



INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact Factor: 6.078

(Volume 9, Issue 2 - V9I2-1368)

Available online at: <https://www.ijariit.com>

Competency-based assessment of the Civil Engineering program under the new learning modalities: A multi-perspective triangulation analysis

Shenon John C. Valencia

vshenonjohn42@gmail.com

Don Honorio Ventura State University,
Pampanga, Philippines

Beah Marie T. De Guzman

beahmariedeguzman@gmail.com

Don Honorio Ventura State University,
Pampanga, Philippines

Roenzon C. Gagui

roenzongagui4@gmail.com

Don Honorio Ventura State University,
Pampanga, Philippines

Ralph Vincent C. Peñaflor

ralph.penaflor09@gmail.com

Don Honorio Ventura State University,
Pampanga, Philippines

Mherhica B. Santos

mherhicasantos26@gmail.com

Don Honorio Ventura State University,
Pampanga, Philippines

Erica D. Tamayo

tamayoericadeleon@gmail.com

Don Honorio Ventura State University,
Pampanga, Philippines

Juanita Carmelita R. Zoleta

jcrzoleta@dhvsu.edu.ph

Don Honorio Ventura State University, Pampanga, Philippines

ABSTRACT

In a rapidly advancing world, civil engineering students should be able to adapt with the dynamic competencies valued in the industry to succeed in their future careers. This study aims to fill a research gap by analyzing the competencies acquired through the new learning modalities. Its significance extends to multiple sectors, providing growth for students, improving teaching methods for faculty, informing hiring decisions for construction companies, enhancing educational systems for universities, assisting curriculum programmers, and offering insights for future researchers. The study examined competencies of civil engineering students under new learning modalities, exploring self-assessments, professors' perspectives, and construction companies' viewpoints, it also uncovered the intricate relationships between these perspectives. Additionally, this study compared the acquired competencies of students with the valued competencies in the industry. This study utilized a mixed method research design, specifically triangulation. The study surveyed eighty (80) students, sixteen (16) faculty members, and ten (10) construction companies through purposive sampling technique. Validated questionnaires and structured interviews were used as research instruments. Furthermore, the quantitative and qualitative data were analyzed accurately and systematically. The findings of the study revealed that civil engineering students possess a strong foundation in ethical responsibilities, teamwork,

and leadership, as mentioned by the participants, who believe that ethical responsibilities have been instilled in students since childhood. However, the students also demonstrate a need for further development in engineering mechanics, design, and managing risk and uncertainty. In the perspective of professors and companies, students need to have knowledge and mastery in design, and risk and uncertainty that are valued competencies in industry. In conclusion, the study emphasizes the significance of aligning academic and industry expectations for preparing successful civil engineering students. While competencies from new learning methods are generally effective, technical improvements are required. Varying perspectives highlight the need for enhanced curriculum to meet industry demands, with strong support for the formal integration of hybrid learning.

Keywords: Hybrid learning, t-test, thematic analysis, skills

1. INTRODUCTION AND REVIEW OF RELATED LITERATURE AND STUDIES

Higher education institutions (HEIs) play a critical role in equipping students with the necessary theoretical knowledge and skills. The education and training provided by these institutions serve as the backbone of competency development and the foundation of successful professional practice throughout students' careers.

Passow (cited in Condeiro et al., 2020) defined competencies as the synthesis of knowledge, skills, abilities, attitudes, and other characteristics that enable a person to function proficiently in complex and uncertain circumstances such as professional work, civic engagement, and personal life. Kudngaongarm and Sojivorakul (cited in Grate, 2017) added that competency is a gauge of the ability to successfully fulfill duties and responsibilities to the standard expected in a profession.

In civil engineering, Passow (cited in Roy et al., 2022) formalized the areas of competencies that students of accredited engineering programs must attain. While technical competencies have traditionally been the impetus of engineering curricula, the importance of foundational, fundamental, and professional competencies continues to be recognized and acknowledged into civil engineering education.

The book "Civil Engineering Body of Knowledge Third Edition" published by the American Society of Civil Engineers (2019) identified twenty-one (21) concentrated competencies under the four (4) areas of competencies. Project management, engineering economics, risk and uncertainty, breadth in civil engineering areas design, technical depth and sustainability fall under the technical competencies. Foundational competencies include mathematics, natural sciences, social sciences, and humanities. Additionally, materials science, engineering mechanics, experiment methods and data analysis, and critical thinking and problem solving are included in fundamental competencies. Lastly, professional competencies include communication, teamwork and leadership, lifelong learning, professional attitudes, professional responsibilities, and ethical responsibilities.

Additionally, Mishra (2016) examined the perceptions of both employers and employees regarding the employability skills required for entry-level positions in engineering firms. The study revealed that aspiring engineers should have personal skills, presentation skills, effective communication skills, technical knowledge, and leadership abilities. Similarly, a study by Mohd shanmsuri Md Saad (cited in Bakare 2019) found that problem-solving skills, tool-handling expertise, and presentation skills are highly in demand competencies.

However, a study conducted by Polmear et al. (2020) reveal a huge gap between the competencies provided by the curriculum for undergraduate civil engineering students and the competencies valued in the industry.

Civil engineering is an innovative profession sculpted by evolving challenges and emerging opportunities as stated by Russell (cited in Polmear et al., 2017). Given the dynamic nature of the field, the set of competencies varies across different countries, companies, periods of time, and perspectives.

With the massive advancement of technology, the complexity of how civil engineering is practiced and learned has been ever-expanding over the past decades (J. Izwan et al., 2019). As a result, engineers have become "learning professionals," where undertaking continuous education is a necessity to be at par with the more complex technical environment. (Ganiron, 2017)

The contribution of technology in civil engineering education is immensely evident, from the emergence of various engineering software to the development of numerous engineering devices and modern equipment. Elaish et al. (2019) noted that one such

contribution is the adoption of online learning technologies across diverse learning contexts to allow for the seamless delivery of instructions and resources. Although the effectiveness of this new learning method has long been recognized by the education community, challenges in its proper implementation and formal integration into the curriculum continue to proliferate.

In recent times, the educational system has suffered an unprecedented health crisis with the emergence of the COVID-19 pandemic, which has devastated its foundational framework. According to Ciotti et al. (2020), COVID-19 is an infectious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which emerged in China in December 2019 and has symptoms of fever, cough, and shortness of breath. The Philippines reported its first case of the disease on March 1, 2020, and by early May 2020, the virus had infected 4,806,299 people and resulted in 318,599 deaths worldwide, leading the World Health Organization (WHO) to declare the outbreak a global pandemic.

This pandemic has initiated major disruptions in the educational system, affecting more than 1.5 billion students (Simbulan, 2020). This stimulated the digital transformation of higher education in order to recommence the educational training while curbing viral transmission. Rotas et al. (2019) noted that online learning technologies have been integrated in educational delivery mechanisms giving rise to the implementation of new learning modalities such as modular learning, online learning (both synchronous and asynchronous), blended learning, and hybrid learning.

Khalil et al. (2020) stated that the sudden transition to these new learning modalities has raised a wide range of serious concerns relating to socioeconomic factors, pedagogy, policy, technology, logistics, and psychosocial factors. Educators, particularly those used to the traditional educational delivery mechanism, have been forced to adapt despite their inadequate technological literacy. As a result, acquiring the necessary education may be less than ideal, especially in courses where direct interactions are required. Additionally, Franchi (2020) has observed that dropout rates among students in higher education have increased due to economic, psychological, and academic reasons.

Researchers worldwide have been churning out studies relating to the pandemic and the new modes of learning. Among these are Fawaz et al. (2021) and Copeland et al. (2021), who investigated the impact of COVID-19 on the mental health of college students and their coping mechanisms. Tang et al. (2020) studied the effectiveness of online modes of learning among engineering students and found that students are not satisfied with the education acquired through online learning. Additionally, Suryaman et al. (2020) observed the setup of online learning during the pandemic and found that students encountered difficulties such as high internet costs, lack of technological knowledge, and limited socialization.

On the other hand, students generally view synchronous online learning positively, as indicated in a study conducted by Khalil et al. (2020) at a medical school in Saudi Arabia. Furthermore, Singh et al. (2020), who examined the experiences of students during the pandemic, reported that students positively acknowledged the use of online learning as an educational delivery mechanism.

Although numerous studies and assessments have been published on national policies, professional development, curriculum, psychological effects, and the effectiveness of new learning delivery mechanisms, there is limited or worse, non-existent analysis of the competencies acquired and developed through these new learning modalities, particularly in civil engineering.

Despite the significant changes in the educational system in recent years, the civil engineering curriculum has not been updated since 2017, as stipulated in CHED Memorandum Order No. 46 Series of 2017.

This series of massive advancements suggests that the future will be different. The competencies expected of engineering students will be rigorous and constantly changing. Therefore, the civil engineering education should be able to adapt to these changes to prepare the students for the demands of a rapidly advancing technological world.

This study used the triangulation method to analyze the perspectives of construction companies, engineering professors, and civil engineering students at Don Honorio Ventura State University regarding the competencies of students undertaking new learning modalities. According to Noble et al. (2019), triangulation is a technique used to improve the credibility and validity of research findings. Credibility refers to the degree to which a study accurately evaluates the concept or ideas being investigated, while validity refers to the extent to which an investigation accurately evaluates the concept and ideas being investigated. By combining theories, methods, or observers in a research study, triangulation can help overcome biases caused by the use of a single method or observer. Additionally, Honorene (2017) stated that triangulation is a powerful technique for validating data by combining information from multiple sources. Specifically, it refers to the use and combination of multiple research methods in the study of the same phenomenon.

color and different ways of arrangement. In recent years, there has been a general trend towards reducing the use of natural resources and the reuse of waste products (Tan et al., 2017).

2. RESEARCH PROBLEM

With the use of data triangulation analysis, this study explored the perspectives of construction companies, engineering professors, and students towards the competencies of civil engineering students undertaking the new learning modalities as a repercussion of the pandemic. Specifically, the researchers sought to answer the following queries:

1. How do civil engineering students undertaking the new learning modalities describe their competencies?
2. How do faculty members outline the competencies of civil engineering students undertaking new learning modalities?
3. How do construction companies define the competencies of civil engineering students undertaking new learning modalities?
4. Is there a significant difference among the perspectives of construction companies, engineering professors, and students?
5. How do the competencies valued in the industry compare to the actual competencies acquired by students?

3. OBJECTIVES

This study is designed to achieve the following objectives:

1. To investigate the self-reported competencies of civil engineering students undertaking new learning modalities.
2. To examine the perspectives of engineering professors on the competencies of civil engineering students undertaking new learning modalities.
3. To explore the perspectives of construction companies on the competencies of civil engineering students undertaking new learning modalities.
4. To determine if there is a significant difference among the perspectives of construction companies, engineering professors, and civil engineering students on the competencies of civil engineering students.
5. To compare the competencies acquired by civil engineering students with the competencies valued by the industry.

4. CONCEPTUAL FRAMEWORK

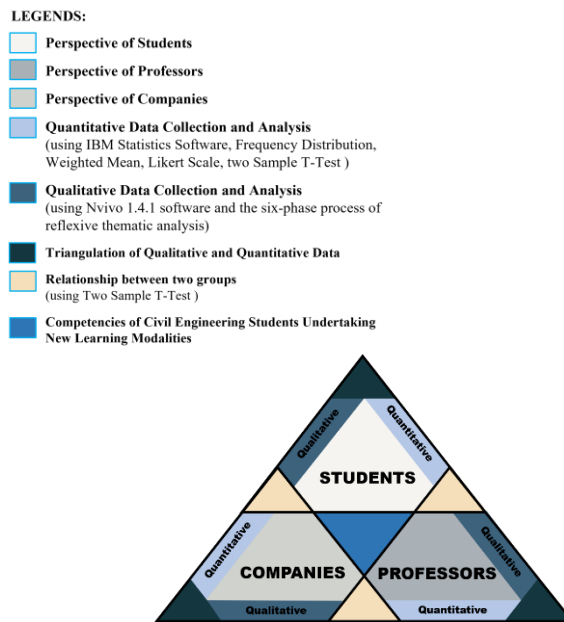


Figure 1: Paradigm of the Study

The study framework is presented in Figure 1 and consists of eight components. The first three are the data sources: civil engineering students, professors, and construction companies. The fourth and fifth components involve collecting and analyzing quantitative and qualitative data from each group, respectively. The sixth component involves triangulating the quantitative and qualitative data across the different sources. The seventh component involves triangulating the data sources to identify relationships between groups. Finally, the last component presents the final result of the study, which is the competencies of civil engineering students under the new learning modalities.

5. HYPOTHESIS

Alternative Hypothesis, Ha: There is a significant difference among the perspectives of construction companies, engineering professors, and students.

Null Hypothesis, Ho: There is no significant difference among the perspectives of construction companies, engineering professors, and students.

Alternative Hypothesis, Ha: There is a significant difference between the competencies valued in the industry and the competencies acquired by students.

Null Hypothesis, Ho: There is no significant difference between the competencies valued in the industry and the competencies acquired by students.

6. SIGNIFICANCE OF THE STUDY

This study provides rigorous result analysis regarding the competencies of civil engineering students undertaking the new modes of learning based on the perspectives of the students themselves, faculty members, and construction companies. The following sectors are among those who benefit from the study:

The Students. This study may be beneficial to civil engineering students who experienced new learning modalities, as it provides them with information on the perspectives of different data sources regarding their competencies. It may also raise their awareness of the gaps between their actual competencies and the competencies expected by construction companies.

The Faculty Members. Civil engineering faculty members may use the results of this study to determine the effectiveness of their educational delivery techniques and whether students are acquiring quality education through new learning methods. This study may serve as a basis for developing new teaching techniques for further improvement.

The Construction Companies. This study may be useful in the hiring process for construction companies, providing them with consolidated data on the competencies and quality of education acquired by civil engineering graduates during the pandemic.

The University. The results of this study may provide the university with valuable insights into the effectiveness of its current educational system and inform decisions on further improvements. This may also serve as a basis for implementing new educational frameworks to align with the competencies valued in the industry.

Curriculum Programmers. The results of this study will be significant to civil engineering curriculum programmers as it will provide them with valuable insights on the effectiveness of the new learning modalities. It may also help them in making informed decisions on the curriculum design and pedagogical strategies, which will ultimately enhance the students' learning outcomes and prepare them for the demands of the industry.

Future Researchers. This study may serve as a guide for future researchers conducting related studies. It may also be used as a source for another triangulation design study, or as a basis for expanding the scope and delimitation of this study.

7. SCOPE AND LIMITATION

This study focused on the perspectives of students, faculty members, and construction companies towards the competencies of civil engineering students currently undertaking the new learning methods.

The scope of this study included 4th year civil engineering students currently enrolled at Don Honorio Ventura State University and civil engineering faculty members currently employed at the same university. The scope also includes construction companies within Pampanga which supervised civil engineering interns from the university in 2022.

8. METHODOLOGY

This chapter presents the research design, population, research instrument, data collection procedure, and data analysis for this study. These methodologies have served as guidelines for the researchers in conducting the necessary procedures from data collection to analysis.

8.1. Research Design

This study employed a mixed method research design, specifically triangulation design. According to Cameron (2015), mixed method research is a study that collects, analyzes, and interprets both quantitative and qualitative data in a single study or series of studies examining the same underlying phenomenon. As stated by George (2022), mixed method design allows researchers to obtain a more comprehensive view and extract more informative evaluations than a single quantitative or qualitative investigation.

Furthermore, as stated by Denzin et al. (cited in Campbell et al., 2018), triangulation design is a type of mixed method research that uses multiple datasets, methods, theories, and/or investigators to make the design more effective and improve interpretation of results. According to Noble and Heale (2019), this type of design also increases the reliability and substance of research findings,

making a study more convincing and trustworthy. It verifies data using both quantitative and qualitative analyses and provides balanced explanations to readers.

The use of quantitative and qualitative data allowed the researchers to capture a broader range of perspectives and experiences from different data sources, including students, faculty members, and construction companies. Overall, the mixed method design, particularly triangulation, was chosen to provide a more thorough and informative evaluation of the competencies of civil engineering students under the new learning modalities.

8.2. Population

This study used purposive sampling technique in selecting the respondents. According to Alkassim, Etikan and Musa (2016), purposive sampling technique is the deliberate selection of participants based on certain qualities they possess and uses a method that is not random and does not use random sampling methods or require a certain number of participants.

Raosoft was used to determine the minimum recommended population. For the 4th year civil engineering students, with a total population size of 696, a margin of error of 5%, and a 95% confidence level, the minimum recommended sample size for the students is 78. And for the professors, with a total population size of 40, a margin of error of 10%, and a confidence level of 90%, the minimum recommended sample size for the professors is 16.

The final number of respondents for the survey questionnaires were eighty (80) civil engineering students, sixteen (16) civil engineering faculty members at Don Honorio Ventura State University, and ten (10) construction companies within Pampanga. Structured interviews were only conducted with those who agreed to participate.

This study employed specific criteria for each group to ensure the selection of right respondents. Only fourth-year students who had experienced face-to-face, online, modular, and hybrid learning were chosen to participate. This criterion made sure that the respondents have sufficient exposure to different learning modalities. Additionally, only faculty members with a minimum of four-years of teaching experience and had experienced teaching in face-to-face, online, modular, and hybrid setup were chosen to participate. This condition ensured that the respondents had adequate teaching experience and had adapted to the new teaching modalities. Lastly, only representative of engineering firms who supervised civil engineering interns from Don Honorio Ventura State University in 2022 were invited to participate. This criterion ensured that the respondents had sufficient experience in working with civil engineering undergraduates who had undergone the new learning modalities.

8.3. Research Instrument

To gather the necessary data for the results analysis of this study, the researchers used survey questionnaires followed by structured interviews with participants from the three data sources. These instruments underwent validation by a grammarian, psychometrician, and approval by a research consultant to ensure quality and eliminate bias and animosity in the methodologies. Furthermore, the survey questionnaire underwent pilot testing and reliability test using the Cronbach's alpha. As defined by Bujang et. al. (2018), it is a statistical metric that assesses the internal consistency and reliability of multiple items, measurements, or ratings. This measure is commonly used in research to determine the degree to which a questionnaire, instrumentation, or rating evaluated by subjects produces consistent and dependable results, thereby indicating the stability of these tools. The calculated value of alpha from the reliability test is 1.0324, which has an interpretation of excellent internal consistency.

Survey Questionnaires. For the quantitative component of this study, survey questionnaires were used. The questionnaires contained twenty-one (21) competencies along with their definitions and examples. These competencies were adopted from the book *Civil Engineering Body of Knowledge Third Edition* published by the American Society of Civil Engineers (2019). Respondents were asked to rate these competencies based on their perspectives towards the civil engineering students under the new learning methods. Additionally, the questionnaires included a consent or request for an interview. Respondents who agreed to the consent served as participants for the qualitative data collection.

Structured Interviews. For the qualitative section of this study, structured interviews were conducted. These interviews consisted of open-ended questions designed to elicit in-depth responses from participants. The questions were tailored to each of the three data sources: students, faculty members, and construction companies. Students were asked about their perception of the competencies they have acquired through new learning modalities, their career plans, and their views on the effectiveness of these methods. Faculty members were asked about their perspectives on the competencies valued in the industry, their observations on the competencies of students undergoing new learning modalities, and their opinions on the advantages and disadvantages of these methods. Construction companies, specifically those that have supervised civil engineering interns, were asked about the competencies they expect from applicants and whether they believe these competencies are acquired by the interns through new learning modalities. These interviews provided valuable insights into the perspectives of different stakeholders on the competencies of civil engineering students.

8.4. Data Collection

The data collection for this study were conducted in two simultaneous parts. First, the researchers submitted an approval letter to the university to formalize the study and validate its procedures. Once the letter was signed, the researchers disseminated the survey questionnaires and conducted structured interviews with the civil engineering students and faculty members at Don Honorio Ventura State University.

For the second part, the researchers conducted preliminary visits to selected construction companies to submit a formal letter of request to participate in the study. If the companies agreed to participate, the researchers conducted the survey and structured interviews with their representatives at a mutually agreed upon date and time. The researchers ensured that the data collection procedures were conducted in a neutral and unbiased environment in order to maintain the validity of the collected data.

8.5. Data Analysis

This section encompasses the comprehensive data analysis procedure of this study which is divided into three phases.

Quantitative Data. The quantitative data gathered by the researchers from the survey questionnaires were classified, organized, tallied, and tabulated using the IBM SPSS Statistics software. According to William (2022), this software is commonly used by researchers to analyze complex statistical data from social science research. It allows researchers to create and validate predictive models using advanced statistical techniques and aids in the collection of insights from quantitative inputs through open-ended surveys.

Initial analysis was performed using frequency distribution and weighted mean to determine the average ratings of each competency within each data source. The Likert Scale was used to interpret the weighted data. Likert Scale uses five points to appraise attitudes, where the third point in the middle (anchors) is neutrality. The response scales in structured survey questionnaires include using the Likert scale to allow respondents to express their viewpoint's direction and tenacity (Chyung et al, 2017). In addition, several advantages of using Likert-type scales have been identified. Most notably, Likert-type scales are economical and easy to administer, and allow researchers to collect information in a simple, standardized manner. Participants are generally familiar with this survey format and will not require substantial assistance when the questions are written at an appropriate reading level (Ho, 2016).

Table 1: Likert Scale Interpretation

Weighted Average	Interpretation	Weighted Average	Interpretation
4.20 – 5	Excellent	4.20 – 5	Very Important
3.40 – 4.19	Good	3.40 – 4.19	Fairly Important
2.60 – 3.39	Acceptable	2.60 – 3.39	Important
1.80 – 2.59	Poor	1.80 – 2.59	Slightly Important
1 – 1.79	Very Poor	1 – 1.79	Not at all Important

Additionally, the Two-samples Independent T-test was used to triangulate the initial result analysis which determined the relationship between the perspectives of students, teachers, and construction companies. According to Kumar (2023), the unpaired two-sample t-test, also referred to as the two independent samples t-test, is a crucial statistical technique that enables researchers to derive significant insights from the data. This test assesses whether the disparity between the means of two separate samples is statistically significant or simply a result of random variation.

Table 2: T-test Interpretation

Sig.	Interpretation
P<0.05	Significant
P>0.05	Insignificant

Qualitative Data. The qualitative data collected from the structured interviews were transcribed and analyzed using NVivo 1.4.1 software and the inductive logic approach of thematic analysis. NVivo is a mixed-methods and qualitative research software used to analyze unstructured text, audio, video, and image data from various sources such as interviews, focus groups, and surveys. It allows researchers to dive down into the data for thorough assessment and gives the techniques to obtain a general sense of the themes in the data (Kent State Universities Libraries, 2021). Furthermore, as stated in the article published by J. Caulfield (2019), in an inductive logic approach, themes are generated based on the data gathered. To produce a rigorous result, the researchers adopted the six-phase process of reflexive thematic analysis developed by Virginia Braun and Victoria Clarke. The process includes

familiarizing with the data transcripts, coding, generating initial themes, developing and reviewing themes, defining and naming themes, and writing the result analysis.

The extracted themes from this procedure were assessed for relevance to the objectives and stated problems of the study and were used to produce scholarly report narratives and a thematic map for visual reference. Selected data transcripts were quoted to support the analysis and pseudonyms were used to maintain the confidentiality of the respondents.

Methods Triangulation. The final result analysis of the study was obtained through triangulation of the result analyses from the quantitative and qualitative data. This process involved comparing and contrasting the results from the two methods to determine any convergence or divergence, providing a more comprehensive understanding of the data and producing more robust conclusion.

8.6. Ethical Consideration

The data were collected in accordance with the Data Privacy Act of 2012 and only be used for the sole purpose of the study. Furthermore, personal and demographic information of the respondents was treated with strict confidentiality, and pseudonyms were employed to protect their identities.

All authors of the articles, related studies, related literature, and other information utilized in this paper were appropriately cited and acknowledged following the American Psychological Association (APA) format.

9. RESULTS AND DISCUSSION

9.1. Perspective of Engineering Students

Table 3: Assessment of engineering students to their acquired competencies

Competencies	Mean	SD	Interpretation
Foundational			
Mathematics	3.56	0.855	Good
Natural Sciences	3.49	0.763	Good
Social Sciences	3.64	0.875	Good
Humanities	3.64	0.917	Good
Fundamental			
Material Sciences	3.58	0.776	Good
Engineering Mechanics	3.45	0.761	Good
Experiment Methods and Data Analysis	3.22	0.763	Acceptable
Critical Thinking and Problem Solving	3.22	0.839	Acceptable
Technical			
Project Management	3.55	0.899	Good
Engineering Economics	3.38	0.848	Acceptable
Risk and Uncertainty	3.51	0.871	Good
Breadth in Civil Engineering Areas	3.55	0.855	Good
Design	3.18	0.965	Acceptable
Depth in Civil Engineering Areas	3.21	0.852	Acceptable
Sustainability	3.28	0.779	Acceptable
Professional			
Communication	3.78	0.856	Good
Teamwork and Leadership	3.96	0.892	Good
Lifelong Learning	3.93	0.839	Good
Professional Responsibilities	3.94	0.876	Good
Professional Attitudes	3.91	0.845	Good
Ethical Responsibilities	4.24	0.815	Excellent
Grand Mean	3.58		

The table presents the competencies acquired by civil engineering students based on their self-assessment. According to the findings, Ethical responsibilities have been identified as one of the most crucial skills that civil engineering students have acquired. They believe that these ethical values have been ingrained in them since childhood. Additionally, they emphasized that ethical conduct is integral to achieving their personal aspirations in their chosen career and serves as a compass for distinguishing between right and wrong.

Civil engineers are ethically obligated to adhere to established principles and guidelines that prioritize the welfare of the public and promote the common good (Verma, 2023). Hence, it is essential for aspiring civil engineers to recognize that while foundational, fundamental, and technical skills are important, the ability to work with integrity is equally indispensable. On the other hand, the competency of design received the lowest rating among the respondents. They expressed difficulties in learning this subject through the new learning modalities. It was revealed that design, being a complex topic, requires face-to-face demonstrations and interactions to enhance understanding and proficiency.

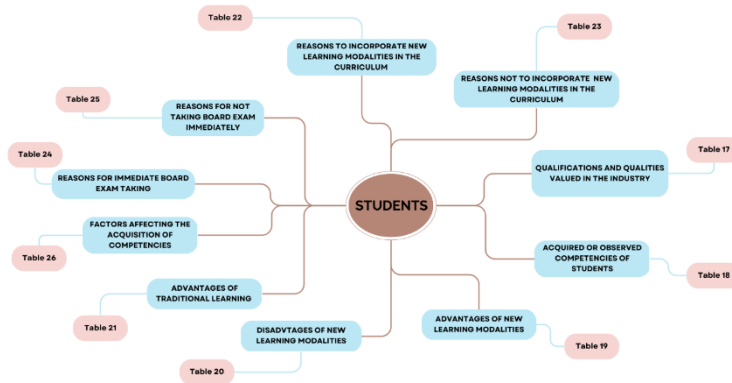


Figure 2: Thematic map generated from the perspective of engineering students

The thematic map generated from the thematic analysis of student interview transcripts is shown in Figure 2. Ten themes were identified, each with their underlying codes, including Advantages and Disadvantages of New Learning Modalities and Traditional Learning, Qualifications and Qualities Valued in the Industry, Factors Affecting Competency Acquisition, Reasons for Delaying Board Examinations, Acquired or Observed Competencies of Students, and Reasons for Choosing to Incorporate or Not Incorporate New Learning Modalities in the Curriculum.

Narrative

The sudden transition from traditional to new learning modalities has led to numerous changes, including alterations in the learning setup that have both positive and negative effects on the students' acquisition of knowledge. This shift in the modes of learning has also influenced their decisions in taking the board examinations immediately. Additionally, the sudden change in learning modes has impacted students' ability to acquire the necessary qualities and competencies valued in the industry. The analysis of the participants' responses was detailed in ten (10) themes that emerged.

Theme 1: Qualifications and Qualities Valued in the Industry

When asked about the competencies that are highly valued in the industry and their awareness of them, students listed competencies they have acquired. The majority of students identified computer-software literacy, decision-making, and critical thinking skills as the top competencies valued in the industry today. Some of them specifically mentioned the significance of technical skills related to computer and software, while others emphasized the importance of decision making and critical thinking. Furthermore, some students highlighted the value of communication skills, especially for those aspiring to become contractors. They emphasized that effective communication is crucial in such roles, stating that being able to express oneself is essential. However, there were fewer mentions of competencies like respect and goal-oriented behavior, which are highly valued in the industry. Some students also acknowledged the importance of respect within oneself and towards seniors, while others highlighted the significance of being goal-oriented and dedicated to achieving objectives.

Theme 2. Acquired Competencies of Students

In terms of the competencies acquired by the students, the majority of respondents mentioned their skills in computer literacy, teamwork, and professional responsibilities. Some students highlighted their computer skills, while others emphasized their high rating in teamwork and ethical responsibilities, which they believed were instilled in them since childhood. The importance of professional responsibilities was also acknowledged by other students, stating their willingness and sense of responsibility. Leadership and communication skills were also noted by some students expressed confidence in their ability to lead, even though they hadn't had much practical experience in it. Other students emphasized the significance of communication skills, particularly in terms of reporting, thesis work, and client interactions in the field. Additionally, the students mentioned a range of other competencies they have acquired. These included responsibility and self-reliance, project management and critical thinking, proficiency in AutoCAD and STAAD, drawing and analytical skills, and a

strong sense of responsibility. Some students highlighted personal achievements and awareness of right and wrong, while others mentioned their proficiency in project management and critical thinking. Basic knowledge of AutoCAD and STAAD was noted as important for fresh graduates in certain positions. The importance of drawing skills and analytical skills, particularly in the context of civil engineering, were also mentioned by respondents.

Theme 3. Advantages of New Learning Modalities

According to the students' perspectives, there are several advantages to new learning modalities. One significant benefit is the work-friendly nature of these modalities, allowing working students to pursue their studies while gaining valuable work experience. This flexibility was highlighted as an advantage for individuals who may not have the ability or time to commit to traditional full-time education. The opportunity to acquire work experience alongside studying was seen as a positive aspect by these students.

Another advantage mentioned by the students is the reduction in commute time and physical strain. By eliminating the need to travel long distances to attend classes, students can save time and energy, which can contribute to a more balanced lifestyle. This reduction in physical strain was seen as beneficial, ensuring that students are not overly exhausted from commuting long distances, particularly for those whose homes are far from the educational institutions.

The students also recognized that new learning modalities can help alleviate overcrowding in educational settings, creating a more conducive environment for learning. This aspect was seen as advantageous, as reduced overcrowding can enhance concentration and facilitate a more interactive and focused learning experience.

Furthermore, the students expressed their support for these new learning methods, as long as the quality of education is not compromised. They emphasized the importance of maintaining high educational standards and ensuring that these new modalities still provide students with the necessary competencies and skills. The students emphasized the need to preserve the same level of quality in education while incorporating new learning methods.

Theme 4. Disadvantages of New Learning Modalities

The participants' responses indicate that they recognized several disadvantages and challenges associated with new learning modalities, particularly online learning. The most notable concern highlighted by the students is the increased presence of distractions compared to face-to-face learning. They expressed that online learning environments offer more opportunities for distractions, which can slow down their focus and productivity. The availability of these distractions can make it difficult for students to fully engage in their online classes and coursework.

Laziness was also mentioned as a challenge by some participants, stating that they feel more motivated and attentive during face-to-face classes compared to online or modular learning. This suggests that the convenience of online learning may lead to a lack of discipline and a tendency to procrastinate.

In addition to distractions and laziness, the participants identified other challenges. Some students expressed concerns about not taking courses seriously in virtual settings, as they perceive a potential decrease in their level of commitment and engagement. There were also mentions of the possibility of cheating in online assessments and exams, which can compromise the integrity of the learning process.

Furthermore, the participants highlighted the impact of poor internet connection on their ability to absorb the course material effectively. Fluctuating or unreliable internet connectivity can disrupt online classes, hinder participation, and limit the students' comprehension of the subject matter.

Theme 5. Advantages of Traditional Learning

When asked about the advantages of traditional learning, the participants highlighted several benefits that they perceive in comparison to online or remote learning. They emphasized the ability to concentrate better in a traditional classroom setting, stating that face-to-face interaction allows them to focus more effectively on the subject matter at hand. This enhanced concentration is seen as a valuable advantage of traditional learning.

Furthermore, participants mentioned that traditional learning promotes increased comprehension of the material. They believe that being physically present in the classroom facilitates a deeper understanding of the lessons being taught. The immediate availability of the teacher for clarification and the ability to ask questions in real-time contribute to a better grasp of the material.

Another advantage mentioned by the participants is the importance of student-teacher interaction and the value of immediate feedback. They emphasized that face-to-face learning allows for a dynamic exchange between students and teachers, where teachers can apply the concept they teach and students can receive instant feedback on their progress. This interaction is perceived as beneficial for both the learning process and the ability to absorb the knowledge being presented.

Additionally, students expressed appreciation for the hands-on learning experiences that traditional learning offers. They mentioned the significance of being able to perform experiments, engage in practical activities, and apply what they learn in real-life settings. This hands-on approach provides a tangible and immersive learning experience that is considered valuable by the participants.

Theme 6. Reasons to Incorporate the New Learning Modalities in the Curriculum

The participants' responses indicate that time flexibility and self-paced learning are highly valued aspects of new learning modalities. They appreciate the convenience of being able to study at their own pace and according to their own schedule. The flexibility provided by these modalities is seen as a significant advantage and is considered beneficial for students.

Furthermore, participants believe that incorporating new learning modalities can contribute in producing competent professionals. They recognize the potential of these methods to enhance the skills and knowledge of students, equipping them with the necessary competencies for their future careers.

However, while participants generally support the incorporation of new learning modalities into the curriculum, some expressed reservations and suggested certain considerations. They emphasized the need for stricter attendance tracking, proper planning, and studying, and taking into account class length. These suggestions aim to ensure that the implementation of new modalities is well-regulated and maximizes the learning experience for students.

The benefits of online learning were also highlighted by participants. They mentioned the ability to catch up on missed lessons and participate in webinars as advantages of online platforms. The effectiveness of online learning is recognized, as it allows for the utilization of various internet resources, such as webinars, which offer opportunities for additional learning and skill development.

Theme 7. Reasons not to Incorporate the New Learning Modalities in the Curriculum

When asked about their reluctance to incorporate new learning modalities into the curriculum, students provided a range of reasons. Many expressed a preference for face-to-face learning, emphasizing the value they place on face-to-face interactions and the classroom environment. They believe that traditional learning allows for better engagement and a more immersive learning experience.

Distractions during online classes were cited as a significant concern by several students. They acknowledged that online learning can be challenging due to the presence of various distractions, making it harder for them to focus and take the material seriously. These distractions could hinder their ability to absorb information and fully engage with the learning process.

Furthermore, some students highlighted the advantages of traditional assessment methods. They believed that face-to-face instruction enables more accurate and comprehensive evaluation of students' progress and improvement. The ability for teachers to directly observe and interact with students in a physical classroom setting was seen as crucial for assessing their development effectively.

Additionally, the students recognized the importance of experiencing real-world challenges and environments. They expressed concerns that online learning may not adequately prepare them for the practical aspects of their fields, such as working on-site or in office settings. They emphasized the need to adapt to real-world circumstances and believed that face-to-face instruction better facilitated this adaptation.

Theme 8. Reasons for Immediate Board Exam Taking

The majority of respondents believe that taking the board exam immediately after completing their degree is beneficial to avoid wasting time and loss of knowledge. They emphasize the importance of utilizing their recently acquired knowledge and skills without delay. Taking the board exam promptly is seen as a way to leverage on their education and prevent any potential gaps in their understanding.

Participants expressed the concern that delaying the board exam might lead to a loss of knowledge and skills. They fear that if they become idle or engage in unrelated activities during the gap period, they may forget important concepts and struggle to recall the information necessary for the exam. Taking the board exam immediately after graduation is viewed as a proactive measure to ensure that the knowledge they have acquired, remains fresh and accessible.

Moreover, respondents highlighted the importance of maintaining momentum in their studies. By taking the board exam immediately after graduation, they believe they can capitalize on the motivation and drive they have developed throughout their studies. This continuous learning approach enables them to stay focused and dedicated to their goals without a significant interruption in their academic journey.

Additionally, participants recognized that taking the board exam immediately provides valuable experience, even if they do not pass on their first attempt. It allows them to gain insights into the exam process and identify areas for improvement. This experience can be utilized to better prepare for subsequent attempts and increase their chances of success in future board exams.

Theme 9. Reasons for not taking the Board Exam Immediately

When asked about their reasons for not taking the board exam, students expressed several concerns. The most common reason cited was a feeling of unpreparedness and inadequate knowledge. Many students felt that they lacked the necessary readiness and understanding of the subjects and topics required for the exam. The transition to online classes for two years was seen as a factor that left them feeling left out and lacking in the knowledge needed for the board exam.

Limited time for preparation was also a significant factor mentioned by students. With only a few months left to study for the exam, they believed it was insufficient to adequately prepare themselves. Mental and physical unreadiness were additional factors that influenced their decision. Some students felt they were not mentally prepared or physically ready to undertake the board exam.

The limitations of online learning were also brought up by students. They expressed concerns that online classes hindered their ability to fully comprehend and grasp the subject matter compared to face-to-face instruction. They felt that the online learning experience was less effective in providing them with a comprehensive understanding of the topics.

Furthermore, financial concerns and the perceived low salary rates for engineers in the Philippines were mentioned by some students. They expressed uncertainty about pursuing engineering as a career due to the pressures of financial stability and the belief that engineering professions may not offer favorable income prospects.

Theme 10. Factors Affecting the Acquisition of Competencies

According to the students' responses, two main factors were identified as influential in the acquisition of knowledge and competencies. The first factor mentioned was the importance of learning experiences. Students emphasized that the experiences they encounter during their educational journey play a significant role in acquiring competencies. These experiences contribute to the improvement of various skills and abilities necessary for competency development. The students recognized that the quality and variety of learning experiences directly impact their overall competency acquisition.

The second factor identified by the students was the significance of home practice. They acknowledged that acquiring competencies is not solely dependent on formal education or learning experiences within educational institutions. Home practice and individual effort were highlighted as essential components in the acquisition of competencies. The students emphasized that simply having high ratings or scores is not enough; it is the consistent and dedicated practice at home that allows them to truly acquire and develop the competencies listed.

9.2. Perspective of Engineering Professors

Table 4: Assessment of engineering professors' observation on the competencies of the students

Competencies	Mean	SD	Interpretation
Foundational			
Mathematics	2.94	0.854	Acceptable
Natural Sciences	3.06	0.772	Acceptable
Social Sciences	3.56	0.727	Good
Humanities	3.50	0.730	Good
Fundamental			
Material Sciences	3.31	0.793	Acceptable
Engineering Mechanics	2.69	1.078	Acceptable
Experiment Methods and Data Analysis	3.06	1.063	Acceptable
Critical Thinking and Problem Solving	2.94	0.929	Acceptable
Technical			
Project Management	3.38	0.719	Acceptable
Engineering Economics	3.31	0.793	Acceptable
Risk and Uncertainty	3.38	0.885	Acceptable
Breadth in Civil Engineering Areas	3.19	0.750	Acceptable
Design	2.81	0.911	Acceptable
Depth in Civil Engineering Areas	3.25	0.856	Acceptable
Sustainability	3.19	0.981	Acceptable
Professional			
Communication	3.38	1.147	Acceptable
Teamwork and Leadership	3.75	0.775	Good
Lifelong Learning	3.38	1.025	Acceptable
Professional Responsibilities	3.38	0.885	Acceptable
Professional Attitudes	3.13	0.885	Acceptable
Ethical Responsibilities	3.31	0.793	Acceptable
Grand Mean	3.23		

Teamwork and leadership are both essential components in engineering education programs around the world (Beddoes, Jesiek, and Borrego 2017). Effective leadership, which includes the basic ability to lead, is necessary for managing an organization successfully (R. Burke 2019). In accordance to the civil engineering professors, DHVSU students are good at teamwork and leadership, based on the interviews we conducted. Therefore, the integration of teamwork and leadership in engineering education can help prepare students to become competent professionals who can effectively manage organizations.

Additionally, professors have noted that civil engineering students demonstrate the least proficiency in the field of engineering mechanics. Engineering mechanics involves abstract concepts like forces, moments, and equilibrium, which can pose challenges for students to comprehend. The understanding of these concepts typically necessitates a thorough grasp of physics and mathematical principles, requiring significant time and effort to fully grasp (ASCE 2008).



Figure 3: Thematic map generated from the thematic analysis

Figure 3 displays a thematic map resulting from a thematic analysis of interviews with professors. The analysis generated fifteen themes, each with its underlying codes. Some of these themes include the advantages and disadvantages of new learning modalities and traditional learning, the qualifications and qualities valued in the industry, the competencies acquired or observed in students, reasons for incorporating or not incorporating new learning modalities in the curriculum, teaching styles of professors in new learning modalities, university interventions, ways of ensuring students' global competitiveness, professors' confidence levels in students' success, materials used in new learning modalities, and the characteristics needed to succeed in the civil engineering profession.

Narrative

The rapid evolution of technology has revolutionized the way education is delivered with the emergence of new learning modalities. As students are exposed to these innovative approaches, it is important to evaluate how they affect the competencies that students need to acquire in their field of study, particularly in terms of preparing them for the workforce. There are evident advantages in new learning modalities, however there are also potential disadvantages. Despite these challenges the professors and the university are making interventions to ensure that the new learning modalities are conducive to learning and that students are receiving necessary support and resources to become globally competitive professionals. The participants' responses were examined and categorized into fifteen (15) distinct themes.

Theme 1. Qualifications and Qualities Valued in Industry

The participants provided diverse responses regarding the competencies they believed were necessary for students to acquire in their respective fields of work. Critical thinking, technical skills, and project management were identified as essential competencies by the majority of participants. Critical thinking was seen as crucial for problem-solving and decision-making in real-world situations. Technical skills were highly valued, as they enable self-study, self-learning, and proficiency in specific areas of expertise. Project management skills were also highlighted as essential for predicting and addressing potential problems and being a critical thinker in professional settings.

Additionally, the participants mentioned a range of other important competencies for students to develop. These included data analysis, moral values, socialization, good attitude, leadership skills, teamwork, avoiding authoritarianism, cooperation, understanding basic math and structural engineering, expertise in materials, economics, mastery in design, professionalism, communication skills, and integrity. Data analysis was emphasized as a crucial skill for handling and interpreting data in practical scenarios. Moral values were seen as important for ethical decision-making and maintaining good moral character. Socialization and good attitude were highlighted as necessary for effective collaboration and building positive relationships with colleagues. Leadership skills were mentioned, emphasizing the need for students to develop the ability to lead and manage a team. Basic math and structural engineering knowledge were identified as important foundational skills for various fields. Other competencies such as expertise in specific materials, economics, design, professionalism, communication skills, and integrity were also recognized as essential for success in the industry.

Theme 2. Acquired or Observed Competencies of Students

During discussions about civil engineering students' skills and abilities, professors identified several key attributes that the students demonstrated. Leadership skills were highlighted by participants, with students being praised for their strong leadership capabilities. The students were also commended for their professional competencies, as their experience-based learning approach facilitated their development in this area. Ethical responsibility was emphasized, with participants noting the students' discipline and behavior as indicators of their commitment to ethical practices.

Teamwork was recognized as a strength among students, reflecting their ability to collaborate effectively. Professors also acknowledged the students' proficiency in social sciences and humanities, emphasizing their confidence and personality in these areas. Technical skills and fundamental skills were seen as areas where students excelled, with participants acknowledging the students' capacity for self-study and self-learning to acquire these skills.

The students' presentation skills were highly praised, as they were described as competent and confident in delivering reports and presentations. Overall, the participants agreed on the importance of equipping students with a comprehensive set of skills and competencies to succeed in their academic and professional pursuits.

Theme 3. Advantages of New Learning Modalities

The professors in the study identified several benefits of new learning modalities. They acknowledged that these modalities offer various advantages, such as access to recorded discussions, the ability to have a backup plan for unexpected situations, self-paced learning, flexibility, accessibility to additional learning resources, rest time, and convenience for students.

The availability of recorded discussions was seen as beneficial by professors, as it allows students to review and re-watch the content for better understanding. This feature provides assurance to students that they can always refer back to the material when needed.

Having a backup plan in case of emergencies or unforeseen circumstances was also emphasized. Professors recognized that new learning modalities can serve as a safety net, ensuring that students can continue their learning journey regardless of external factors that may disrupt traditional classroom settings.

Participants in the study mentioned the advantages of self-paced learning, where students have the flexibility to study and review lessons at their own pace. This approach allows students to personalize their learning experience and cater to their individual needs and preferences.

The accessibility to additional learning resources was another benefit highlighted by the professors. They acknowledged that new learning modalities provide easy access to a wide range of supplementary materials, enabling students to delve deeper into the subject matter and explore various perspectives.

Rest time was also recognized as a positive aspect of new learning modalities. Professors noted that online or remote learning can allow students to manage their time more effectively, creating opportunities for rest and relaxation while still maintaining their academic progress.

Convenience for students was another advantage mentioned by participants. They highlighted the reduced commute time associated with online learning, which saves students from the hassle of traveling to physical classrooms. Additionally, online classes were noted to improve audio quality, ensuring that students can clearly hear and understand the instructional content.

Moreover, participants acknowledged that new learning modalities contribute to enhancing students' technological literacy as they become familiarized with electronic gadgets and digital tools.

Theme 4. Disadvantages of New Learning Modalities

The professors acknowledged the benefits of online learning, such as flexibility and accessibility, but also raised several concerns and disadvantages. They highlighted the limited interaction between students and professors, which made it difficult to gauge reactions and engage in meaningful discussions. The absence of hands-on learning experiences, particularly in fields that require practical application or use of specific tools and equipment, was also noted as a drawback.

Participants expressed concerns about decreased attentiveness and increased distractions during online learning. They mentioned that being in the comfort of their own space allowed for potential complacency and reduced effort in their studies. Some participants also faced challenges in adapting to the technology used for online learning and finding the most effective teaching styles to facilitate effective learning.

The participants further highlighted the difficulties in evaluating performance and the potential impact on future job competition. They mentioned the possibility of culture shock when transitioning to in-person discussions or practical applications. Additionally, participants pointed out that first-year students who had experienced primarily online learning in their previous education might have limited knowledge compared to those who had face-to-face instruction.

Mental health and self-discipline were also mentioned as concerns, with participants expressing worries about increased procrastination and inadequate knowledge in utilizing online tools and equipment. Moreover, some participants mentioned the increased workload for instructors, who had to create additional materials like PowerPoint presentations.

Theme 5. Advantages of Traditional Learning

The participants in the study identified numerous advantages associated with the traditional learning. They emphasized that traditional learning is effective in keeping students attentive and engaged. The personal interaction between teachers and students

allows for better monitoring of students' actions and behaviors, creating an environment where students are more accountable for their learning.

Participants also noted that traditional learning motivates students to review and exert effort in their studies. Students recognize the challenges they will face in exams and understand the necessary effort required to succeed in specific subjects. They also develop resourcefulness and problem-solving skills, actively engaging in solving problems and demonstrating higher levels of competence. Traditional learning was seen as a source of motivation for students, as the physical presence of classmates and friends creates a supportive environment that encourages studying even when tired. Participants highlighted that students in traditional learning environments develop greater patience and resilience due to their exposure to a curriculum that assigns multiple tasks and challenges.

One significant advantage of traditional learning mentioned by participants is hands-on learning. This unique aspect allows students to acquire practical skills and experiences that can be directly applied in real-world or industry settings. Traditional learning also provides a clearer assessment of students' capabilities, as face-to-face interactions make it easier to gauge their progress and potential.

Participants further highlighted several other benefits of traditional learning, including the ability to assess students' abilities through interactive sessions, fostering discipline and a sense of urgency in studying, facilitating spontaneous discussions due to familiarity with classmates, excelling at solving impromptu problems, promoting comfortable and engaging interactions, preparing students for real-world challenges, enhancing competence through challenging tasks, facilitating problem comprehension, increasing chances of success, enabling teachers to regain students' attention effectively, conveying knowledge in a more nuanced way, and making facial reactions visible for better understanding and communication.

Theme 6. Disadvantages of Traditional Learning

In contrast to the numerous advantages of traditional learning mentioned earlier, a few participants highlighted some specific disadvantages. These include difficulties in understanding lessons if not heard clearly, drowsiness and exhaustion during certain types of lectures, and noise interference in the classroom.

Some participants noted that if a student doesn't hear the teacher's explanation clearly, they may struggle to comprehend the content and have to ask questions in subsequent sessions. Other participants also mentioned that certain lecture styles that focus on definitions and discussions without active problem-solving can lead to drowsiness among students. It was also noted that face-to-face learning can be more physically exhausting compared to online learning. Additionally, some mentioned the need to speak louder in traditional classrooms due to background noise.

However, it is important to emphasize that these disadvantages mentioned by the participants were relatively specific and limited in number.

Theme 7. Reasons to Incorporate New Learning Modalities in the Curriculum

The majority of participants in the study expressed agreement with the incorporation of new learning methods, particularly hybrid or online learning, into the curriculum. They emphasized the advantages of self-paced learning and the ability to have a backup plan in unexpected situations. Participants recognized the value of recording classes for easy recall of discussions and the need for uninterrupted learning despite weather disturbances or sudden activities. The inclusion of new learning modalities in the curriculum was supported by participants for various reasons, including the ability to evaluate students both in-person and online, raising awareness of social responsibility, enhancing discipline, and adapting to different situations.

Participants emphasized the importance of assessing student performance regardless of whether classes are conducted online or face-to-face, highlighting the need for hybrid learning to achieve this. They also recognized the benefit of hybrid learning in addressing facility limitations and the potential for students to become globally competitive through increased awareness of social responsibility.

However, some participants also emphasized the need for discipline and self-motivation in hybrid learning, and the importance of facilities and resources to support this type of education.

Theme 8. Reasons not to Incorporate New Learning Modalities in the Curriculum

While the majority of participants expressed support for incorporating new learning methods into the curriculum, a few individuals voiced their disagreement due to concerns about resource availability. They emphasized that not all students have access to the necessary internet connection and electronic devices required for online or hybrid learning. This raises an important issue regarding the equitable distribution of technology and resources among students. It is crucial for educational institutions to address these concerns and strive to provide equal opportunities for all learners to access quality education. By ensuring that every student has the necessary resources, schools can minimize the disparities in educational access and promote inclusivity in the learning process.

Theme 9. Materials Used in New Learning Modalities

The shift towards new learning modalities has brought about changes in the required class materials, as noted by professors in the study. They emphasized the need to purchase digital pads, which engages the students in problem-solving activities more

effectively. Professors mentioned that understanding problem-solving concepts becomes easier for students when they can actively work on them using digital pads.

Additionally, the shift to online modes has led to improvements in modules. Professors mentioned that modules now come with solutions embedded, making it more convenient for students to check their work and learn from their mistakes. This integration of solutions within the modules facilitates self-paced learning and allows students to gain a better understanding of the subject matter. In online setups, professors highlighted the importance of creating PowerPoint presentations and utilizing improved learning materials from the internet. They acknowledged the need to constantly update and enhance the PowerPoint presentations to ensure they remain relevant and engaging for students. Moreover, professors mentioned that the shift to online learning has not only upgraded modules but also expanded to include videos as a valuable learning resource.

Theme 10. Teaching Styles of Professors in New Learning Modalities

The participants in the study recognized the need for adjustments in teaching styles to accommodate new learning modalities. They emphasized the importance of implementing engagement strategies to make discussions more interactive and captivating for students. This involves creating innovative techniques and approaches to keep students actively involved in the learning process. Moreover, participants mentioned several attributes and adjustments they make in their teaching styles. They highlighted the need for flexibility, creativity, resourcefulness, and resilience to adapt to different modalities and meet the diverse needs of students. They also mentioned the importance of slowing down the pace of teaching to ensure students' thorough understanding of principles and concepts.

Participants emphasized the value of using actual examples and illustrations to make lessons more relatable and interesting to students. By showcasing real-life applications and demonstrating the practical relevance of the subject matter, they aim to increase student engagement and interest.

Additionally, participants stressed the importance of timely updating presentations and materials to keep up with the evolving nature of education. They recognized the need to stay knowledgeable about the lessons and subject matter they teach, regardless of the learning modality employed.

Theme 11. Confidence Level to the Success of Students from New Learning Modalities

After analyzing interviews with several professors, it was evident that the key to students' success lies in their motivation and ability to retain the knowledge they acquire. Professors emphasized that even with excellent motivation techniques, students need to actively engage with the material and internalize what they learn. Some professors expressed skepticism about the success rates of students in online learning, ranging from 50% to 90% depending on the professor. However, other professors maintained a more optimistic outlook, suggesting that 75% to 90% of students could be successful in their online learning endeavors.

While uncertainties remained regarding student success, some professor expressed confidence in their own teaching abilities, despite uncertainties about the outcomes for students. They believed in delivering high-quality instruction, even if they couldn't guarantee the students' success. Ultimately, the professors agreed that the mode of learning or teaching style is not the sole determinant of student success. Instead, it is the students' willingness to learn actively and retain the lessons taught that plays a crucial role in determining their educational outcomes.

Theme 12. Characteristics Needed for Students' Success

During interviews with professors, they were asked to share their perspectives on the essential traits that students should possess in order to achieve success. The professors highlighted character, discipline, and personal qualities as crucial attributes. They emphasized that success is not solely dependent on knowledge and skills acquired from books but also on the development of one's character during their time in an educational institution.

Discipline was identified as a key trait for success, applicable in various aspects of life and work. The professors recognized that students have different abilities, and success may look different for each individual based on their unique capabilities.

Furthermore, the professors emphasized the significance of a positive attitude, motivation, skills, and adequate preparation through practice. They stressed that good behavior and attitudes are essential, as knowledge alone is not enough if one's character is lacking. Motivation, especially fostered by instructors, was seen as crucial for students. Additionally, the professors highlighted the importance of people skills and the ability to interact effectively with others.

Preparation through practice was also highlighted as vital for success. The professors emphasized that students should not rely on others during exams or assessments but should practice and be capable of independently demonstrating their knowledge and skills.

Theme 13. Ways in Ensuring the Global Competitiveness of Students

The interviewed professors shared various strategies and approaches to ensure the global competitiveness of their students. They discussed adjusting exam difficulty levels to challenge and assess students effectively. This approach ensures that students are prepared for the professional demands they will face in their future careers.

Additionally, the professors emphasized the importance of providing complete and comprehensive materials to their students. They understand that students have different learning styles and preferences, so they strive to offer a range of examples and perspectives

to help students develop their analytical skills. They also shared their own life experiences to make the teaching more relatable and engaging for the students.

Furthermore, the professors emphasized the significance of being approachable and accessible to their students. They encouraged students to reach out and ask questions, and they expressed their willingness to respond and support them. This creates a positive learning environment where students feel comfortable seeking guidance and clarification.

The professors also stressed the importance of focusing on foundational and core concepts. They encouraged students to actively engage in their learning by studying, reviewing, and practicing problems consistently. By emphasizing the importance of personal effort and dedication, the professors aim to instill a strong work ethic and discipline in their students.

Theme 14. Needed to be Acquired by Students to be Globally Competitive

Participants in the study emphasized the importance of certain factors that contribute to students' ability to excel in their chosen fields. Attitude and professionalism were identified as key attributes that make students globally competitive. Participants highlighted the significance of having a positive attitude and demonstrating professionalism in the workplace to stand out internationally.

In addition, participants stressed the importance of computer-related courses for students to keep up with the rapidly evolving competencies required in the global market. They recommended that students should enroll in more computer-related courses to enhance their competitiveness and adaptability in a technology-driven world.

Investing in gadgets was another aspect mentioned by participants as a means to help students become globally competitive professionals. Some educators personally invested in gadgets to facilitate students' access to technology, recognizing the role it plays in enhancing their skills and capabilities.

Moreover, the participants emphasized the importance of practical application. They emphasized that students should not only understand the theoretical concepts but also comprehend how to apply their knowledge in real-world situations. This practical application of skills was regarded as essential in developing students' competencies for global competitiveness.

Theme 15. Interventions of the University for Online Learning Setup

The COVID-19 pandemic has posed significant challenges to educational institutions, particularly in transitioning to online learning. However, universities have responded swiftly by implementing interventions to support students and faculty during this transition. One of the key interventions has been the provision of free review sessions, academic seminars, and training programs focused on math and problem-solving skills. For instance, some respondents mentioned that their university offered free civil engineering review sessions to support students in that field. This initiative aimed to help students prepare for their academic semester and ensure they have the necessary knowledge and skills.

Additionally, universities have organized various events and activities to enhance students' knowledge and abilities. These include quiz bees and academic seminars, both within and outside the campus. These events provide opportunities for students to engage in learning beyond their regular coursework, fostering a deeper understanding of the subjects and promoting personal growth. The respondent mentioned that these activities contribute to improving students' abilities and knowledge.

Furthermore, departments within universities have conducted seminars and training programs specifically focused on developing students' math and problem-solving skills. These initiatives aim to equip students with essential skills that are applicable across various disciplines and enhance their problem-solving capabilities. The participants highlighted the efforts made by different departments to provide students with opportunities to improve their mathematical skills and problem-solving abilities.

9.3. Perspective of Engineering Companies

Table 5: Assessment of engineering companies' observation on the competencies of the interns

Competencies	Mean	SD	Interpretation
Foundational			
Mathematics	3.70	0.949	Good
Natural Sciences	3.50	0.850	Good
Social Sciences	3.50	0.972	Good
Humanities	3.40	0.699	Good
Fundamental			
Material Sciences	3.50	1.269	Good
Engineering Mechanics	3.70	1.252	Good
Experiment Methods and Data Analysis	3.60	1.174	Good
Critical Thinking and Problem Solving	3.10	1.197	Acceptable
Technical			
Project Management	3.10	1.101	Acceptable

Engineering Economics	3.50	0.972	Good
Risk and Uncertainty	3.00	1.054	Acceptable
Breadth in Civil Engineering Areas	3.40	1.075	Good
Design	3.00	1.247	Acceptable
Depth in Civil Engineering Areas	3.60	1.265	Good
Sustainability	3.10	0.994	Acceptable
Professional			
Communication	3.90	0.994	Good
Teamwork and Leadership	4.00	1.247	Good
Lifelong Learning	4.00	1.054	Good
Professional Responsibilities	4.10	0.876	Good
Professional Attitudes	4.00	1.054	Good
Ethical Responsibilities	4.30	0.949	Excellent
Grand Mean	3.571		

Engineering companies have acknowledged that ethical responsibilities are the most frequently demonstrated or observed competency among civil engineering students. They have emphasized the importance of prioritizing the development of ethical competencies in the field of engineering, as these competencies hold great value in the industry. In their professional practice, civil engineers carry a significant ethical obligation to prioritize public well-being and uphold the highest standards of integrity, competence, and accountability (ASCE, 2021).

On the other hand, engineering companies have also noted that design and risk and uncertainty are the least observed competencies among civil engineering students. Design subjects in civil engineering present challenges for students due to the complex nature of the field and the diverse set of skills it requires (ASCE, 2008).

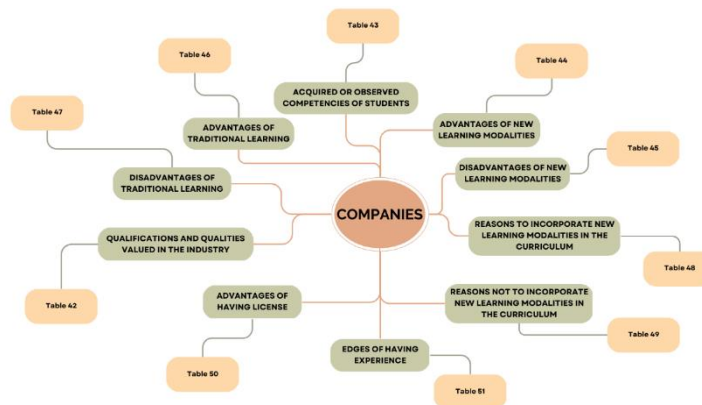


Figure 4: Thematic map generated from the thematic analysis

The thematic map resulting from the thematic analysis of professor interview transcripts is presented in Figure 4. Ten themes with underlying codes were generated, including Advantages and Disadvantages of New Learning Modalities and Traditional Learning, Qualifications and Qualities Valued in the Industry, Acquired or Observed Competencies of Students, Reasons for Choosing to Incorporate or Not Incorporate New Learning Modalities in the Curriculum, Advantages of Having a License, and Benefits of Experience.

Narrative

In today's dynamic world, industries are constantly evolving and adapting to new technologies and practices. In order to remain competitive and innovative, companies must have a workforce equipped with the necessary competencies to meet the standards of the industry. The acquisition of these competencies is a crucial factor in the success of both individual employee and the company. In response to the pandemic, new learning modalities have gained prominence in recent years. This transition has had a significant impact on how companies evaluate the competencies acquired by their employees. The participants' responses were analyzed and resulted in the emergence of ten (10) themes.

Theme 1. Qualifications and qualities valued in industry.

When asked about the requirements and characteristics that their companies seek in job candidates during the hiring process, the participants provided varying answers. Effective communication skills were highlighted as crucial, as it enables problem-solving through effective collaboration and clear articulation of ideas. Leadership and teamwork were also highly valued, as individuals need to be capable of managing teams and projects while working harmoniously with others. The possession of relevant licenses or certifications was mentioned as a consideration for certain positions, although some companies are open to hiring candidates without licenses, particularly fresh graduates who are eager to work.

In terms of core competencies, participants stressed the importance of a strong foundation in the field and proficiency in design. They emphasized the significance of mastering engineering fundamentals and having a deep understanding of the principles and practices of design. Advanced technical skills were regarded as essential, especially for companies focused on implementation and hands-on work. Participants also highlighted the significance of a proactive attitude and the willingness to take initiative. Candidates who demonstrate curiosity, resourcefulness, and the ability to independently seek solutions were considered desirable.

Theme 2. Acquired or observed competencies of students.

The participants in the study shared their observations regarding the skills and competencies of the interns they have worked with. Overall, the majority of the interns were described as willing to learn, proactive, and demonstrated a high level of professionalism and computer literacy. They were eager to understand the tasks assigned to them and took the initiative to perform their duties. The participants also acknowledged the interns' proficiency in utilizing technology and their adaptability to new learning modalities. However, some participants highlighted certain shortcomings observed in some of the interns. These included a lack of basic knowledge in specific areas, such as estimations in engineering, and a perceived cluelessness or ineptitude in their respective fields of study, particularly among those who underwent online classes.

Upon examining the feedback, it becomes evident that while the majority of interns exhibited competence and preparedness, there were still areas in which some interns required improvement. This indicates a need for targeted interventions and additional support to address these weaknesses and enhance the interns' overall performance.

Theme 3. Advantages of new learning modalities

The participants in the study recognized the advantages of new learning modalities, particularly online learning. They mentioned that online learning is convenient for master's students and working students, allowing them to manage their time effectively. It also helps improve technological literacy among students and offers flexibility in terms of self-paced learning.

The participants highlighted that instructors can still provide quality instruction online, and it can be a convenient option for students who are juggling work and education. They mentioned the ability to attend online classes while at work and review the material at home. The use of technology in new learning modalities was also praised, as it allows for tasks such as planning and estimation to be done more efficiently.

Additionally, the participants emphasized the cost-saving benefits of online learning, as it eliminates the need for transportation expenses and the discomfort of high temperatures or congested traffic.

Theme 4. Disadvantages of new learning modalities

The participants in the study identified several drawbacks associated with new learning modalities, despite acknowledging their advantages. One significant drawback mentioned by participants is the decreased attentiveness during online classes compared to face-to-face classes. This lack of attentiveness can potentially affect the learning experience and hinder knowledge absorption.

Another drawback highlighted by participants is the limited knowledge of basic skills among learners. Participants noted the need for further instruction, particularly in areas like estimation, where learners may lack essential knowledge. This suggests that additional support and guidance are necessary to ensure comprehensive learning in new modalities.

Participants also expressed concerns about cheating in online classes. The ease of accessing external resources and the ability to switch between different applications or tabs on a computer make it more challenging to monitor and prevent cheating. This raises ethical concerns and the need for effective measures to maintain academic integrity.

Furthermore, participants pointed out the challenges faced by instructors in elaborating on lessons in online environments. Limited interaction and the absence of in-person engagement may hinder instructors' ability to fully explain complex concepts and ensure learners' understanding.

Lastly, participants mentioned the increased distractions associated with new learning modalities. Learning from home or in non-traditional environments can introduce various interruptions that impede concentration and hinder the learning process.

Theme 5. Advantages of Traditional Learning

The respondents' insights shed light on the company's perspective on learning, with a majority of them emphasizing the advantages of traditional learning methods. They believe that traditional learning offers several benefits that contribute to better knowledge acquisition and skill development.

Participants highlighted the hands-on learning opportunities available in traditional learning, which provide students with practical experiences and a deeper understanding of the subject matter. The immediate feedback received in face-to-face interactions and the

ability to witness real-world applications, such as in construction and structural work, were also cited as advantages. This firsthand exposure enables students to gain valuable insights and knowledge specific to their field of study.

While some respondents acknowledged that there may not be significant differences between the two learning methods, they recognized that traditional learning students often possess an advantage due to their prior experience and background knowledge. This advantage is attributed to the immersive nature of traditional learning, where students are actively engaged and have a focused approach to their studies.

Participants also emphasized the importance of face-to-face communication in traditional learning. Direct interaction with teachers allows for immediate clarification of doubts and a better understanding of the material. Being physically present in school and having direct access to teachers were seen as contributing factors to better learning outcomes.

Theme 6. Disadvantages of Traditional Learning

In contrast to the advantages mentioned earlier, some participants expressed concerns and drawbacks associated with traditional learning methods. They highlighted the challenges faced by working students who find it difficult to balance their job and studies. The time constraints and competing responsibilities can hinder their ability to fully focus on their education, affecting their learning experience and performance.

Another drawback mentioned by participants is the passive nature of traditional teaching methods. They pointed out that unless the instructor specifically revisits and reinforces the discussion, students may struggle to retain and recall the lesson. The lack of opportunities for students to independently revisit the discussion was seen as a limitation of the traditional approach.

Theme 7. Reasons to incorporate the new learning modalities in the curriculum.

A significant number of companies have recognized the importance of integrating new learning modalities into the curriculum. Participants expressed that this approach is necessary to keep up with other countries and advancements in technology. They believe that embracing these modalities will contribute to the progress and advancement of students and the country as a whole.

Participants showed support for incorporating new learning modalities in the form of hybrid learning, rather than relying solely on online classes. They emphasized the value of hybrid learning, particularly for technical courses like engineering, as it allows for practical application and hands-on experience. They also highlighted the benefits of self-paced learning, which is enabled by hybrid approaches, and emphasized the importance of face-to-face interactions for seeking guidance and clarification.

Moreover, participants acknowledged the significance of these new modalities for students who are unable to attend full-time school due to work commitments. They believe that incorporating new learning approaches into the curriculum would benefit working students and provide them with opportunities to balance their education and employment.

Theme 8. Reasons Not to incorporate the new learning modalities in the curriculum.

While the majority of participants expressed support for the integration of new learning methods, some participants had dissenting views. They believed that the current teaching methods are already effective and that face-to-face interactions are preferable. They questioned the need to add new methods if the existing curriculum is sufficient. They also emphasized the value of in-person learning by stating their preference for face-to-face interactions.

Other participants, raised concerns about the suitability of new learning methods for technical courses that require hands-on experience. They emphasized the importance of practical application in preparing students for their future careers. The participant believed that the new learning methods may present difficulties for students in technical fields like civil engineering.

Despite these dissenting views, it is important to highlight that the majority of participants still supported the integration of new learning modalities into the curriculum. They recognized the potential benefits and advantages that these methods can bring to the learning experience. However, it is also acknowledged that there may be certain subjects or fields where the traditional approach remains more effective and better suited to meet specific learning objectives.

Theme 9. Advantages of having a license.

The participants in the study expressed a strong belief in the benefits of obtaining a professional license and passing board examinations. They highlighted several advantages associated with these accomplishments.

One significant advantage mentioned by the participants is the potential for career advancement. They noted that passing the board exams can lead to extra points, promotions, and recognition within their field. The participants acknowledged that being a board passer can give them a competitive edge and open doors to higher positions and increased responsibilities.

The participants also emphasized the importance of professional recognition. They recognized that being recognized as an engineer and being able to use a professional title, such as "Engineer," is contingent upon passing the board exams. They consider this recognition crucial for establishing their credibility and professional identity.

Furthermore, the participants highlighted the value of having a professional license, particularly in the context of the Philippines. They noted that having a license is highly regarded in the country and often serves as a necessary requirement for many job opportunities. Additionally, possessing a license can lead to higher salaries. The participants shared that employers in the Philippines tend to prioritize licensed professionals and may offer better compensation packages to those who have passed the board exams.

Some participants also mentioned the impact of not having a license on salary negotiations. They described situations where individuals without a license may face lower initial salary offers or need to engage in bargaining to secure fair compensation.

Theme 10. Edges of having experience.

According to the participants' feedback, work experience is highly valued for career advancement. They believe that gaining experience leads to the development of autonomous qualities and improved skills, which in turn allows individuals to work with minimal supervision and be prioritized when applying for future jobs. The participants emphasize that individuals with experience require less training and can contribute immediately in their roles.

The participants also highlight the importance of experience during the hiring process. Employers tend to prioritize applicants with relevant experience, as it indicates a level of proficiency and familiarity with the tasks and responsibilities of the job. Some participants even shared their personal experience in hiring a structural engineer, noting that candidates with experience in structural design were preferred due to their ability to require less guidance and supervision.

9.4. Comparison Between Groups

Table 6: Two-samples T-test between the perspectives of Civil Engineering Students and Civil Engineering Professors

	N	Mean	Std.Dev	df	t-value	Sig.	Interpretation
Students	21	3.58	0.285	40	4.126	0.00018	Significant
Professors	21	3.23	0.254				

Table 6 presents the results of the two-samples t-test analysis, showing a t-value of 4.126, indicating a significant difference between the two groups. Specifically, the mean rating of the students' competencies (M=3.5819, SD=0.285) is significantly higher than the mean rating of the professors' observations (M=3.233, SD=0.254). Therefore, the Alternative Hypothesis (Ha) is accepted and the Null Hypothesis (Ho) is rejected.

The result suggests that the professors' observations of the students' competencies have significant difference to the actual competencies possessed by the students. This could be due to various reasons, such as the professors not having enough opportunities to observe the students' competencies directly, differences in the criteria used to evaluate the competencies, or subjective biases in the professors' evaluations. It is important to note that further analysis is needed to gain a deeper understanding of the implications of these findings.

Table 7: Two-samples T-test between the perspectives of Civil Engineering Students and Construction Companies

	N	Mean	Std.Dev	df	t-value	Sig.	Interpretation
Students	21	3.58	0.285	40	0.100	0.921	Insignificant
Companies	21	3.57	0.381				

The result of the two-samples t-test presented in Table 7, with a t-value of 0.1, indicates that there is no significant difference between the two groups. Specifically, the mean rating of the competencies provided by the professors (M=3.5819, SD=0.285) is not significantly different from the mean rating provided by the companies (M=3.571, SD=0.381). Therefore, the Alternative Hypothesis (Ha) is rejected and the Null Hypothesis (Ho) is accepted.

The findings suggest that there is similarity or agreement between the self-assessed competencies of civil engineering students and the observations made by the companies during their internship. This could be attributed to the fact that the criteria and standards used by the companies to evaluate the students' competencies might align with the students' own perceptions, resulting in agreement between the two perspectives. Another possibility is that the internship experience might have equipped the students with valuable insights and practical skills, enabling them to accurately assess their own competencies.

Table 8: Two-samples T-test between the perspectives of Civil Engineering Professors and Construction Companies

	N	Mean	Std.Dev	df	t-value	Sig.	Interpretation
Companies	21	3.57	0.381	40	3.383	0.00178	Significant
Professors	21	3.23	0.254				

Table 8 shows the results of a two-samples t-test, revealing a t-value of 3.383 that surpasses the critical value. This signifies a significant difference between the two groups being compared, specifically, between the mean rating of the professors (M = 3.233,

SD=0.254) and the mean rating of the companies (M = 3.571, SD=0.381). Therefore, the Alternative Hypothesis (Ha) is accepted and the Null Hypothesis (Ho) is rejected.

In other words, the professors' observations of the students' competencies differ with the companies' observations of the same competencies in their interns. This may indicate that there are differences in the way that the professors and the companies evaluate competencies. It could also suggest that the internship experience itself has a greater impact on the development of the competencies valued by the companies than the academic experience evaluated by the professors. Overall, further investigation may be needed to determine the reasons for this finding and its implications for the development of civil engineering competencies.

9.5. Assessment of gap between the competencies acquired by the students and the competencies valued in the industry.

Table 9: Assessment of the perspectives of engineering professors and companies on the competencies valued in the industry.

Table 10 presents the

Competencies	Weighted Mean	Interpretation
Foundational		
Mathematics	4.495	Very Important
Natural Sciences	3.730	Fairly Important
Social Sciences	4.080	Fairly Important
Humanities	3.545	Fairly Important
Fundamental		
Material Sciences	4.920	Very Important
Engineering Mechanics	4.755	Very Important
Experiment Methods and Data Analysis	4.545	Very Important
Critical Thinking and Problem Solving	4.775	Very Important
Technical		
Project Management	4.805	Very Important
Engineering Economics	4.730	Very Important
Risk and Uncertainty	4.520	Very Important
Breadth in Civil Engineering Areas	4.550	Very Important
Design	4.745	Very Important
Depth in Civil Engineering Areas	4.560	Very Important
Sustainability	4.330	Very Important
Professional		
Communication	4.595	Very Important
Teamwork and Leadership	4.705	Very Important
Lifelong Learning	4.50	Very Important
Professional Responsibilities	4.50	Very Important
Professional Attitudes	4.40	Very Important
Ethical Responsibilities	4.60	Very Important

evaluation of the importance of competencies valued in the industry by engineering professors and companies. The competencies rated as Very Important include Mathematics, Material Sciences, Engineering Mechanics, Experiment Methods and Data Analysis, Critical Thinking and Problem Solving, Project Management, Engineering Economics, Risk and Uncertainty, Breadth in Civil Engineering Areas, Design, Depth in Civil Engineering Areas, Sustainability, Communication, Teamwork, Leadership, Lifelong Learning, Professional Responsibilities, Professional Attitudes, and Ethical Responsibilities. Meanwhile, Natural Sciences, Social Sciences, and Humanities were rated as Fairly Important.

Table10: Two-samples T-test between the competencies acquired by the students and competencies valued in the industry.

	N	Mean	Std.Dev	df	t-value	Sig.	Interpretation
Acquired	21	3.58	0.285	40	9.508	0.00000	Significant
Valued	21	4.517	0.343				

The result of the two-samples t-test shown in Table 10, with a t-value of 9.508, indicates a large difference between the two groups. The mean competency rating for the students (M=3.582, SD=0.285) is significantly lower compared to the mean competency rating for the competencies valued in the industry (M=4.517, SD=0.343). Therefore, the Alternative Hypothesis (Ha) is accepted and the Null Hypothesis (Ho) is rejected.

In other words, the competencies that students acquire in the academe do not necessarily align with the competencies that are highly valued in the industry. This could indicate that there are gaps in the curriculum or teaching methods used in civil engineering education, which do not fully prepare students for the needs of the industry. It could also suggest that industry standards and expectations of competencies have evolved beyond what is currently being taught in civil engineering programs. Further investigation may be necessary to identify the reasons behind the negligible correlation and to address any potential gaps in civil engineering education.

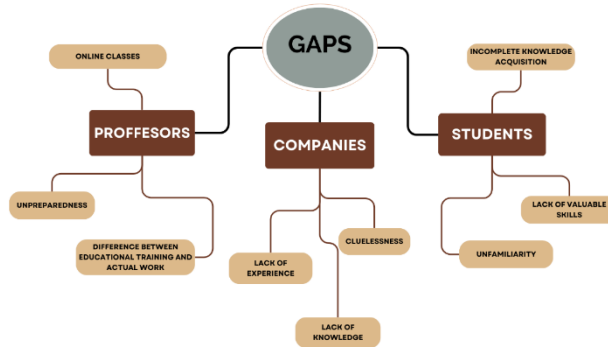


Figure 5: Thematic Map of the Driving Factors of the Gaps

The thematic map presented in Figure 14 illustrates the driving factor of the gap between the competencies acquired by students and those valued in the industry. The map presents three main perspectives: professors, companies, and students. The codes generated from the professors' perspective include affects the acquisition of competencies, limits knowledge, and not fully equipped. The codes from the companies' perspective include lack of experience, lack of knowledge, and cluelessness. Lastly, the codes from the students' perspective include incomplete knowledge acquisition, lack of valuable skills, and unfamiliarity.

Narrative

Gaps based on the perspective of the engineering students.

The interviews conducted with students revealed that there are gaps between the competencies acquired by students and the competencies valued by the industry. These gaps can be attributed to several factors, including unfamiliarity with industry-valued competencies, incomplete acquisition of skills, and a lack of valuable skills.

One significant factor contributing to the gaps is the students' unfamiliarity with the competencies that are highly valued by the industry. Students expressed that they were not familiar with these competencies, and they acknowledged that the landscape of required skills may change over time. This lack of familiarity can be attributed to a variety of reasons, such as outdated curriculum or a lack of exposure to industry demands.

Additionally, students mentioned that they have not fully acquired the competencies and valuable skills necessary for success in their future careers. They recognized that there is still a gap between their current skillset and the skills they need to excel professionally. Some students expressed a lack of motivation or the tendency to not push themselves beyond their limits, which may hinder their acquisition of the necessary competencies.

Gaps based on the perspective of the engineering professors.

The perspectives shared by the participants shed light on the potential gaps between the competencies acquired by engineering students and the competencies valued by the industry. The impact of online classes was highlighted as a significant factor contributing to this gap. Participants acknowledged that online learning may not fully provide the practical and hands-on experience that is essential for certain engineering competencies.

Furthermore, participants emphasized that there is a difference between the theoretical knowledge gained in educational training and the practical skills required in the actual work environment. They expressed a concern that the gap between what is taught in the classroom and the real-world applications of engineering can be substantial. This suggests that students may not feel adequately prepared to transition into professional roles upon graduation.

Gaps based on the perspective of the construction companies.

The responses from the participants in the study indicate a shared concern regarding the lack of practical experience and knowledge among students entering the workforce. It is evident that many students have limited exposure to actual work and site-related activities, which can hinder their preparedness for the professional environment.

Participants emphasized that students often lack familiarity with the actual work processes, which can lead to a sense of being clueless when faced with real-world tasks. This gap between theoretical knowledge and practical application raises the question of whether students are adequately prepared for the demands of the industry.

Moreover, participants highlighted the limitations of online learning in acquiring certain skills and knowledge. They noted that the absence of in-person learning experiences can result in a discrepancy between what students should have learned and what they actually know. This discrepancy becomes evident when students enter the workforce or engage in internships, where they may struggle to apply their knowledge effectively.

10. CONCLUSION

The competencies that enable civil engineers to adapt in the dynamic industry are essential for individual success and the profession as a whole. Aligning academic and industry expectation is a vital component for workforce preparation. This study used a mixed-methods approach to assess the civil engineering program under the new learning modalities by exploring the perspectives of engineering students, professors, and companies towards the competencies of undergraduate civil engineering students.

The students have concluded that the civil engineering program is effective in instilling ethical values among them, as demonstrated by their excellent rating of Ethical Responsibilities. The program is also successful in equipping students with competencies in foundational, fundamental, technical, and professional areas, with most competencies rated as good. However, improvements are necessary in some technical areas such as Design, Critical Thinking and Data Analysis, and Depth in Civil Engineering Areas. Furthermore, students recognized the importance of acquiring additional competencies related to technology, highlighting their proficiency in engineering software such as Autocad and STAAD. However, a considerable proportion of students decided to delay taking the board exam after graduating due to the lack of preparation, limited time, and inadequate knowledge, which is a disadvantage of new learning modalities. Overall, these findings emphasize the importance of continuous program evaluation and improvement to ensure that students are equipped with the necessary competencies for their future careers.

The professors have taken note of the students' impressive achievements across various academic competencies, including social sciences and humanities, as well as their demonstrated proficiency in working collaboratively as a team and exhibiting leadership qualities. However, professors generally view the students' competencies in various areas as acceptable, which require a lot of room for improvement. Furthermore, the abrupt transition from traditional to new learning modalities resulted in changes in the teaching approach and materials used, including the use of a digital pad, regularly updated presentations, video discussions, online modules, and various learning software. To aid in the transition, the university provided interventions such as seminars and training for instructors. However, some instructors still experience difficulties coping with technological devices and software, hampering the students' acquisition of the necessary competencies.

The companies have emphasized the commendable ethical responsibilities displayed by the students. On the other hand, it was found that although students demonstrated proficiency in certain professional competencies as agreed upon by both companies and professors, they lacked technical competencies in crucial areas such as design, civil engineering depth, and sustainability. Despite this, the companies have revealed the significance of acquiring a license, which can potentially result in higher salaries, professional titles, promotions, and recognition. It is clear that while the students possess certain strengths, there are areas in which they need to improve to excel in their chosen careers. Overall, it is essential for them to acquire the necessary skills and certifications to further their professional development and achieve success in their respective fields.

There are varying degrees of correlation between the perceptions of Civil Engineering Students, Professors, and Construction Companies regarding the competencies of the undergraduate students. The professors' observations of the students' competencies are not strongly related to the actual competencies acquired by the students which could be due to professors limited opportunities to observe the students' competencies directly. However, the competencies acquired by students in their education are accurately reflected in their performance as interns, indicating a strong correlation between the two groups. Moreover, the result suggests differences in the evaluation of competencies by professors and companies, or that the internship experience has a greater impact on developing competencies valued by the companies than the academic experience evaluated by the professors.

Furthermore, all three perspectives concur that critical thinking is a highly valued quality in the industry, and they also agree that hands-on learning is one of the advantages of traditional learning. Additionally, they all hold the belief that new learning modalities tend to increase distractions.

The competencies that students acquired in their education under the new learning modalities do not necessarily align with the competencies that are highly valued in the industry. This could indicate that there are gaps in the curriculum or teaching methods used in civil engineering education, which do not fully prepare students for the needs of the industry. It could also suggest that industry standards and expectations of competencies have evolved beyond what is currently being taught in civil engineering programs.

Despite the challenges brought upon by the new learning modalities, there is strong support from students, professors, and companies for the formal adoption of hybrid learning in the civil engineering curriculum. This approach combines online discussions with in-person activities, laboratory experiments, quizzes, and examinations. The rationale for this support lies in the advantages that hybrid learning offers over traditional and online learning. Traditional learning can be hindered by issues such as transportation problems, classroom shortages, overcrowding, noise disruptions, and difficulty in recapping face-to-face discussions. On the other hand, online classes can be limited by the lack of hands-on experience, potential for cheating during exams, difficulty in assessing students accurately, and the inability to gauge student engagement. By incorporating hybrid learning, these limitations can be addressed and overcome, allowing students and professors to benefit from it. Additionally, hybrid learning can serve as a contingency plan for unexpected events like typhoons or class suspensions, helping to maintain a consistent syllabus timeline and prevent class disruption.

With the continuous development of the engineering industry and the endless emergence of new engineering software, devices, tools, and equipment; the qualities, qualifications, and the competencies valued in the industry will constantly evolve and will become more complex. Hence, the civil engineering education should be able to adapt to these changes to prepare students for the demands of a rapidly advancing technological world.

11. ACKNOWLEDGMENT

The researchers deeply appreciate the significant contributions of individuals and entities that led to the successful completion of this research study.

Firstly, they are immensely grateful to **Almighty God** for His blessings, guidance, and wisdom, which served as the foundation of their strength and determination.

To their research adviser, **Jonna May B. Mandap, RCE**, for her valuable guidance, insights, expertise, and mentorship in shaping the research.

To the research coordinator, **Juanita Carmelita R. Zoleta, RCE**, for her support, assistance, and thoughtful supervision of the research study.

To their research grammarian, **John Reinjoe F. Namit, LPT, MAed**, for his invaluable contributions in ensuring the grammatical accuracy and clarity of this study.

To the research statistician, **Lucia V. Basco, PhD**, for her invaluable contribution in ensuring the accuracy and reliability of the study's data analysis.

To the research panelists, **Regina F. Duya, RCE, Ana Pauline B. Pagador, RCE, Kathleen Camilla E. David, ME, MenM**, for their valuable input, feedback, and suggestions, which greatly improved the study's quality, methodology, and analysis.

Furthermore, the researchers sincerely appreciate the participants' valuable contributions of time and experiences, which greatly enriched the findings through their active engagement in interviews and surveys.

Lastly, the researchers deeply appreciate the unwavering support of their family, friends, and colleagues, whose constant encouragement, and understanding served as the motivation and inspiration to overcome challenges and achieve research goals.

12. REFERENCES

- [1]. American Society of Civil Engineers (2019). Civil Engineering Body of Knowledge: Preparing the Future Civil Engineer. Retrieved on November 7, 2022, from <https://ascelibrary.org/doi/epdf/10.1061/9780784415221>
- [2]. Andrzej Ozadowicz (2020). Modified Blended Learning in Engineering Higher Education during the COVID-19 Lockdown—Building Automation Courses Case Study. Retrieved on October 27, 2022 from <https://www.mdpi.com/2227-7102/10/10/292/html>
- [3]. Bakare, S., Azlan, A., Rosmah, S., Yusri, K., Muhammad, S., Nor, F. (2019). The non-technical skills needed by graduates of technical colleges in metalwork technology. Retrieved on December 13, 2022 from <https://files.eric.ed.gov/fulltext/EJ1238302.pdf>
- [4]. Bujang, M. A., Omar, E. D., & Baharum, N. A. (2018). A Review on Sample Size Determination for Cronbach's Alpha Test: A Simple Guide for Researchers. Retrieved on April 17, 2023 from The Malaysian journal of medical sciences : MJMS, 25(6), 85–99. <https://doi.org/10.21315/mjms2018.25.6.9>
- [5]. Cameron, R., (2015), Mixed Methods Research. Retrieved on November 2, 2022 from https://www.deakin.edu.au/__data/assets/pdf_file/0020/681023/Dr-r-cameron_mixed-methodology.pdf
- [6]. Campbell, R., Goodman-Williams, R., Feeney, H., Fehler-Cabral, G. (2018). Assessing Triangulation Across Methodologies, Methods, and Stakeholder Groups: The Joys, Woes, and Politics of Interpreting Convergent and Divergent Data. Retrieved on December 13, 2022 from https://journals.sagepub.com/doi/full/10.1177/1098214018804195?fbclid=IwAR3XDoJmmjuGZdUWYEsORb68qhQx4-yhNRRaJbkX2mSA3U46hX_UroXCIE0

- [7]. Caufield, J., (2019). How to Do Thematic Analysis | Step-by-Step Guide & Examples. Retrieved on November 8, 2022 from <https://www.scribbr.com/methodology/thematic-analysis/>
- [8]. Chyung, S. Y. Y., Roberts, K., Swanson, I., & Hankinson, A. (2017). Evidence-Based Survey Design: The Use of a Midpoint on the Likert Scale. *Performance Improvement*. Retrieved on December 11, 2022 from <https://onlinelibrary.wiley.com/doi/10.1002/pfi.21727>
- [9]. Ciotti, M., Ciccozzi, M., Terrinoni, A., Jiang, W., Wang, C., Bernardini, S. (2020). Special issue: COVID-19 Pandemic and the Critical Role of the Clinical Laboratory. Retrieved on October 27, 2022 from <https://www.tandfonline.com/doi/full/10.1080/10408363.2020.1783198>
- [10]. Condeiro, F. R., Paslauskis, C. R., Wachs, P., Tinoco, M. A. C. (2020). Production engineers profiling: competences of the professional the market wants. Retrieved on December 13, 2022 from <https://www.scielo.br/j/prod/a/XHwJyWKHCThVQ8JVzQQ9MPB/?lang=en&format=pdf>
- [11]. Copeland, W., McGinnis, E., Bai, Y., Adams, Z., Nardone, H., Devadanam, V., Rettew, J., Hudziak, J. (2021). Impact of COVID-19 Pandemic on College Student Mental Health and Wellness. Retrieved on November 7, 2022 from [https://www.jaacap.org/article/S0890-8567\(20\)31988-2/fulltext](https://www.jaacap.org/article/S0890-8567(20)31988-2/fulltext)
- [12]. Darwinbox Digital Solutions (2022). Human Resource Glossary for HR Terms. Retrieved on November 15, 2022 from <https://explore.darwinbox.com/hr-glossary/competency>
- [13]. Denzin, N. K. (1978). *The research act: A theoretical introduction to sociological methods*. Retrieved on November 2, 2022 from <https://www.taylorfrancis.com/books/mono/10.4324/9781315134543/research-act-norman-denzin>
- [14]. Edrada, E., Lopez, E., Villarama, J. B., Salva Villarama, E., Dagoc, B., Smith, C., Sayo, A. R., Verona, J., Trifalgar-Arches, J., Lazaro, J., Balinas, E. G., Telan, E. F., Roy, L., Galon, M., Florida, C. H., Ukawa, T., Villanueva, A. M., Saito, N., Nepomuceno, J. R., Ariyoshi, K., Carlos, C., Nicolasora, A. D., Solante, R. (2020). First COVID-19 infections in the Philippines: a case report. Retrieved on November 8, 2022 from https://tropmedhealth.biomedcentral.com/articles/10.1186/s41182-020-00203-0?fbclid=IwAR0_ArZqdSvEJQkVIqFz6cMdrWoYn7XRNZ0gjel_mk_HX073h_dBKh0A22I#Abs1
- [15]. Elaish, M., Shuib, L., Ghani, N., & Yadegaridehkordi, E. (2019). Mobile English language learning (MELL): A literature review. Retrieved on November 8, 2022 from <https://www.tandfonline.com/doi/abs/10.1080/00131911.2017.1382445?journalCode=cedr20>
- [16]. Etikan, I., Musa, S., & Alkassim, R. (2016). Comparison of convenience sampling and purposive sampling. Retrieved on November 8, 2022, from <https://article.sciencepublishinggroup.com/html/10.11648/j.ajtas.20160501.11.html>
- [17]. Fawaz, M., Al Nakhal, M. & Itani, M. (2021). COVID-19 quarantine stressors and management among Lebanese students: a qualitative study. Retrieved on November 8, 2022 from <https://link.springer.com/article/10.1007/s12144-020-01307-w>
- [18]. Franchi, T. (2020). The impact of the Covid-19 pandemic on current anatomy education and future careers: A student's perspective. Retrieved on November 7, 2022 from <https://anatomypubs.onlinelibrary.wiley.com/doi/10.1002/ase.1966>
- [19]. Ganiron, T. Jr. (2017). Job Satisfaction as Determinants on Organizational Performance. Retrieved on December 13, 2022 from https://www.researchgate.net/publication/258210320_Job_Satisfaction_and_Organizational_Performance_Evidence_from_Canadian_Credit_Union
- [20]. George, T., (2022). Mixed Methods Research | Definition, Guide & Examples. Retrieved on November 02, 2022 from <https://www.scribbr.com/methodology/mixed-methodsresearch/>
- [21]. Grate, A., Grate, E. (2017). The vision, mission, program educational objectives, and program outcomes of the college of engineering: An assessment. Retrieved on December 13, 2022 from https://issuu.com/davidcababarobueno/docs/grate_a_and_grate_e_the_vision
- [22]. Ho, G. W. K. (2016). Examining Perceptions and Attitudes: A Review of Likert-Type Scales Versus Q-Methodology. Retrieved on December 11, 2022 from <https://journals.sagepub.com/doi/10.1177/0193945916661302>
- [23]. Honorene, J., (2017). Understanding the Role of Triangulation in Research. Retrieved on October 27, 2022 from <http://www.srjjs.com/pages/pdfFiles/149544238718.%20HONORENO%20JOHNSON.pdf>
- [24]. Izwan, J., Sayuti, I. M., & Ramli, N. I. (2019). The knowledge competency of civil engineers in construction industry. Retrieved on November 8, 2022 from <https://iopscience.iop.org/article/10.1088/1755-1315/244/1/012047/meta?fbclid=IwAR1XkztPylpwfIi857w9UtQWroKncxDEt715aaJJVJ8SmD2cIzwIAzPSeuw>
- [25]. Kent State Universities Libraries. (2021). Statistical & Qualitative Data Analysis Software: About Nvivo. Retrieved on November 15, 2022 from <https://libguides.library.kent.edu/statconsulting/NVivo>
- [26]. Khalil, R., Mansour, A., Fadda, W., Almisnid, K., Aldamegh, M., Al-Nafeesah, A., Alkhalifah, A., Al-Wutayd, O. (2020). The sudden transition to synchronized online learning during the COVID-19 pandemic in Saudi Arabia: a qualitative study exploring medical students' perspectives. Retrieved on November 8, 2022 from <https://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-020-02208-z#citeas>
- [27]. Kudngaongarm, P., Sojivorakul, C. (2012). Competencies Framework for Civil Engineer in Thailand. Retrieved on November 7, 2022 from <https://maxwellsci.com/print/rjaset/v4-377-382.pdf>

- [28]. Kumar, A. (2023). Two independent samples t-tests: Formula & Examples. Data Analytics. Retrieved on May 21, 2023 from <https://vitalflux.com/two-sample-t-test-formula-examples/>
- [29]. Mei, L., and Wang, Q., (2021). Structural Optimization in Civil Engineering: A Literature Review. Retrieved on November 15, 2022 from <https://sci-hub.se/https://doi.org/10.3390/buildings11020066>
- [30]. Mishra, T., (2016). Engineering Employability Skills Required by Employers in India. Retrieved on November 7, 2022 from <https://www.academia.edu/download/54675510/IRJET-V3I2169.pdf>
- [31]. Moghabghab, R., Tong, A., Hallaran, A., & Anderson, J. (2018). The Difference Between Competency and Competence: A Regulatory Perspective. Retrieved on November 15, 2022 from [https://sci-hub.se/https://doi.org/10.1016/S2155-8256\(18\)30118-2](https://sci-hub.se/https://doi.org/10.1016/S2155-8256(18)30118-2)
- [32]. Mohd Shanmsuri Md Saad, A. R. (2013). Employers' Perception On Engineering, Information And Communication Technology (Ict) Students' Employability Skills. Retrieved on November 7, 2022 from <http://www.wiete.com.au/journals/GJEE/Publish/vol15no1/06-Saad-M-S.pdf>
- [33]. National Institute of Health (2022). What are Competency? Retrieved on November 15, 2022 from <https://hr.nih.gov/about/faq/working-nih/competencies/what-are-competencies>
- [34]. Noble, H., and Heale, R., (2019). Triangulation in research, with examples. Retrieved on November 02, 2022 from https://www.researchgate.net/publication/333794057_Triangulation_in_research_with_examples#:~:text=Triangulation%2C%20by%20combining,come.
- [35]. Passow, H. J. (2012). Which ABET Competencies Do Engineering Graduates Find Most Important in their Work?. Retrieved on November 8, 2022 from <https://onlinelibrary.wiley.com/doi/epdf/10.1002/j.2168-9830.2012.tb00043.x>
- [36]. Passow, H. J. (2007). What competencies should engineering programs emphasize? A meta-analysis of practitioners' opinions informs curricular design. Retrieved on December 13, 2022 from <http://www.cdio.org/files/document/file/T2A1Passow.pdf>
- [37]. Polmear, M., Simmons, D., Clegorne N. (2020). Undergraduate Civil Engineering Students' Perspectives on Skills for Future Success. Retrieved on November 7, 2022 from <https://ieeexplore.ieee.org/abstract/document/9274269?fbclid=IwAR34vjO2bPuph-kDtCaE8MgMjsNpRYz9-q-SoQ8rTyQzadsd2iHev4-5G8k>
- [38]. Rotas, E., Cahapay, M., (2019). Difficulties in Remote Learning: Voices of the Philippine University Students in the Wake of COVID-19 Crisis. Retrieved on October 27, 2022 from <https://files.eric.ed.gov/fulltext/EJ1285295.pdf>
- [39]. Roy, S., Dong, Y., Baber, L., Ahn, B. (2022). Classroom to Workplace: Knowledge and Skills Learned by Recently Hired Aerospace Engineers. Retrieved on December 13, 2022 from <https://arc.aiaa.org/doi/pdf/10.2514/1.I011043>
- [40]. Russell, J. S. (2013). Shaping the Future of the Civil Engineering Profession. Retrieved on November 7, 2022 from <https://ascelibrary.org/doi/10.1061/%28ASCE%29CO.1943-7862.0000600>
- [41]. Simbulan, N. (2020). COVID-19 and its impact on higher education in the Philippines. Retrieved on November 8, 2022 from <https://headfoundation.org/2020/06/04/covid-19-and-its-impact-on-higher-education-in-the-philippines/>
- [42]. Singh, K., Srivastav, S., Bhardwaj, A., Dixit, A., & Misra, S. (2020). Medical education during the COVID-19 pandemic: a single institution experience. Retrieved on November 8, 2022 from <https://link.springer.com/article/10.1007/s13312-020-1899-2>
- [43]. Stern, J., (2017). Introduction to Online Teaching and Learning. Retrieved on November 15, 2022 from <https://www.wlac.edu/online/documents/otl.pdf>
- [44]. Suryaman, M., Cahyono, Y., Muliansyah, D., Bustani, O., Suryani, P., Fahlevi, M., & Munthe, A. P. (2020). COVID-19 pandemic and home online learning system: Does it affect the quality of pharmacy school learning?. Retrieved on November 8, 2022 from <https://www.academia.edu/download/64603171/196-1600979364.pdf>
- [45]. Tang, T., Abuhmaid, A. M., Olaimat, M., Oudat, D. M., Aldhaeebi, M., & Bamanger, E. (2020). Efficiency of flipped classroom with online-based teaching under COVID-19. Retrieved on November 8, 2022 from <https://www.tandfonline.com/doi/full/10.1080/10494820.2020.1817761?cookieSet=1>
- [46]. TWI Group Websites. (2021). What Is Civil Engineering? (Definition, Types And Job Salary). Retrieved on November 15, 2022 from <https://www.twi-global.com/technical-knowledge/faqs/what-is-civil-engineering>
- [47]. Visual Paradigm (2022). What is Scatter Diagram?. Retrieved on December 13, 2022 from <https://online.visual-paradigm.com/knowledge/data-visualization/what-is-scatter-diagram/?fbclid=IwAR1T5mVFd2sKik2eqFm7eGnAYaXhK0WyaSFWA6WGyxgJWJe3qGzU7maEBRE>
- [48]. Wildemuth, B. M. (2017). Applications of social research methods to questions in information and library science. Retrieved on May 5, 2023 from <https://www.sciencedirect.com/topics/computer-science/venn-diagram>
- [49]. William, K., (2022). What is SPSS? Definition, Features, Types, and Use Cases. Retrieved on November 15, 2022 from <https://surveysparrow.com/blog/what-is-spss/>
- [50]. Wisconsin Department of Public Instructions. (2021). Wise Data Elements. Retrieved on November 15, 2022 from <https://dpi.wi.gov/wise/data-elements/learning>