean value (4.216) for the academic integrity (AAI6) indicator suggests that students maintain a commitment to honest assessments, even in online settings.

EC follow with an importance value of 0.223, indicating that online consultation hours are crucial for student learning [37]. The highest mean value (4.174) for CE is the EC2, the availability of group interaction platforms, where students can consult peers and teachers about blended tasks. However, online and offline consultation (EC5) has the lowest mean value (3.984) among all indicators due to the difficulty of scheduling consultations with multiple students in limited time slots. However, providing supplementary materials for peer discussion through collaboration apps can make topics easier to understand. Faculty can manage consultation hours more effectively by using online platforms like group chats to enhance student engagement and learning outcomes [28].

CI had a relative mean importance of 0.156 as a predictor of faculty performance but is essential for student collaboration [24]. Students value online platforms, instructional support tools, and diverse teaching methods. According to [38], [39], online communication in education enhances accessibility, engagement, and collaborative learning by utilizing digital tools like video conferencing and whiteboards. These technologies act as mediators facilitating dynamic interactions, enabling learners to co-construct knowledge, challenge assumptions, and shift their perspectives. Online spaces support deeper critical thinking and allow students to explore complex social issues, fostering a more inclusive and participatory learning experience compared to traditional settings.

Finally, IL had the least impact at 0.071, suggesting its quality is overshadowed by AAI and CE in blended learning. Hence, instruction in the blended mode faces challenges due to the complexity of the approach, requiring instructors to balance digital platforms and traditional settings [40]. Balancing these modes can affect student engagement and faculty performance [41]. Unlike traditional teaching, blended modes of teaching and learning lack clear performance indicators [41]. Recognizing and addressing these challenges can lead to a more holistic assessment of faculty teaching performance.

3.4. Implications and recommendations

Faculty performance is evaluated based on their ability to integrate various teaching approaches seamlessly. They are responsible for designing engaging content, facilitating discussions, and assessing students' learning. Given that assessment is the most influential factor, faculty members may prioritize designing well-structured assessment activities. Regular feedback on student performance is also essential in higher education because it helps students develop self-regulation skills, which are important for lifelong learning [31]. The work [6] confirmed that assessments positively impact blended learning, however, in their study weights on assessments are lesser compared to other factors.

Assessments alone do not fully capture a teacher's overall teaching performance [42]. Defining clear evaluation criteria for blended instruction remains a challenge [6]. It is also important to review the design of the curriculum to make it effective in a blended setting. The integration of diverse resources and the provision of supplementary materials can give additional guidance and improve student engagement [43]. Institutions should invest in faculty development programs specifically tailored to blended learning. Faculty members must be proficient in using LMS, multimedia tools, and virtual communication platforms. Lack of training can hinder a teacher's ability to effectively merge the online and face-to-face components.

Findings on CI and EC are in contrast to the work [44] by emphasizing that CI has higher importance compared to EC. These different views provided valuable insight into the complexity of this phenomenon. Even though, these factors are determinants of faculty and student performance, further research exploring these factors across diverse environments could offer a more comprehensive understanding. Higher academic institutions should promote effective communication channels between faculty and students, encourage collaborative learning activities, and facilitate opportunities for student consultation and engagement. Creating a supportive learning environment where students feel connected to their instructors and peers will enhance overall teaching effectiveness and student satisfaction.

Faculty performance evaluation is mandatory for every higher academic institution [45], [46]. If implemented effectively, it can provide clear expectations and guidance on meeting these criteria. However, unclear performance criteria can create uncertainty in evaluation results that could lead to faculty dissatisfaction and low performance. Uncertain evaluation results can have consequences not only for semester-to-semester performance but also can significantly influence their tenure and promotion.

4. CONCLUSION

The COVID-19 pandemic has forced a rapid shift to blended learning, presenting numerous challenges to educational institutions. With the adjustments made, the need to evaluate the teaching performance of the faculty and the effectiveness of this mode of delivery arises. The academic institution assesses this through student ratings. However, the relative importance of these criteria remained unclear.

This study utilized student feedback data and ANN to analyze the significance of each criterion. The results revealed that AAI had the greatest impact on faculty teaching performance, followed by EC, communication and engagement, and IL, respectively. These findings provide valuable insights into faculty development and intervention strategies in higher education institutions, suggesting the need to prioritize effective assessment practices, timely feedback, academic integrity, and meaningful consultation to enhance student engagement and overall learning outcomes in blended learning environments. However, it is important to acknowledge that the study has limitations. The analysis is based solely on student ratings, which may be subject to bias and may not fully capture the complexity of teaching performance. Additionally, the study is confined to data from one academic institution, limiting the generalizability of the findings to other universities or educational contexts. Further research involving additional performance metrics would provide a more comprehensive understanding of the factors influencing teaching effectiveness in blended learning environments. It is also suggested to explore these constructs in other provinces having dissimilar environments and consider these drawbacks further. The study contributes to the ongoing efforts to improve teaching practices and enrich student learning experiences by offering valuable insights for refining instructional strategies, boosting student engagement and learning outcomes, and guiding policy-making and faculty development in higher education.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Junrie B. Matias	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			
Gladys L. Lagura	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Grace T. Flores	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	
Trixie E. Cubillas					✓				✓	✓				
Laurence B. Calagui					✓		✓		✓	✓		✓		
Myron T. Cubillan					✓		✓		✓					
Ritchfildjay L. Mariscal	✓				✓		✓	✓	✓					
Erlin S. Rodas	✓				✓		✓		✓					
Miraluna L. Herrera	✓	✓	✓		✓		✓		✓			✓	✓	✓
Renante P. Tabudlong					✓	✓	✓	✓		✓			✓	

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY

The data that support the findings of this study are available on request from the corresponding author, [JBM]. The data, which contain information that could compromise the privacy of research participants, are not publicly available due to certain restrictions.

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BIOGRAPHIES OF AUTHORS

Junrie B. Matias is a faculty member of Caraga State University in Butuan City. He graduated from the same university with a bachelor's Degree in Computer Science. He holds a master's Degree in information technology from the University of Science and Technology Southern Philippines–Cagayan de Oro campus and completed his Doctoral Degree in Information Technology at the Technological Institute of the Philippines. His research interests include artificial intelligence, technology adoption, software engineering, and programming languages. He can be contacted at email: jbmatias@carsu.edu.ph.

Gladys L. Lagura is an associate professor V at the College of Education, Caraga State University. She earned her Doctorate in Educational Management in 2019, her Master of Arts in Education with a major in Educational Management in 2013, and her Bachelor of Secondary Education with a major in History, cum laude, in 2000. She serves as the Chairperson of the Secondary Education Department within the College of Education at Caraga State University. She can be contacted at email: gllagura@carsu.edu.ph.

Grace T. Flores is an associate professor V at the College of Education, Caraga State University, Butuan City, Philippines. She earned her Doctorate degree in Instructional System and Resource Management from San Jose Recoletos, Cebu City, Philippines as a full scholar under the CHEd K-12 Program. She has received multiple awards, including a special presidential citation, a publication award, and the best research paper presenter award. She has published numerous research papers in international peer-reviewed journals. She can be contacted at email: gtflores@carsu.edu.ph.

Trixie E. Cubillas is a BEEd graduate-English Concentration at the Philippine Normal University. She earned her Master of Arts in Education Major in English Language Teaching from the same institution and her doctorate from Father Saturnino Urios University. She is currently a Professor I at the College of Education, Caraga State University, and an ETCOR Educational Research Consultant, in the Philippines. Presently, she led two research projects funded by the aforementioned scientific body. She can be contacted at email: tecubillas@carsu.edu.ph.

Laurence B. Calagui is an assistant professor 3 in the Biology Department at Caraga State University-Main Campus. An alumnus of Mindanao State University at Naawan, he holds both undergraduate and master's degrees in Marine Biology. His research focuses on aquatic ecology and biodiversity in the Caraga Region, with numerous publications related to aquatic resource assessments. He can be contacted at email: lbcalagui@carsu.edu.ph.

Myron T. Cubillan is a language studies Ph.D. student at Mindanao State University-Iligan Institute of Technology, Iligan City, The Philippines. He is an instructor of English language education at the College of Education, Caraga State University, Butuan City. His research interests include multimodality, semiotics and education, spatial discourse analysis, memory studies, and language and placemaking. He is a lifetime member of the Linguistic Society of the Philippines. He can be contacted at email: mtcubillan@carsu.edu.ph.

Ritchfildjay L. Mariscal is a faculty member of the College of Industrial Technology and Teacher Education, Caraga State University-Cabadbaran Campus. He is a graduate of Doctor of Philosophy in Technology Management at Cebu Technological University in Cebu City, Philippines. His research interests include innovative pedagogical approaches, teaching philosophies, integration of technology into educational practices, technology adoption, and artificial intelligence. He can be contacted at email: rlmariscal@csucc.edu.ph.

Erlin S. Rodas is an associate professor of Caraga State University Cabadbaran City Campus under the College of Tourism and Hospitality Management. She finished her baccalaureate at the University of Southeastern Philippines in Davao City and earned her master's degree at St. Paul University Surigao. He holds a Doctor of Philosophy in Educational Administration, majoring in Higher Education Administration, from Ateneo de Davao University as one of the scholars under the CHED K-12 program. She can be contacted at email: esrodas@csucc.edu.ph.

Miraluna L. Herrera is a professor in the Department of Mathematics at Caraga State University. She holds a Ph.D. in Mathematics from MSU–IIT in Iligan City and an MS in Applied Mathematical Sciences with a focus on Applied Mathematics from USTP in Cagayan de Oro City. As the leader of the RESILIENT-Immersive Flexible Education Research Program, she spearheads the development of Outcomes-Based Instructional Materials for the K-12 curriculum in Caraga. Her dedication to education is demonstrated through her leadership in various research and extension programs. She can be contacted at email: mlherrera@carsu.edu.ph.

Renante P. Tabudlong is a researcher at the Office of Curriculum and Instruction Development at Caraga State University, Ampayon, Butuan City. He graduated cum laude with a Bachelor of Arts in Sociology from the same university in 2022 and is currently pursuing graduate studies in Public Administration. His research interest focuses on the implementation of outcomes-based education, assessment and evaluation, teaching and learning strategies, and student learning and development. He can be contacted at email: rptabudlong@carsu.edu.ph.