Employment Outcomes And Curriculum Alignment In Computer Education At A State University: A Tracer Study Employing The MIMI Interview Method

Mia V. Villarica[1], Maria Laureen B. Miranda[2]
[1]College of Computer Studies, Laguna State Polytechnic University, Santa Cruz Campus
[2]College of Computer Studies, Laguna State Polytechnic University, Santa Cruz Campus.
[1]mia.villarica@lspu.edu.ph, [2]laureen.miranda@lspu.edu.ph

Abstract:

Higher education institutions aim to offer students a high-quality education and meaningful opportunities that enable them to grow into engaged and well-rounded members of society. This study examines the present employment situation, explicitly exploring the significance and impact of program outcomes and university services on graduates' personal and professional growth. The research collected quantitative data through an online survey with 246 respondents and qualitative data through Mobile Instant Messaging Interviews (MIMI) involving 55 participants. Most of the graduates' current employment was found to be closely aligned with the programs they completed. Several courses were particularly valuable in developing skills such as working under pressure, teamwork, discipline, socializing, and communication, which are highly relevant to their jobs.

Furthermore, the curriculum and instruction were identified as strengths in facilitating employment placement, and the respondents perceive themselves as responsible and ethical individuals. The most noteworthy finding is that alumni aspiring to establish businesses favor entrepreneurship and freelance work. Integrating international perspectives and trends, such as hybrid work models, into the curriculum is recommended to contribute to a more comprehensive and enriched educational experience for students.

Keywords: *Computer Studies Graduate Tracer, MIMI, Hybrid work models, Educational Internationalization*

1. INTRODUCTION

 As we move into the post-pandemic era, Education 5.0 will continue to play a crucial role in shaping the future of education. [1] mentioned that the emergence of Education 5.0 highlights skills like communication, leadership & endurance, curiosity, comprehension, and critical and creative thinking. To fulfill the objectives and motive of Industry 5.0, we need to enhance and empower education with high-definition educators, COBOTS (Collaborative Robots), which would improve the personalization of Society 5.0 and make it a Human-Centered Society, as mentioned [1]. On the other hand, [2] stated that the goal of Industry 5.0, which is thought of as the next stage in industrial evolution, is to combine the creativity of human experts with practical, intelligent, and precise machinery to provide manufacturing solutions that are more user-friendly and resource-efficient than those of Industry 4.0. While these two concepts are different, they are interconnected. The skills and knowledge imparted through Education 5.0 will be significant for the workforce to adapt to the changing demands of Industry 5.0. As such, Education 5.0 and Industry 5.0 represent a shift towards a more technology-driven and collaborative approach to education and manufacturing, respectively [1]. Every academic institution strives to generate capable and highly qualified graduates so they may eventually compete on a local and international level. The competition among graduates in the country has become increasingly intense as universities strive to provide a high-quality education and curriculum that helps their students gain a competitive edge after graduation. Hence, [3], employability tracking became a vital element when universities formulate curricula and policies. Graduate tracer studies are vital in program evaluation and improvement, future program creation, career counseling, and strengthening alumni participation. They are a crucial tool for educational institutions to ensure that their graduates are well-prepared for the workforce and remain relevant in a constantly evolving job market.

Many colleges and universities in the Philippines, specifically in computer studies, recognize the significance of conducting graduate tracer studies.

[4] conducted a study of one of the state college graduates in the Philippines with 1,983 participants across all programs and campuses. The university developed a structured survey questionnaire anchored on the competencies of the Commission on Higher Education (CHED) graduate tracer. The questionnaire had three significant parts: general information, educational background, and the respondents' employment status. An organized survey and a questionnaire were used to gather and analyze data using frequencies and percentages. Findings showed that most graduates were in their early 20s and had just received their university degree. Also, they could get a job through a connection. Most alumni are employed in fields linked to their individual degree programs. The degree program's relevance to professional requirements was one of the undergraduate curriculum's key strengths. However, the report recognized a few optional classes and extracurricular activities needing improvement. They suggested concentrating on student mobility, credit transfers, quality assurance, and research clusters as the four primary priorities to harmonize with the ASEAN higher education system to enhance the currently offered degree programs.

[3] aims to evaluate the employability of Information Technology Education graduates from a state university in the Philippines. The researchers used the cross-sectional retrospective survey method with 174 out of 204 (or 86.76%) participants who had a Bachelor of Science in Information Technology and a Bachelor of Science in Computer Science degree from the academic years 2015–2017. The Graduate Tracer Study, developed by the Commission on Higher Education, is the tool the researchers utilized to collect data. The results showed that 78.53% are already working, and 69.78% believed that their first employment was associated with the course they studied in college. The study also revealed significant information: 25.90% of the respondents found their first employment in 1-6 months, and the majority of the respondents (69.78%) said that the curriculum of the program they had in college is indeed applicable when questioned whether or not it is essential in their first employment. One of the researchers' recommendations is for academic leaders, alumni, and company representatives to review the curriculum regularly to make sure that graduates are prepared with the knowledge and skills needed in the industry. This will help further improve the marketability of BSIT and BSCS programs and the employability of their graduates.

[5] conducted research that sought to locate graduates and ascertain their traits and qualifications, including the demographic, educational, employment, and other contextual factors that were considered when using the descriptive study technique. The development of a Facebook-based social networking group enables the creation of a platform for gathering pertinent data and establishing connections with the graduates. Also, using Google Docs, particularly Google Forms, to create the e-Survey tool makes it easier to distribute surveys online and gather responses. The survey tool for the graduate tracer study questionnaire was adopted from the one developed by the Commission on Higher Education (CHED) and modified to obtain the needed information. Google Docs serves as a collection, monitoring, retrieval, dissemination, and other types of electronic repository, information reporting, archiving, and storage. The study generates the following: (1) a report on the employability rate of BSIT alums of Isabela State University; (2) a digital repository for graduates' data; and (3) the creation of an electronic catalog of graduates' information profile and employment data; (3) the creation of an online network for graduates; and (4) information on employment. Overall, this study's findings were pertinent to the on-the-job training priorities, curriculum revision/enhancement, and capstone project guidelines based on industry demands and developments in information technology education.

[6] directly identify the current state and employment of the BSIT graduates of the San Isidro Campus of Nueva Ecija University of Science and Technology for the Academic Years 2016–2017 and 2017–2018. Specifically, the unwaged respondents' general profile, educational background, professional examinations passed after college, employment profile, and reasons for unemployment were determined. A modified descriptive research design was adopted, and a questionnaire was used to acquire data. Of the original 249 graduates, 219 responded, with 122 male and 97 female. The study significantly revealed that most respondents' reasons for unemployment were family-related. To ascertain the employment situation of a

private Higher Education Institution of the program BS Computer Science graduates from 2004 to 2009, [7] a tracer study was conducted that evaluated how well the BSCS curricula aligned with the graduates' jobs, as well as the graduates' knowledge, skills, and work ethics. It also identified the personal and professional traits of computer science graduates who were hired and the school-related factors that contributed to their employment.

The mentioned studies were valuable in constructing this study's research objective. In addition,. [4] Focus on general information, educational background, and the respondents' employment status. At the same time, [5] it focuses on employment contextual factors such as competencies learned in a helpful college in their first, current job, and self-employed, reasons for taking the course, reasons for taking the first job, and staying on the job. In addition to this, the author focuses on utilizing useful technology to gather data, such as social media and online collaborative applications.

This study aims to investigate the employment outcome and curriculum relevance of graduates in a particular educational institution, to identify ways to improve the institution's educational programs to better prepare graduates for the workforce. Employment outcome, which is an indicator to reflect the ability of institutions to ensure a high level of employability for their graduates, while also nurturing future leaders who go on to make an impact in their respective fields, [8]. Specifically, focusing on the knowledge, skills, and work values acquired by the graduates that they use in their work-related qualification to fit their employment; identify the personal and professional characteristics and job placement of the graduates and the school-related factors such as curriculum and instruction, faculty and instruction, student services, organization and community extension, linkages and research which is associated with their employment and self-assessment on the graduate attributes of the university such as responsible and upright citizen, compassionate leader, professionally skilled, effective communicator, creative thinker, and competent research oriented individual. The findings of the study served as the basis for the researcher to improve, update, or enhance the curricula of BSIT, BSCS, and MSIT programs to make them more responsive to the needs of fast-changing technology and employment demands.

Every educational institution aims to produce graduates who are skilled and well-prepared to compete both locally and globally. The level of competition among graduates within the country has significantly increased, prompting universities to make significant efforts to provide quality education and curriculum that give their students a competitive advantage upon graduation. Consequently, employability has become a critical factor in the development of curricula and policies within schools and universities, as highlighted by [3].

The Laguna State Polytechnic University (LSPU) is fully committed to producing graduates who possess professionalism, competence, and initiative for work. Envisioning their graduates to be responsible and upright citizens, compassionate leaders, professionally skilled, effective communicators, creative thinkers, and competent research-oriented individuals. It offers different programs that focus on various fields of expertise. One of which is the College of Computer Studies (CCS), which is currently offering three different programs, namely, Bachelor of Science in Information Technology, Bachelor of Science in Computer Science, and Master of Science in Information Technology. The college aims to achieve the goals of higher education as it can be directed by strengthening the higher education system to be able to enhance its role in producing quality education and professional graduates. Graduate tracer studies play a vital role in program evaluation and improvement, future program creation, career counseling, and strengthening alumni participation. They are a crucial tool for educational institutions to ensure that their graduates are well-prepared for the workforce and remain relevant in a constantly evolving job market. Many colleges and universities in the Philippines, specifically in Computer Studies, recognize the significance of conducting a graduate tracer study.

The primary objective of this study is to examine the employment outcomes of CCS graduates from LSPU-Sta. Cruz Campus Batch 2018-2020 and evaluate the relevance of the curriculum concerning their career paths. It also identifies areas of improvement in the institution's educational programs to enhance the preparation of graduates for the workforce and their respective careers.

2.   METHODOLOGY

This study used a descriptive research design capturing both quantitative and qualitative data. The survey instrument was adapted from the CHED Graduate Tracer Questionnaire, which research experts previously validated. Relevance and reliability were ensured, aligning with the objective of the study. The questionnaire was digitized using Google Forms. The study participants were recruited through graduate lists from the college database, alumni associations, and social media groups (primarily Facebook). The study participants were BS Information Technology, BS Computer Science, and MS Information Technology graduates from 2018 to 2020. Besides email, other social media platforms used for survey distribution included Facebook groups, Messenger, and group chats, leading to 246 respondents from 743 graduates during six months.

The researchers acknowledge that the sample size from the survey is not representative or sufficient for a graduate tracer research study. The COVID-19 pandemic significantly impacted the survey completion, as social distancing measures prevented face-to-face interviews with graduates as initially planned. Moreover, participants faced busy and complex daily lives, which were particularly challenging during the work-from-home setup. To address these limitations, the researchers utilized the Mobile Instant Messaging Interview (MIMI) technique, developed by [9]as a qualitative research method. MIMI involves conducting interviews through mobile messaging applications such as WhatsApp, Facebook Messenger, or WeChat. This remote interview approach allowed real-time communication with participants regardless of location [10].

Interview participants were recruited through Facebook Messenger, utilizing snowball sampling, which is commonly used when participants are difficult to reach or identify. Initially, a few participants who met the desired criteria, specifically those who answered the survey, were selected. Then, they were asked to refer other individuals who also met the requirements. This referral chain continued, resulting in a sample size of 55 participants for the interviews.

During the interviews, participants were asked about their name, year of graduation, course, company, position, years of work experience, reasons for leaving previous companies, current job alignment with their program of study, and specific learnings from their program that apply to their work. The data obtained from individual instant messaging interviews were consolidated using spreadsheet software.

After completing the online survey, the collected data underwent analysis to uncover patterns and trends. Descriptive statistical analysis was conducted on the online survey data, with frequencies and percentages in a table format. On the other hand, the qualitative data gathered from the Mobile Instant Messaging Interviews (MIMI) was analyzed using an online Natural Language Processing (NLP)-as-a-service [11] platform called OneAI. This platform utilizes advanced algorithms to analyze, process, and transform language data with 85% accuracy and precision into comprehensive reports [13].

Figure 1. Text Analysis Framework

3.   RESULTS AND DISCUSSION

3.1. Employment Status, Nature of Employment, Job Satisfaction

After 6 months of sharing the online survey, 246 were answered, with 169 Male and 77 Female respondents. Most of the respondents belong to the 20-25 and 26-32 age ranges, with a frequency of 172 and 62, respectively. Also, many of the respondents are single, with a frequency of 218, and married, with a frequency of 28. The researchers also checked the educational attainment purposely tertiary level of the parents for the respondents' fathers, there are 118 and 111 for the respondents' mothers. Most of the respondents are from

Batch 2018 and the program BS Information Technology, with a frequency of 197, BS Computer Science with a frequency of 42, and 6 MS Information Technology graduates.

The survey explored the career aspirations of the participants when they decided to enroll and pursue a degree at CCS/LSPU-SCC. Most respondents, with a frequency of 28, expressed their intention to become Programmers. Additionally, 9 respondents indicated their aspiration to become Software Engineers, while 7 mentioned their interest in becoming Computer Instructors and Game Developers. The remaining participants expressed their interest in various computer-related roles, including office work, technical support, and Business Process Outsourcing.

In terms of current employment status, 187 (76.02%) of the respondents are working full-time, which means that the graduates are currently employed in permanent positions, 23 (9.35%) working on a contractual basis, 6 (2.44%) working part-time but not seeking full-time work and 17 (6.91%) not working and looking for a job. It also reveals that 10 (4.07%) of the respondents are self-employed, which can be interpreted as either working as a freelance software developer, a consultant specializing in cybersecurity, a web designer or graphic designer, a social media strategist, or any other role related to technology and communication [12] explained how ICT affects self-employment, which can be crucial to economic growth, by examining the effects of IT and IT-enabled platforms on self-employment in underdeveloped nations against the framework of risk aversion. In addition, 1 (.41%) of the respondents either responded Start Up, None, Not working, or unavailable for paid work.

Most of the respondents prefer not to reveal their employers 71(28.86%) on the other hand, the top five companies were found to be the current employers which are mostly Business process outsourcing firms including Concentrix Philippines presently employs 13 (5.28%) of the respondents, 11(4.47%) currently working for Accenture, 5 (2.03%) from Startek Inc. Both have 4 (1.63%) of respondents who are currently working for Convergys and Macrin Ph. According to [13] if the right policies are put in place and human capital is improved, it is predicted that the Philippine BPO sector could grow to become a significant employer. Also, it should be noted that 197 of the respondents are BS in Information Technology, Specializing in Service Management Programs.

In terms of job satisfaction, 100(41.3%) of the respondents responded, "Very much." Likewise, 91 (37.60%) of respondents chose "much" when asked how satisfied they were with their jobs. However, 24 (9.92%) and 27 (11.16%) respondents respectively responded, "a little" and "not at all." In addition, when asked if they intended to remain in their current position or line of work, 152 respondents (61.79%) indicated that they would do so, while 65 respondents (26.42%) disagreed. The study revealed that most respondents were satisfied with their job/profession and intended to stay in the same job profession however, a significant amount of the respondents reflected job/profession disappointment which can be correlated to job-education mismatches as mentioned by [14] that the absence of practical skills, poor job placement assistance, networking opportunities, curriculum, and academic structure as reflected OECD, [2]. In this case, this study opted to conduct a deeper understanding of the findings through an online interview.

3.2. Program and Institution's Contribution to Personal and Professional Growth

In the survey, the respondents were also queried involving the relevance of the current job to the earned program. 112 (45.53%) answered Much, and 77 (31.30%) answered "Very Much". Nevertheless, 11 (4.47%) "Not at all" and 46 (18.70%) "A little" which indicates that most respondents believe their current employment is in line with the earned program.

The survey revealed that 8 (3%) of the respondents pursued additional tertiary-level programs besides the program taken at the university. 8 answered Yes, which means that 3% of them graduated. Currently, 6 (2%) of the respondents are taking graduate studies, and 82 (33%) intend to upgrade their qualifications and plan to take a master's degree or pursue technical certifications. Most of the respondents are interested in pursuing a master's degree, which is 146 (59%) and 22 (8%) responding with a doctorate. In addition, 19 respondents prefer distance education, 40 part-time, and 18 respondents full-time as a mode of study.

Table 1. Respondents' Ratings of Program Contribution to Personal and Professional Skills Development (n = 246)

Criteria	Low	%	Medium	%	High	%	Very High	%
1. Organizational Skill	3	1.22	38	15.45	109	44.31	96	39.02
2. Problem-Solving	0	0.00	38	15.45	107	43.50	101	41.06
3. Leadership Skills	4	1.63	42	17.07	101	41.06	99	40.24
4. Ability to Work Independently	0	0.00	27	10.98	94	32.21	125	50.81
5. Creativity/Creative Thinking	4	1.63	35	14.23	95	38.62	112	45.53
6. Teamwork/Team Orientation	1	0.41	31	12.60	94	38.21	120	48.78
7. Time Management	6	2.44	35	14.23	98	39.84	107	43.50
8. Initiative/Risk-Taking	3	1.22	33	13.41	112	45.53	98	39.84
9. Writing Skills	5	2.03	45	18.29	108	43.90	88	35.77
10. Communication/Interpersonal Skills	6	2.45	45	18.37	109	44.49	85	34.69
11. Computer Skills	0	0.00	29	11.79	88	35.77	129	52.44
12. Job-Specific Skills	5	2.06	45	18.52	94	38.68	99	40.74
13. Technical Knowledge	3	1.22	30	12.20	98	39.84	115	46.75
14. Decision-Making	0	0.00	40	16.26	108	43.90	98	39.84
15. Entrepreneurship Skills	10	4.07	71	28.86	92	37.40	73	29.67
16. Ability to Work Under Pressure	1	0.41	28	11.38	90	36.59	127	51.63

Insights illustrated in Table 1 show that the graduates from the College of Computer Studies showed no less than a moderate level of perceived effectiveness for the program in helping them build some fundamental skills like Operating Under Pressure (OUP). The overwhelming majority rated this descriptor "High" 32.21 percent and "Very High" 50.81 percent, which speaks to its relevance in their current employment contexts. Other vital competencies, such as computer skills, teamwork/team orientation, as well as technical knowledge, were also rated highly, which suggests that the employer's expectations about the curriculum are being met. On the other hand, "low" ratings were received for entrepreneurship skills. A significant portion of the respondents rated themselves as "Low", 4.07 percent, and "Medium", 28.86 percent. A good number of respondents also affirmed their entrepreneurial skills already at "High" or "Very High" levels, but this distribution quite clearly indicates an insufficient entrepreneurial skills training gap in the curriculum. Along with shortcomings in primary technical competencies, communicative and job-related soft skills lag as well, which requires a redress in policy since these skills are essential in hybrid and group work environments that are becoming more prevalent.

Table 2. Respondents' Ratings of University-Related Factors Relevant to Employment Placement (n = 246)

School-Related Factor	Weakness	%	Does Not Apply	%	Strength	%
1. Curriculum and Instruction	27	10.98	22	8.94	197	80.08
2. Faculty and Instruction	38	15.45	20	8.13	188	76.42
3. Student Services	49	19.92	26	10.57	171	69.51
4. Organization and Administration	34	13.82	20	8.13	192	78.05

5. Community Extension, Linkages, Research	32	13.01	18	7.32	196	79.67

Table 2 highlights the importance of curriculum and instruction in promoting graduate employment. Most respondents (80.08%) recognized this criterion as a strength, confirming that the academic content and pedagogical methods are adequately equipping students for the workforce. Nonetheless, student services were perceived as a comparative deficiency, with merely 69.51% considering them a positive, and over 20% categorizing them as a weakness. This research indicates that although academic preparation is strong, support services, including career counseling, job placement, and alumni engagement, need improvement to facilitate graduates' transition to employment.

Faculty and instruction received predominantly favorable assessments; nevertheless, several respondents identified deficiencies, highlighting the necessity for continuous faculty development and instructional innovation to align with advancing industry requirements.

Table 3. Distribution of Respondents' Self-Assessment on LSPU Graduate Attributes (n = 246)

| Graduate Trait	Neutral	(%)	Agree	(%)	Strongly Agree	(%)
1. Responsible and Upright Citizen	16	6.50	94	38.21	136	55.81
2. Compassionate Leader	51	20.73	106	43.09	89	36.18
3. Professionally Skilled	40	16.26	110	44.72	96	39.02
4. Effective Communicator	42	17.07	119	48.37	85	34.55
5. Creative & Critical Thinker	24	9.76	110	44.72	112	45.53
6. Competent Research-Oriented Individual	38	15.45	119	48.37	89	36.18

The self-assessment results in Table 3 demonstrate that graduates significantly align with essential university traits, notably as responsible and ethical citizens, innovative and analytical thinkers, and proficient research-oriented persons. These attributes were predominantly assessed as "Agree" or "Strongly Agree," indicating the university's efficacy in imparting fundamental principles and advanced cognitive skills. The "Compassionate Leader" trait garnered a greater percentage of indifferent responses, indicating a potential lack of confidence in leadership capabilities or reluctance to engage in self-promotion. This can be resolved by incorporating additional leadership development opportunities into the curriculum and co-curricular activities. The findings support the efficacy of the CCS programs in developing technical and cognitive abilities that meet the demands of today's labor market. However, the gaps in leadership, communication, and entrepreneurship that have been found point to areas where the curriculum needs to be improved. Including opportunities for experiential learning, such as leadership training, communication seminars, and capstone projects with entrepreneurial elements, could improve graduation results even more. To make sure that graduates are not only academically competent but also supported during their professional transitions, it will be essential to strengthen student services, especially in the areas of career support and alumni networking. It should be noted that the survey reflected a low percentage of respondents who rated Neutral, which can be interpreted as avoidance of picking satisfactory responses and reluctance to socialize with undesirable reactions on the self-report survey, as stated by [18].

3.3. Qualitative Analysis Result

The information regarding the completion of the program, company affiliation, position, years of employment, number of jobs held after graduation, reasons for leaving the previous company, current employment status, its alignment with the undertaken program, and the specific learnings acquired during the program that are beneficial to their current work was obtained from 55 participants through the MIMI qualitative approach. Out of the 55 participants, 11 do not exhibit alignment between their program and job; however, the majority are currently employed in reputable hospitals, government offices, top-ranking

universities in the Philippines, and a private company in Dubai as clerks, junior office aides, purchasers, and administrative staff, with tenures ranging from over 8 months to 2 years. [16] current analysis demonstrates that, within what is perceived as a saturated and competitive graduate labor market, students contend that their academic credentials assume a diminished significance in shaping their career prospects. The remaining participants are engaged as digital engagement officers, full-stack developers, reports analysts, application system engineers, software engineers, internal tools developers, associate software engineers, and application developers.

Qualitative data were subjected to text analysis, focusing on participants' narratives regarding reasons for leaving previous employment, current job alignment with their academic program, and specific learnings from their university experience that proved helpful in their professional roles. The analysis, comprising 1,294 words, was facilitated by an AI-powered online platform (see Figure 1 for workflow). This approach enabled the identification of key themes and patterns in employment trajectories, the perceived relevance of curricular content, and the practical application of acquired skills in diverse professional settings. The findings provide nuanced insights into the academic programs' strengths and gaps, informing recommendations for curriculum enhancement and improved graduate employability.
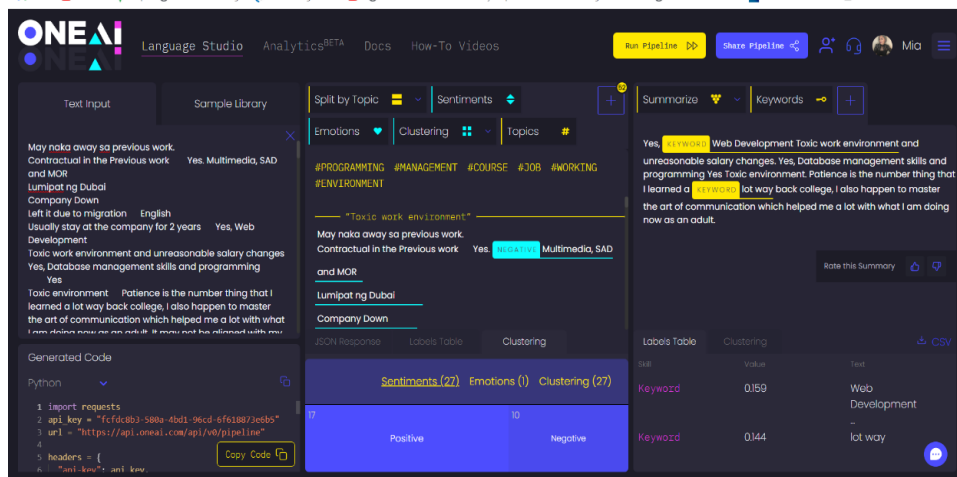
Figure 2. Screenshot of the Text Analysis Result using OneAI

The OneAI platform generated six primary article topics- Programming, Management, Course, Job, Working, and Environment- based on the qualitative data. Additionally, it identified valuable keywords such as "Web Development" and "Toxic Work Environment." Figure 1 illustrates the preprocessing output, where responses were segmented by topic using dialogue segmentation.

{"subheading":"Toxic work environment"} || May naka away sa previous work. ||toxic environment and unreasonable salary changes ||
{"subheading": "Why I left my previous job"} || As long as you still see yourself in that company, growing. A reason to leave the company is when you're in a toxic management/ environment, do not a good rewards and compensation & lastly when you think you're not growing as an individual anymore || Health Issue || Covid-19 Pandemic || Better opportunity in other company || I'm planning to stay in my company for a long term and I don't have any reasons yet to leave it. ||
{"subheading": "What if I think it's not healthy?"If you think it's not healthy or have a toxic environment, and if you don't enjoy what you are doing. ||
{"subheading": "What is your dream job?"} || Freelancing

The dialogue segmentation of qualitative responses revealed several significant factors influencing graduates' decisions to leave their previous employment, including work environment, compensation, health issues, the pursuit of better opportunities, and considerations of personal and professional development. Notably, a recurring theme was the impact of toxic work environments and inadequate salary adjustments, which were frequently cited as primary reasons for job changes. Additionally, several participants preferred freelance work, aligning with the increasing demand for freelancers in the digital economy. As defined by [17], freelancers are individuals contracted to provide one-time or seasonal services for a predetermined period and payment, often leveraging specialized skills such as web development and ICT. The study further highlights that the proliferation of the internet and digital platforms has accelerated the demand for ICT-related freelance services, underscoring the importance of equipping graduates with relevant digital competencies to succeed in evolving employment landscapes. These findings suggest that, beyond technical training, higher education institutions should also foster adaptability, resilience, and entrepreneurial skills to better prepare graduates for diverse and dynamic career pathways.

Table 4. Sentiment Analysis of Respondents' Employment Experiences and Program Relevance

Sentiments	Generated Statements
Negative	The reason I leave is because of the unhealthy mentality of the people surrounding me.
Negative	Well on my first company I stay for them for 1 year and the reason of leaving is that the company shut down its operation when the pandemic hit that is why I was forced to resign and find another job.
Negative	The reason I leave is because of the unhealthy mentality of the people surrounding me. I am currently in a new company since my past company had retrenchment and I was one of the unfortunate ones.
Positive	Technical writing // Helped me document cases effectively with only keywords.
Positive	It may not be aligned with my course, but in some parts it still helped me along the way.
Positive	Multimedia, SAD, and MOR. Patience is the number one thing that I learned a lot of way back college, I also happen to master the art of communication which helped me a lot with what I am doing now as an adult.
Positive	My course helps me in my job since I'm computer literate and able to analyze more effectively. Also, programming course might help to create a tool related to your job to eliminate repetitive task.
Positive	One of the things that helped me in my work now is the activities about programming activities that were taught properly and explained clearly by my instructor during my studies.

The AI-driven sentiment analysis identified a total of 27 sentiment statements from the qualitative responses, comprising 10 negative and 17 positive sentiments. Negative sentiments primarily centered on reasons for leaving previous employment, including toxic work environments, company shutdowns during the pandemic, and retrenchment, with "anger" being the predominant emotion detected, exemplified by statements such as, *"The reason I leave is because of the unhealthy mentality of the people surrounding me."* In contrast, most sentiments were positive, reflecting job satisfaction and the perceived relevance of the academic program to current employment. Respondents highlighted the value of patience, a skill developed during college, as essential for professional success, particularly in the technology sector, where it supports problem-solving, adaptation, and effective collaboration. This finding aligns with previous research [18], emphasizing the importance of patience in technology-driven workplaces. Furthermore, key courses such as Technical Writing, Programming, Multimedia, System Analysis and Design (SAD), and Methods of Research (MOR) were frequently mentioned as instrumental in developing skills applicable to the workplace. These results suggest that while graduates encounter significant workplace challenges, the academic program effectively equips

them with the technical and soft skills necessary for career advancement and adaptability in diverse professional environments.

Table 5. Clusters of Graduate Employment Experiences and Contributing Factors

Cluster Value	Generated Statements
Cluster 1	*Freelancing I think yung pika importante kong nakuha sa course ko na lagi kong nagagamit e yung pag tatrabaho as sa group saka yung time management ko. Dati kasi di naman ako ganun.* *I am planning to stay in my company for the long term, and I have no reason yet to leave it. Yes* *Maybe 1-2 years because I am trying to seek a better opportunity. Aligned because we do a lot of system troubleshooting*
Cluster 2	*If you think it's not healthy or have a toxic environment, and if you don't enjoy what you are doing.* *As long as I want to work with this company, yes, it is aligned with my current job.* *Not really, I pursue graphic designer and mostly sa OJT ko na acquire yung fundamentals knowledge ko about Ps and Ai.* *Because of the Agency I learned how to make a barcode and inventory also using application system that we have at work.* *Low Salary* *Better opportunity in another company. Computer literate, analytical thinking, and communication skills.* *Low salary, stressful environment, and toxic workmates. Yes, my job is aligned to my work and work experience before.* *To explore and learn new things // The reason I leave is because of the unhealthy mentality of the people surrounding me, technical writing //* *I am currently in a new company since my past company had a retrenchment, and I was one of the unfortunate ones.|| A reason to leave the company is when you're in a toxic management/ environment, not a good rewards and compensation & lastly when you think you're not growing as an individual anymore.*
Cluster 3	*May naka away sa previous work.* *Contractual in the Previous work, yes. Multimedia, SAD, and MOR* *Lumipat ng Dubai* *Company Down* *Left it due to migration to English* *Usually stay at the company for 2 years. Yes, Web Development* *Toxic work environment and unreasonable salary changes. Yes, Database management skills and programming* *Toxic environment. Patience is the number one thing that I learned a long way back in college, I also happened to master the art of communication, which helped me a lot with what I am doing now as an adult. It may not be aligned with my course, but in some parts, it still helped me along the way.* *Toxic environment No. What I learned is how you can socialize yourself with others, how to adjust, and how to communicate well.*

COVID-19 Lockdown No. More Patience and discipline.
End of Contract: Yes, the BPO subject
Yes, it is aligned because I'm teaching computer one of the lessons is about development of website and database management.
Depends on the contract of the Part time instructor. I am aligned with the subject I teach in our school about i.t and basic programming.
Depends on the company or the people I work with. The reason I leave is because of the unhealthy mentality of the people surrounding me, technical writing // Helped me document cases effectively with only keywords.
I am currently in a new company since my past company had a retrenchment and I was one of the unfortunate ones. My current job us aligned with my degree that I took.

Using a fuzzy matching technique, cluster values automatically establish groups of values that are like one another, and then map each column's value to the group that is most closely related to [19]. The text analysis generated 27 clusters, with 1 for Cluster Value 3, 3 for Cluster Value 2, and the rest are Cluster Value 1. Based on the provided cluster values and generated statements, it shows that the respondents' statements are related to their experiences and reasons for leaving or staying in their previous or current employment.

The statements in Cluster 3 generally concentrate on negative incidents from past employment, such as disagreements with coworkers, contractual obligations, downsizing of the organization, a hostile work environment, and difficulties with migration or lockdowns. Some interviewees, however, also remark on how their prior courses have helped them hone skills such as discipline, socialization, and communication.

In Cluster 2, the statements center on reasons for leaving a company, including an unhealthy work environment, low salary, limited growth opportunities, and toxic management. Some participants mention how their current job aligns with their previous work experiences or degree curriculum, while others mention learning specific skills or applications in their earlier jobs. In Cluster 1, the statements highlight positive aspects of their current employment or plan to stay long-term, such as freelancing opportunities, improved time management skills, and seeking better opportunities aligned with their skills.

Generally, the cluster values and generated statements suggest that respondents' perceptions of their previous and current employment are influenced by factors such as work environment, compensation, growth opportunities, alignment with their skills and degrees, and personal development. Some respondents mention challenges they faced in their previous employment, but also highlight how those experiences have helped them develop skills or adapt to different situations. Others mention positive aspects of their current employment or plan to seek better opportunities in the future. These statements provide insights into the respondents' perspectives on their employment experiences and how they perceive the alignment of their jobs with their skills and interests. In general, these statements provide valuable insights into the respondents' opinions and experiences regarding their employment placement.

The qualitative insights gathered through Mobile Instant Messaging Interviews (MIMI) provided depth to the survey findings. Graduates described themselves as responsible and ethical professionals, attributing much of their workplace adaptability and resilience to experiences and training received during their studies. Notably, the interviews revealed a growing interest among alumni in entrepreneurship and freelance work, mirroring broader trends in the digital economy and the increasing importance of flexible, self-directed career paths. This shift suggests that while traditional employment remains a primary outcome, the curriculum must continue to evolve to support diverse career trajectories, including business creation and remote work.

3.4 Mixed Method Result

The mixed-method results of the study reveal a strong alignment between the curriculum of the College of Computer Studies at Laguna State Polytechnic University and the employment outcomes of its graduates. Quantitative survey data showed that most graduates found jobs closely related to their academic programs, with university services and specific courses significantly contributing to their professional readiness, particularly in developing teamwork, communication, and adaptability skills as mentioned in [3]. Qualitative

insights from Mobile Instant Messaging Interviews (MIMI) reinforced these findings, highlighting not only the value of technical and soft skills acquired but also graduates' perceptions of themselves as responsible and ethical professionals. The interviews further uncovered a growing interest among alumni in entrepreneurship and freelance work, suggesting the need to integrate international trends and hybrid work models into the curriculum. Overall, the combination of broad survey results and in-depth interview narratives provides a comprehensive understanding of how curriculum and institutional support influence graduate employability, while also identifying areas for future curricular enhancement to better meet evolving industry demands.

4. CONCLUSION AND RECOMMENDATION

The findings of this tracer study provide strong evidence that the academic programs and instructional approaches of the College of Computer Studies at Laguna State Polytechnic University are effective in preparing graduates for employment in fields closely aligned with their academic training. The majority of respondents are employed in permanent positions relevant to their degrees, including roles such as Digital Engagement Officers, Full Stack Developers, Software Engineers, and Application Developers, across reputable organizations in the Philippines. Courses such as Technical Writing, Programming, Multimedia, System Analysis and Design, and Methods of Research were consistently identified as instrumental in developing critical professional skills, including teamwork, discipline, communication, and adaptability. These competencies are essential for thriving in dynamic and competitive work environments.

The study further highlights that the curriculum and instructional quality are perceived as key strengths in facilitating successful employment placement. Graduates also self-identified as responsible and ethical professionals, reflecting the institution's emphasis on character and values formation. However, the research also identified areas for improvement, particularly in enhancing entrepreneurship, communication, and job-specific skills. The growing inclination among alumni toward entrepreneurship and freelance work underscores the need for curricular innovation that supports business creation and flexible career pathways. Additionally, while graduates expressed satisfaction with their current employment, the analysis revealed that work environment, compensation, health, and career advancement opportunities remain significant factors influencing job retention and mobility.

Despite the strengths of the academic programs, the study revealed that student services were perceived as a relative weakness, suggesting the need for further development in this area to support holistic graduate outcomes. The positive sentiment analysis and qualitative feedback also emphasized the importance of patience, time management, and lifelong learning, with many graduates expressing aspirations for further study and professional certification.

The following recommendations are systematically derived from the study's conclusions:

1. Integrate international standards and emerging trends in global IT education, such as hybrid work models and digital entrepreneurship, into the curriculum. This will ensure that graduates are equipped to compete and excel in both local and international labor markets.

2. Strengthen curricular and co-curricular initiatives that foster entrepreneurship, leadership, communication, and interpersonal skills. Embedding practical business modules and experiential learning opportunities will better prepare graduates for self-employment and freelance careers.

3. Regularly review and update academic programs in consultation with industry stakeholders to maintain alignment with evolving workforce demands. Emphasize the development of job-specific technical competencies and adaptability to technological advancements.

4. Improve student support services, including career counseling, mental health resources, and job placement assistance. Establish an online alumni portal to facilitate real-time tracking of graduate employment outcomes, foster alumni engagement, and gather feedback for continuous program improvement.

5. Encourage graduates to pursue advanced degrees and technical certifications by providing information, resources, and institutional partnerships with local and international training providers.

6.   Institutionalize the use of graduate tracer studies and qualitative feedback mechanisms, such as Mobile Instant Messaging Interviews, to inform evidence-based curriculum and policy enhancements.

By implementing these recommendations, the College of Computer Studies at Laguna State Polytechnic University can further strengthen its role in producing competent, adaptable, and globally competitive graduates, while continuously responding to the dynamic demands of the digital economy and the broader society.

REFERENCES
[1]   P. K. R. Maddikunta *et al.*, "Industry 5.0: A survey on enabling technologies and potential applications," *J. Ind. Inf. Integr.*, vol. 26, p. 100257, Mar. 2022, doi: 10.1016/j.jii.2021.100257.
[2]   "Education at a Glance 2020," OECD. Accessed: Apr. 03, 2025. [Online]. Available: https://www.oecd.org/en/publications/education-at-a-glance-2020_69096873-en.html
[3]   A. C. Albina and L. P. Sumagaysay, "Employability tracer study of Information Technology Education graduates from a state university in the Philippines," *Soc. Sci. Humanit. Open*, vol. 2, no. 1, p. 100055, 2020, doi: 10.1016/j.ssaho.2020.100055.
[4]   L. J. Cuadra, M. R. K. L. Aure, and G. L. Gonzaga, "The Use of Tracer Study in Improving Undergraduate Programs in the University," *Asia Pac. High. Educ. Res. J. APHERJ*, vol. 6, no. 1, Art. no. 1, Aug. 2019, doi: 10.56278/apherj.v6i1.1315.
[5]   I. T. Plata, "Connecting With The Graduates: An Online Employability Graduate Tracer Study (O-EGTS) Of Isabela State University," vol. 9, no. 03, 2020.
[6]   J. C. Mina, E. J. G. Reyes, and R. F. Salas, "A Tracer Study of Bachelor of Science in Information Technology(BSIT) Graduates of Nueva Ecija University of Science and Technology (NEUST), San Isidro Campus," *Int. J. Engl. Lit. Soc. Sci.*, vol. 5, no. 4, pp. 1337–1344, 2020, doi: 10.22161/ijels.54.77.
[7]   L. Macatangay, "TRACER STUDY OF BSCS GRADUATES OF LYCEUM OF THE PHILIPPINES UNIVERSITY FROM 2004-2009," vol. 4, no. 5, 2013.
[8]   "Employment Outcomes (Indicator)," QS Quacquarelli Symonds. Accessed: Apr. 03, 2025. [Online]. Available: https://support.qs.com/hc/en-gb/articles/4744563188508-Employment-Outcomes-Indicator
[9]   K. Kaufmann and C. Peil, "The mobile instant messaging interview (MIMI): Using WhatsApp to enhance self-reporting and explore media usage in situ," *Mob. Media Commun.*, vol. 8, no. 2, pp. 229–246, May 2020, doi: 10.1177/2050157919852392.
[10]   K. Kaufmann, C. Peil, and T. Bork-Hüffer, "Producing In Situ Data From a Distance With Mobile Instant Messaging Interviews (MIMIs): Examples From the COVID-19 Pandemic," *Int. J. Qual. Methods*, vol. 20, p. 16094069211029697, Jan. 2021, doi: 10.1177/16094069211029697.
[11]   S. Pais, J. Cordeiro, and M. L. Jamil, "NLP-based platform as a service: a brief review," *J. Big Data*, vol. 9, no. 1, p. 54, Apr. 2022, doi: 10.1186/s40537-022-00603-5.
[12]   A. Tiwari, A. Patro, and J. Patky, "Information Communication Technology and Self-Employment," in *Role of IT- ITES in Economic Development of Asia: Issues of Growth, Sustainability and Governance*, S. Sikdar, R. C. Das, and R. Bhattacharyya, Eds., Singapore: Springer, 2020, pp. 235–249. doi: 10.1007/978-981-15-4206-0_18.
[13]   N. Magtibay-Ramos, G. Estrada, and J. Felipe, "An Input–Output Analysis of the Philippine BPO Industry," *Asian-Pac. Econ. Lit.*, vol. 22, no. 1, pp. 41–56, 2008, doi: 10.1111/j.1467-8411.2008.00211.x.
[14]   V. Rudakov, H. Figueiredo, P. Teixeira, and S. Roshchin, "The Impact of Horizontal Job-Education Mismatches on the Earnings of Recent University Graduates in Russia," IZA - Institute of Labor Economics, 2019. Accessed: Apr. 03, 2025. [Online]. Available: https://www.jstor.org/stable/resrep58894
[15]   M. L. Edwards and B. C. Smith, "The Effects of the Neutral Response Option on the Extremeness of Participant Responses | Incite." Accessed: Apr. 03, 2025. [Online]. Available: https://blogs.longwood.edu/incite/2014/05/07/the-effects-of-the-neutral-response-option-on-the-extremeness-of-participant-responses/
[16]   M. Tomlinson, "'The degree is not enough': students' perceptions of the role of higher education credentials for graduate work and employability," *Br. J. Sociol. Educ.*, vol. 29, no. 1, pp. 49–61, Jan. 2008, doi: 10.1080/01425690701737457.
[17]   D. X. Makhkamova, "METHODOLOGY OF FORMATION OF FREELANCING SKILLS OF FUTURE TEACHERS OF INFORMATICS AND INFORMATION TECHNOLOGIES THROUGH THE SUBJECT OF INFORMATICS AND DIGITAL TECHNOLOGIES," *Conferencea*, pp. 55–64, Mar. 2023, Accessed: Apr. 07, 2025. [Online]. Available: https://conferencea.org/index.php/conferences/article/view/2185

[18]   A. Argandoña, "The importance of patience in the workplace," Workplace Insight. Accessed: Apr. 03, 2025. [Online]. Available: https://workplaceinsight.net/the-importance-of-patience-in-the-workplace/

[19]   ptyx507, "Cluster values - Power Query." Accessed: Apr. 03, 2025. [Online]. Available: https://learn.microsoft.com/en-us/power-query/cluster-values

CONFLICT OF INTEREST STATEMENT

I, Mia V. Villarica, affirm that I have no personal or financial conflicts of interest that could compromise or influence the outcomes of this study. I also confirm that I have no affiliations or connections with any organization or entity that could potentially have a vested interest in the results or conclusions of this study.

INFORMED CONSENT

The respondents acknowledge that the research provided the declaration of the Data Privacy Agreement instigated in the online survey. The data subject acknowledges that information will not be shared with anybody and will only be used for data analysis and data reports, and for the research mentioned.

ETHICAL APPROVAL

The research project underwent panel review and evaluation, resulting in its approval as an institutionally funded research project. The respondents and participants voluntarily agreed to the informed consent. The committee thoroughly reviewed and approved the project's implementation at the Laguna State Polytechnic University, Santa Cruz Campus, and the College of Computer Studies.

BIOGRAPHIES OF AUTHORS

Mia V. Villarica [ID][SC]. The author holds the positions of Associate Professor V and Associate Dean of the College of Computer Studies at Laguna State Polytechnic University, Santa Cruz Campus. Her portfolio includes authoring and publishing numerous articles and engaging in collaborative research with fellow academics. Her research interests primarily involve eGovernment and digital government, eLearning and online education, data mining, machine learning, assistive technology, Persons with Disabilities (PWDs), and Sustainable Development Goals. The author actively contributes to extension services that focus on e-participation and ICT training for diverse participants. Additionally, she continues to fulfill roles as an online mentor, online course materials developer, and advisor for both undergraduate and graduate research and capstone projects.