

DIGITAL LITERACY SKILLS, DIGITAL COMPETENCE AND DIGITAL GOVERNANCE OF PUBLIC HIGHER EDUCATIONAL INSTITUTIONS (PHEIS) IN THE PROVINCE OF BATANGAS: A BASIS FOR ICT ROADMAP DEVELOPMENT

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ABSTRACT

Everyone is in the phase of radical development where digitalization is taking over every niche and corner - education is no exception. However, education seems much the same as it has been for many years. It seems, not much of PHEIs are aware of the significant role of ICT. COVID-19 brought a crisis to educational sectors that called for a radical organizational change. It has exposed the need to equip schools with infrastructure and technologies needed to adapt to a digital environment. Considering the mentioned premises, the researcher aimed to assess the level of digital literacy skills, level of digital competence and digital governance score of PHEIs in the Province of Batangas as an input for ICT Roadmap development. The study utilized descriptive-correlational research design. The Being Digital: Digital Literacy Checklist of The Open University© was used for the digital literacy skills; Self-Assessment Tool of the European Digital Competence Framework for Educators (DigComEdu) for the digital competence; and a self-made questionnaire for the digital governance score of the administrators. It was revealed that the digital literacy skills are on a quite confident level, digital competence is on a competent level and digital governance score is satisfactory. Results yielded substantial relationships, all utilized in the formulation of the ICT Roadmap.

Keywords: Digital Literacy, Digital Competence, Digital Governance, Digital Transformation, ICT Roadmap, ICT infrastructures, Industrial revolution 4.0, Education 4.0

INTRODUCTION

Everyone is running into the 21st century where technology knows no bounds. This is the phase of radical development where technology and digitalization are taking over every niche and corner. They have affected almost every aspect of life today, and education is no exception. The industry now is totally affected by technological change and innovation. These paradigms are called industrial revolutions. These revolutions were caused by mechanization (1st industrial revolution), use of electrical energy (2nd industrial revolution) and electronics and automation (3rd industrial revolution). All these industrial revolutions did not influence only the production itself, but also the labor market and the educational system as well. Currently, due to the development of digitalization and robotics, we are facing the next industrial revolution, known as the Industry 4.0 (IR 4.0) (Benesova and Tupa. 2017). The emerging technologies have huge effect on the education of people. Only qualified and highly educated employees will be able to control these technologies. The industry should collaborate with universities (Bayagin, Yetis & Akin, 2016). No one can avoid these changes, so it is necessary to prepare adequate human resources to be ready to adapt and be able to compete on a global scale. Improving the quality of human resources through education is a way to balance

the development of IR 4.0 (Lase, 2019). To take full advantage of the opportunity created by IR 4.0, we need a similar revolution in education, Education 4.0 – not just to meet the needs of industry, but also to ensure the best possible student experience, employees’ training, and investment in information and communications technology (ICT) facilities and infrastructures. Education 4.0 can be seen as new paradigm which reinterprets the concepts as learning, student, teacher and school according to needs of IR 4.0 (Himmetoglu,2020). Incidentally, some of Education 4.0 principles are parallel from that of IR 4.0. Education is a basic need for every human being and adopting digitalization in this area is the current trend and necessity for every educational institution to achieve growth, development and competitiveness. However, in some ways, here in our country, education seems much the same as it has been for many years. Our old educational system lacks the capability to stand a chance in the 21st century. It seems, not much of educational institutions, educators and school leaders are fully aware of the significant role of technology and ICT in their lives, especially in the educational activities and operational processes.

COVID-19 brought a learning crisis to Philippine’s educational sectors that called for an urgent and radical organizational change. The pandemic has exposed the need to further equip schools with the infrastructure and technologies, and provide faculty members, employees and students with the skills needed to adapt to a digital environment. System-wide change happened unexpectedly to still pursue teaching, learning and operational process even amidst lockdown. The pandemic has been “a wake-up call” for many educational sectors and has shown what can be done with technology and its organizational structure. Nevertheless, responses to the crisis varied on every educational system’s capacity – it was not just a wake-up call but also an “eye-opener” to the current state of our educational system. It exposed that our road to digitalization will not be a walk in the park since majority of schools are not connected to the internet, only few schools have ICT infrastructures and digital tools, workforce is not equipped with concepts and skills needed to work and operate in a digital environment. Therefore, current ICT state, quality and delivery of school’s products and services, including workforce skills and trainings should be observed and reviewed – and eventually be transformed.

The Department of Information and Communications Technology (DICT), launched the E-Government Masterplan (EGMP) 2022, a blueprint of the department’s plans for integrating an interoperable government ICT network and systems with the objective of promoting open governance through digital transformation of basic services. Such document contains policies and programs that will allow government agencies, including State Universities and Colleges (SUCs)/ Local Universities and Colleges (LUCs) to streamline their operations and services. In addition, Senate Bill No. 1738, or the E-Governance Act of 2020 filed by Senator Bong Go on July 2020 aims to institutionalize e-Governance in the Philippines to cope with the transition to the new normal and the challenges posed by the COVID-19 threat. The proposed legislation aims to establish an integrated and interoperable information system for the whole of government, an internal records management system, an information database, and digital portals for government services. The bill also aims to do away with paper-based and outdated models of bureaucratic work within government agencies and units to improve efficiency. In an age where almost everything can be done online and through other digital platforms, the government must harness the power of information and communications technology to better serve its purpose and bring the government closer to the people (Go, 2020). DICT fully supports this vision. Moreover, Senator Sherwin Gatchalian expressed the dire need for digital transformation through the filing of Senate Bill No. 1793 or the proposed “Full Digital Transformation Act of 2020” which streamlines government transactions through the use of automation and digitalization of government services to promote contact-less policy. Under the

Full Digital Transformation Act, all government agencies, government-owned and -controlled corporations, instrumentalities, and local government units must adopt a digitization strategy aligned with the Philippine Digital Transformation Strategy 2022. The bill also seeks to harmonize common data of persons, transportation, business, and land, among others. Part of the recovery efforts from this COVID-19 pandemic is a modern system that would respond to the needs of our people (Gatchalian, 2020). In 2018, Republic Act 11032 or the Ease of Doing Business and Efficient Government Service Delivery Act of 2018 was approved and implemented. It is an act that aims to streamline the current systems and procedures of government services. It is the landmark law of the Duterte administration that addresses priority number 3 of its 0+10 Point Socio-economic Agenda. This particular agenda pertains to improving the competitiveness of and ease of doing business in the Philippines. Signed into law on 28 May 2018, the law effectively amends Republic Act 9485 or the Anti-Red Tape Act of 2007. The strengthened version of the law is poised to facilitate prompt actions or resolution of all government transactions with efficiency. It applies to all government offices and agencies in the Executive Department including local government units (LGUs), government-owned or -controlled corporations, and other government instrumentalities, located in the Philippines or abroad, that provide services covering business-related and non-business transactions as defined in the Implementing Rules and Regulations (IRR) (<https://arta.gov.ph/about/the-ease-of-doing-business-law/>).

SUCs and LUCs need to respond to emerging social needs, they need to progress. Digital transformation may sound just like a prominent buzz phrase, but it's high time for educational sectors to embrace change and have high hopes that ICT and technology can be a game-changer both inside the 4-walls of the classroom and the institution's bureaucracy. Considering the statements and premises above, the researcher developed a study which aimed to assess the level of digital literacy skills confidence, level of digital competence, and digital governance score of key personnel, faculty members and administrators of State Universities and Colleges (SUCs) and Local Universities and Colleges (LUCs) in the Province of Batangas as an input in developing ICT Roadmap. Specifically, it sought answers to the following questions: 1) What is the respondents' (key staffs, faculty members, administrators) level of digital literacy skills in terms of: 1.1 Understanding digital practices, 1.2 Finding information, 1.3 Using information and 1.4 Creating information? 2. What is the respondents' level of digital competence in terms of the following categories: 2.1 Information and data literacy, 2.2 Communication and collaboration, 2.3 Digital content creation, 2.4 Safety and 2.5 Problem solving? 3. What is the respondents' (administrators) digital governance score in terms of the following components: 3.1 Digital strategy, 3.2 Digital policy, 3.3 Digital standards, 3.4 Digital guidelines, 3.5 Digital processes, and 3.6 Digital team structure? 4. Is there a significant relationship between the respondents' level of digital literacy skills confidence and level of digital competence? 5. Is there a significant relationship between the administrators' level of digital competence and digital governance score? 6. Based on the results of the study, what ICT Roadmap can be formulated?

LITERATURE REVIEW

Digital Literacy: Skills for the 21st Century

Industry 4.0 is more than the technology it is bringing. As workforce is a critical element in digital transformation, the skills and qualifications of the human capital will become increasingly eminent. There are many skills and qualifications that will be needed in the era of Industry 4.0, digital literacy and digital dexterity will be essential and primary skills for the future workforce (Nafea and Toplu, 2020). Rapid digitization has made digital literacy essential

for today's and tomorrow's workforce. This means that both current workers whose jobs will be automated and may become obsolete, and also today's students who will be the future workforce will be affected. Many new jobs will be generated and many will adjust to include a greater degree of interaction with digital technologies. It is anticipated that a basic level of digital literacy will be necessary for the majority of the workforce, and demand for advanced level of digital literacy will rise (Huynh & Do, 2017). Digital literacy means the ability and awareness to use emerging technologies to perform academic tasks online while demonstrating proper online attitude in a digital environment (Perera, Gardner, & Peiris, 2017). Cornell University defined digital literacy as the ability to find, evaluate, utilize, share, and create content using information technologies and the Internet. Digital literacy, by this definition, encompasses a wide range of skills, all of which are necessary to succeed in an increasingly digital world. However, the focus of such given definition is on IT and the internet. It is not also confined to understanding just the hardware and knowing how to use the software. As years go on and as technology pervades, new perspectives and definitions of digital literacy evolve. Being digitally literate now looks beyond functional IT skills to describe a richer set of digital behaviors, practices and identities.

Because digital literacy is so important, educational sectors are increasingly required to equip teachers and employees and teach students digital literacy. In many ways, this is similar to what schools have always done in teaching students to read write and behave. Scholars even mentioned that individual's level of digital literacy affects a student's performance positively (Mohammadyari & Singh, 2015; Scholastica, Nkiruka, Ifeanyichukwu, 2016). Tang and Chaw (2016) also reported that digital literacy is a prerequisite for students to learn effectively in a blended learning environment. As digital learning and era continues to expand, it's important for teachers, schools to embrace new technologies and become digital literate.

Digital Competence: Transforming Digital Literacy to Competence

Everybody is talking about competence. It is a haven of a word with a wealth of meanings and the appropriate connotations for utilitarian times. The language of competency-based approaches to education and training is compelling in its common-sense and rhetorical force. Words like 'competence' and 'standards' are good words, modern words; everybody is for standards and everyone is against incompetence. (Norris, 1991; As cited in Glaesser, 2018). The last decade has seen an increased interest in the concept of digital competence. From a European perspective, digital competence has been used in different areas to describe competences needed in a digitalized knowledge society (Hatlevik & Christophersen 2013; as cited in Pettersson, 2017). Competence is therefore distinguished from skill, which is defined as the ability to perform complex acts with ease, precision and adaptability.

Changing the structure of the competence of educators in the transformation of the school of the twenty-first century—the school of digital civilization has been an issue for the few last decades. Since the roles of educators and educational institutions are continuously changing, the range and complexity of competences has to follow. Everyone is talking about organizations having to develop the skills of their employees for the future. This also calls for the development of digital competences. As noted in the European Commission's communication 'Rethinking Education', the reform of education and training systems is essential to achieving higher productivity and the supply of highly skilled workers. Such reforms will not be possible without the full participation and shared agreement of the HEIs and educator themselves. Over the last few decades, the concepts digital competence and digital literacy have been used more frequently and are increasingly discussed, particularly in policy

documents and policy-related discussions related to “what kinds of skills and knowing people should have in a knowledge society, what to teach young people and how to do so” (Ilomäki, Paavola and Lakkala, 2016). Often, they are used synonymously although they have distinct origins and meanings (Iordache, Mariën, and Baelden, 2017). European Commission has developed the European Digital Competence Framework for Citizens (DigComp) which is divided into five areas: information and data literacy; communication and collaboration; digital content creation; safety; and problem solving. Essentially, the framework identifies 21 competences in five key areas, describing what it means to be digitally savvy. People need to have competences in each of these areas in order to achieve goals related to work, employability, learning, leisure and participation in society. The Commission also points out that being digitally competent is not just being able to use the latest gadgets or a software; hence, it is clearly being able to use digital tools and technologies in a critical, collaborative and creative way.

Digital Governance: A Critical Skill For Digital Transformation

Numerous scholars have come up with the definition of governance. Governance is seen as interaction among structures, processes, and traditions that determine how power and responsibilities are exercised, how decisions are taken, and how citizens and other stakeholders have their say (Graham et al., 2003 as cited in Asaduzzaman and Virtanen, 2016). Therefore, governance is about power, relationship, and accountability: it addresses the questions like who has the influence, who makes the decisions, and how decision-makers are held accountable. ISO 26000 defines organizational governance as a system by which an organization makes and implements decisions in pursuit of its objectives. The Global Association of Risk Professionals (GARP) highlights the importance of concepts such as credibility, transparency, and accountability in establishing effective governance. The United Nations Economic and Social Commission (UNESCO), on the other hand, indicates that the eight (8) major characteristics of good governance: participatory, consensus-oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive, and follows the rule of law.

Governance is the action of governing an organization by using and regulating influence to direct and control the actions and affairs of management and others. It is the exclusive responsibility of the ‘governing body’, the person, or group accountable for the performance and conformance of the organization (Bourne, 2014). Organizations has its governing body, usually Board of Directors (BODs) for commercial organizations; school administrators for educational institutions, who provides direction to and oversees the functioning of the organization’s management and makes the ‘rules’ the organization’s management and staff are expected to conform to. While governance starts at the top, different structures have to exist to ensure that decisions and accountabilities are carried throughout the enterprise or organization. Governance is a system and process, not a single activity and therefore successful implementation of a good governance strategy requires a systematic approach that incorporates strategic planning, risk management and performance management. Like culture, it is a core component of the unique characteristics of a successful organization. Now that organizations are using digital advances to transform their businesses, governance still is a key determinant of success in managing this digital transformation. The existence of digital tools, technologies, frameworks and even legislations create new challenges that include security, regulatory compliance (people, infrastructure and processes) and legacy system integration – or the now labelled digital impacts. To answer these new challenges, a new element of governance and mechanism are put into place – the emergence of digital governance. Digital transformation by its nature involves emerging digital technology, which can make heavy demands on the

leaders' digital skills, digital competence and essential communication and management skills – having the roles of leaders redefined and put into transition.

METHODS

The study used descriptive-correlational research design since it determined the level of digital skills, level of digital competence and digital governance score of key personnel, faculty members and administrators of SUCs/LUCs in the province of Batangas. Likewise, it identified possible relationships that exist among variables and it measured the strength of such correlation. The respondents of the study were composed of one hundred fifty-nine (159) employees of SUCs/LUCS. Based on the sample size computation, the total number of respondents for the three groups should be 139. However, only 122 respondents were able to answer the online questionnaire, representing 87.77% retrieval rate. The researcher used three (3) sets of survey questionnaire. The standardized Being Digital: Digital Literacy Checklist of The Open University© to measure the digital literacy skills level using a 3-point Likert-Type Scale: Very Confident (2.500-3.00), Quite Confident (1.50-2.49) and Not Confident (1.00-1.49); the standardized Self-Assessment Tool of the European Digital Competence Framework for Educators (DigComEdu) for digital competence; and a self-made questionnaire adopting the six (6) components of agile digital governance framework formulated by Zenklusen (2019) for the digital governance score. Two (2) questionnaires utilized 5-point Likert-Type Scale, Strongly Agree (4.20-5.00), Agree (3.40-4.19), Neutral (2.60-3.39), Disagree (1.80-2.59), and Strongly Disagree (1.00-1.79).

The researcher prepared a letter addressed to HEIs' University/College Presidents to secure permission of conducting the online survey to different offices and colleges. Thereafter, upon the approval of the requests, the approved letter was forwarded to the head of the different offices and colleges. More specifically, the researcher communicated with the heads and respondents. The nature, scope of the study and data privacy and security concerns in the data collection procedures were also relayed and explained in the prepared questionnaire sent via google forms. For the statistical treatment of data: 1. Weighted mean was used to describe the respondents' digital literacy skills confidence level, digital competence level and digital governance score. 2. Pearson r Moment Correlation Coefficient was utilized to determine the significant relationship between the respondents' level of digital literacy skills confidence and their level of digital competence. It was also used to determine the significant relationship between the school administrators' level of digital competence and their digital governance score. 3. Cronbach's Alpha measure of internal consistency was used to describe the reliability of the instrument specifically its digital governance part.

RESULTS AND DISCUSSION

Discussion of the key personnel', faculty members' and administrators' level of digital confidence skills, level of digital competence and digital governance score are presented in the succeeding tables and textual presentations:

Table 1. Summary of the Respondents' Digital Literacy Skills Level

Indicators	WM SUC s	Verbal Interpretation	WM LU C	Verbal Interpretation	Verbal Interpretation	Rank
1. Understanding digital practices	2.14	Quite Confident	2.13	Quite Confident	Quite Confident	2
2. Finding information	2.11	Quite Confident	2.10	Quite Confident	Acceptable	3

3. Using information	2.15	Quite Confident	2.17	Quite Confident	Acceptable	1
4. Creating information	1.97	Quite Confident	2.13	Quite Confident	Acceptable	4
Overall weighted mean	2.09	Quite Confident	2.13	Quite Confident	Acceptable	

Legend: (Highly Acceptable-3.60-5.00; Acceptable-2.64-3.67; Not Acceptable- 1.00-2.33);

Table 1 presented the summary of the respondents' level of digital literacy skills along the four (4) indicators: "Understanding Digital Practices", "Finding Information", "Using Information", and "Creating Information" all garnered a highly acceptable verbal interpretation. Overall, the results show that the digital literacy skills level of the respondents both from SUCs and LUCs gained an overall weighted mean of 2.09 and 2.13 respectively which were both verbally interpreted as quite confident.

Digital literacy is the ability to access and reveal information through digital tools. In order to be digital literate, individuals need to fulfil high-level critical thinking skills such as research, inquiry, problem solving and decision making (Duran & Ozen, 2018). Being able to operate a device and having the capacity to browse over the internet does not make one digitally literate. According to Martin (2008) as Cited in Yildiz (2020), with digital literacy, individuals also acquire competencies such as using the information they acquire in their life, transferring it, and making a critical assessment of the knowledge gained. Individuals with these skills become more advantageous over time compared to other individuals. Analyzing the results presented in Table 5, it revealed that the respondents' level of digital literacy skills confidence is acceptable. Results also proved that the respondents understand digital practices, knows where and how to find and identify reliable information, has the capacity to utilize effectively the gathered data and capable of creating digital content and information in an applicable platform to a wide variety of audiences. Since the results indicate that the respondents' level of digital literacy confidence is acceptable, it is expected that this skill can possibly lead to efficiency and increased productivity at work. However, technology constantly changes and progresses, it is expected that the workforce practices – whether digital or not yet digital, will continue to revolutionize and evolve. In some senses, as the way we work will persistently change, the degree and level of digital literacy skills confidence required for some occupations will eventually elevate.

Table 2. Summary of the Respondents' Digital Competence Level

Indicators	WM SUCs	Verbal Interpretation	WM LUC	Verbal Interpretation
1. Information and digital literacy	3.43	Competent	3.57	Competent
2. Communication and collaboration	3.70	Competent	3.72	Competent
3. Digital content creation	3.36	Moderately Competent	3.49	Competent
4. Safety information	4.02	Competent	4.02	Competent
5. Problem solving	3.61	Competent	3.72	Competent
Overall weighted mean	3.62	Competent	3.70	Competent

Legend: (Highly Competent-4.20-5.00; Competent-3.40-4.19; Moderately Competent-2.60-3.39; Not Acceptable- 1.80-2.59; Highly Not Acceptable- 1.00-1.79);

Table 2 presented summary of the respondents' level of digital competence along the five (5) indicators. "Information and digital literacy" got a 3.4 weighted mean for SUCs and 3.57 weighted mean for LUCs; "Communication and collaboration." got a 3.70 weighted mean for SUCs and 3.72 weighted mean for LUCs; 3.36 weighted mean for SUCs and 3.49 weighted mean for LUCs in terms of Digital Content Creation; 4.02 weighted mean for both SUCs and

LUCs in terms of “Safety.”; and 3.61 weighted mean for SUCs and 3.72 weighted mean for LUCs in terms of “Problem solving.”. For SUCs, four (4) out of five (5) indicators received a competent verbal interpretation; Digital content creation indicator garnered a weighted mean which was interpreted as moderately competent. For LUCs, the weighted mean garnered by all five (5) indicators were all verbally interpreted as competent. Overall, the respondents’ level of digital competence garnered by both SUCs and LUCs were verbally interpreted as competent.

In Sweden, digital competences are also used as a foundational concept in the currently launched national strategy for the digitalization of education (Swedish Ministry of Education, 2017). With such strategy, personnel working at schools, are pushed to develop competences that will help them utilize appropriate digital tools in executing their jobs. The Philippines has made explicit their agenda for integration of 21CS into the education system. The recent Department of Education (DepEd) Order No 21s (2019) specifies that the Enhanced Basic Education Program must equip students with information media and technology skills, learning and innovation skills, communication skills, and life and career skills, while simultaneously requiring that the curriculum must use "pedagogical approaches that are constructivist, inquiry-based, reflective, collaborative, differentiated, and integrative" (Scolar, Australian Council for Educational Research (ACER), 2020). What DO No. 21s (2019) aims to attain for their students must be true as well to the teachers and personnel. Similarly, the Commission on Higher Education (CHED) through its Faculty Development Program stated: “Our nation cannot compete with its neighboring countries that are now moving towards offering cutting-edge programs and technologies unless we invest in creating a pool of experts in our academic institutions. This critical mass will then be capable to train and equip students for significant and promising careers in the global market. More than 50% or 70,000 higher education institutions (HEIs) faculty need to upgrade their qualifications and competencies in order to improve the quality of teaching in our HEIs (<https://ched.gov.ph/faculty-development-program-facdev/>).

It was revealed in table 11 that the respondents’ level of digital competence for both SUCs and LUCs were both verbally interpreted as competent. One of the indicators even received a moderately competent verbal interpretation. It indicates that there’s a lot of growth potential in terms of the respondents’ digital competence, more particularly in terms of digital content creation. Strengthening ICT capacities and digital competences are such skills that can help for growth and nation-building.

Table 3. Summary of the Administrators’ Digital Governance Score

Indicators	WM SUCs	Verbal Interpretation	WM LUC	Verbal Interpretation
1. Digital Strategy	3.20	Satisfactory	3.33	Satisfactory
2. Digital Policy	3.59	Very Satisfactory	3.22	Satisfactory
3. Digital Standards	3.26	Satisfactory	3.16	Satisfactory
4. Digital Guidelines	3.20	Satisfactory	3.14	Satisfactory
5. Digital Processes	3.59	Very Satisfactory	3.66	Very Satisfactory
6. Digital team Structures	3.05	Satisfactory	3.10	Satisfactory
Overall weighted mean	3.32	Satisfactory	3.27	Satisfactory

Legend: (Outstanding-4.20-5.00; Very Satisfactory-3.40-4.19; Satisfactory-2.60-3.39; Unsatisfactory- 1.80-2.59; Poor- 1.00-1.79);

Table 3 presented the summary of school administrators' digital governance score. Digital strategy, digital standards, digital guidelines and digital team structure indicators obtained weighted mean verbally interpreted as satisfactory for both school administrators in SUCs and LUCs. Moreover, digital processes indicator, obtained a weighted mean verbally interpreted as very satisfactory for both school administrators in SUCs and LUCs. In terms of digital policy, it obtained a 3.59 weighted mean verbally interpreted as very satisfactory for school administrators in SUCs and 3.22 weighted mean verbally interpreted as satisfactory for school administrators in LUCs. Overall, the school administrators' digital governance score for both SUCs and LUCs garnered a 3.32 and 3.27 overall weighted mean respectively which were verbally interpreted as both satisfactory.

The economy is driven now by digital technology. In this new phase, the asset dimension of data will manifest itself by enabling scenario exchanges, universal connectivity and immersive communication in a trend that will not only lead another economic and industrial revolution but will also reshape society and enable the modernization of state governance (Peng, 2021). A revolutionized kind of leadership and governance is called for to create workflow and business processes that allow these new technologies, products and services to be rolled out quickly whilst also making sure that any existing legacy applications and IT operations are being maintained. This digital economy is not just about technology, but also people. As our day-to-day lives are increasingly immersed in technology, we need new breed of leaders capable to empower, innovate and execute. As revealed in table 4, having an up to the mark only points in terms of digital governance is quite alarming. Organizations should think of necessary initiatives to upskill their leaders and ensure digital dexterity as we navigate in this digital transformation process.

Table 4. Relationship Between the Respondents' Level of Digital Literacy Skills along Understanding Digital Practices and their Level of Digital Competence

Understanding Digital Practices	Digital	Pearson r	p-value	Decision	Interpretation
Information and Data Literacy		.063	.499	Null Hypothesis Not Rejected	Not Significant
Communication and collaboration		.103	.267	Null Hypothesis Not Rejected	Not Significant
Digital Content Creation	Content	.001	.988	Null Hypothesis Not Rejected	Not Significant
Safety		.142	.124	Null Hypothesis Not Rejected	Not Significant
Problem Solving		.117	.206	Null Hypothesis Not Rejected	Not Significant

*Significant at 0.05

For the relationship between the respondents' level of digital literacy skills along understanding digital practices and their level of digital competence, pearson r values of .063, .103, .142 and .117 were obtained for information and data literacy, communication and collaboration, digital content creation, safety and problem solving, with p-values of .499, .267, .988, .124 and .206 respectively leading to the acceptance of the null hypothesis. This shows that there is no significant relationship among all the mentioned variables. This means that the level of digital literacy skills confidence along understanding digital practices does not necessarily impact the digital competence along all its indicators. Over the last few decades, the concepts digital competence and digital literacy have been used more frequently and are increasingly discussed, particularly in policy documents and policy-related discussions related to "what kinds of skills

and knowing people should have in a knowledge society, what to teach young people and how to do so” (Ilomäki et al, 2016). Workforce of educational institutions, specifically educators and leaders of Higher Educational Institutions (HEIs), are expected to have a good grasp of digital literacy skills since they are the ones expected to illuminate and pass-on these skills to the students and their respective subordinates. Understanding the nature and role of media, technology and digital practices and being able to utilize them appropriately, are critical to delivering quality education and services in a digital age. Thus, an understanding of how digital technology works is very relevant to be considered digitally competent citizens, which opposes the disconnection of the variables mentioned in table 4.

Table 5. Relationship Between the Respondents’ Level of Digital Literacy Skills along Finding Information and their Level of Digital Competence

Finding Information	Pearson r	p-value	Decision	Interpretation
Information and Data Literacy	.033	.722	Null Hypothesis Not Rejected	Not Significant
Communication and collaboration	.076	.409	Null Hypothesis Not Rejected	Not Significant
Digital Content Creation	-.015	.874	Null Hypothesis Not Rejected	Not Significant
Safety	.092	.320	Null Hypothesis Not Rejected	Not Significant
Problem Solving	.064	.490	Null Hypothesis Not Rejected	Not Significant

*Significant at 0.05

For the relationship between the respondents’ level of digital literacy skills along finding information and their level of digital competence, pearson r values of .033, .076, -.04, .092 and .064 were obtained for information and data literacy, communication and collaboration, digital content creation, safety and problem solving, with p-values of .722, .409, .874, .320 and .490. The results lead to the acceptance of the null hypothesis. This shows that there is no significant relationship among all the variables mentioned. This means that the level of digital literacy skills along finding information does not necessarily impact the digital competence of the respondents.

Janssen et al. (2013) as cited in Falloon (2020) states that digital competency clearly involves more than knowing how to use devices and applications which is intricately connected with skills to communicate with ICT, as well as information skills. Sensible and healthy use of ICT requires particular knowledge and attitudes regarding legal and ethical aspects, privacy and security, as well as understanding the role of ICT in society and a balanced attitude towards technology. In this educational landscape, extending and improving digital competence of the workforce is an area that needs to be given more attention. Digital tools are merely tools that can be used in a variety of ways. What matters more is how these digital tools are applied and utilized. Therefore, it is a given fact that ability of knowing how to find reliable information or the so-called information skills, over the tons of digital contents on-hand is one important competency that workforce need to acquire. Thus, the result presented in table 5 is contrary to the above statements.

Table 6. Relationship Between the Respondents’ Level of Digital Literacy Skills along Using Information and their Level of Digital Competence

Using Information	Pearson r	p-value	Decision	Interpretation
Information and Data Literacy	.085	.356	Null Hypothesis Not Rejected	Not Significant
Communication and collaboration	.109	.236	Null Hypothesis Not Rejected	Not Significant

Digital Creation Safety	Content	-.040	.663	Null Hypothesis Not Rejected	Not Significant
		.052	.574	Null Hypothesis Not Rejected	Not Significant
Problem Solving		.048	.605	Null Hypothesis Not Rejected	Not Significant

*Significant at 0.05

It is presented in table 6 the relationship between the respondents' level of digital literacy skills along using information and their level of digital competence, pearson r values of .085, .109, -.040, .052 and .048 were obtained for information and data literacy, communication and collaboration, digital content creation, safety and problem solving. P-values obtained for the mentioned variables were .356, .236, .663, .574 and .605 that leads to the acceptance of the null hypothesis. This shows that there is no significant relationship among the variables mentioned. This means that the level of digital literacy skills along using information does not directly affect the digital competence of the respondents.

The results disagree with the statements of Lloyd 2003; Oman 2001; O'Sullivan 2002 as Cited in Kirton & Barham (2015) that information literacy should be intensified in the workplace; since an information literate workforce that can locate, evaluate and effectively use information is the key to the success of many organizations. With the advancement in information and communications technology (ICT), many have found new, faster and easier way of acquiring data. The accessibility of Internet has enabled people to easily search and retrieve information. Many terminologies blossomed in the emergence of ICT and the Internet, one of which is the Information Society. As defined by <https://www.oxfordreference.com/>, it is a concept that responds to the expansion and ubiquity of information. Sustained and accelerated growth of media, of education provision and participation, as well as computer communications technologies has led many to posit that the attendant information explosion distinguishes a new epoch. The information society is one in which information is the defining feature, unlike the industrial society where steam power and fossil fuels were distinguishing elements. With the statements above, information is indeed overflowing. The Internet contains billions of pages, everything from rigorous research to deliberate misinformation (<https://sccollege.edu/Library/Pages/EvaluatingInformationontheInternet.aspx>). Finding reliable, accurate, current information is a big challenge since countries of many different kinds of information now plays an increasingly important part in education, economic, social, cultural and even political aspects of human lives – which is now termed as information literacy skills.

Table 7. Relationship Between the Respondents' Level of Digital Literacy Skills along Creating Information and their Level of Digital Competence

Creating Information	Pearson r	p-value	Decision	Interpretation
Information and Data Literacy	.109	.238	Null Hypothesis Rejected	Not Significant
Communication and collaboration	.068	.463	Null Hypothesis Rejected	Not Significant
Digital Content Creation	-.048	.607	Null Hypothesis Rejected	Not Significant
Safety	-.029	.358	Null Hypothesis Rejected	Not Significant
Problem Solving	.096	.301	Null Hypothesis Rejected	Not Significant

*Significant at 0.05

For the relationship between the respondents' level of digital literacy skills along creating information and their level of digital competence, pearson r values of .109, .068, -.048, -.029

and .096 were obtained for information and data literacy, communication and collaboration, digital content creation, safety and problem solving. Obtained p-values were .238, .463, .607, .754 and .301 respectively. Results lead to the acceptance of the null hypothesis. The results show that there is no significant relationship among the variables mentioned. This means that the level of digital literacy skills along using information does not impact the respondents' level of digital competence along all dimensions.

Keeping abreast of changing demands and call for upgrading workforce's digital skills contradicts the results stating negative relationships between level of digital literacy skills along creating information and level of digital competence along all its dimensions. Ability to create content in educational institutions should be a top goal since contents is often meant to be shared and communicated to students who rely on educators for academic information. Technology has a profound impact on today's skills. Now, digital literacy and digital competence is more than just the ability to use digital tools and other ICT resources to thrive in this digital economy. Major technology breakthroughs are affecting and will continue to impact the structure of our workplace and how things are done and delivered. In this era, knowledge involves two strongly inter-linked but different components: content and skills; where content includes facts, ideas, principles, evidence, and descriptions of processes or procedures. (<https://opentextbc.ca/teachinginadigitalage/chapter/section-1-3-the-skills-needed-in-a-digital-age/>).

Table 8. Relationship between the School Administrators' Level of Digital Competence along Information and Data Literacy and their Digital Governance Score

Information and Data Literacy	Pearson r	p-value	Decision	Interpretation
Digital strategy	.378	.052	Null Hypothesis Not Rejected	Not Significant
Digital Policy	.401*	.038	Null Hypothesis Rejected	Significant
Digital Standards	.406*	.036	Null Hypothesis Rejected	Significant
Digital Guidelines	.080	.690	Null Hypothesis Not Rejected	Not Significant
Digital Processes	.348	.075	Null Hypothesis Not Rejected	Not Significant
Digital Team Structure	.311	.114	Null Hypothesis Not Rejected	Not Significant

*Significant at 0.05

For the relationship between the administrators' level of digital competence along information and data literacy and their digital governance score, pearson r values of .401, and .406, were obtained for digital policy and digital standards. P-values of .038 and .036 were obtained respectively which were lower than the test of significance at 0.05, leading to the rejection of the null hypothesis. The results show that there is a significant relationship among the variables mentioned. This means that the higher is the level of digital competence along information and data literacy, the higher is the administrators' level of digital governance score along digital policy and standards. The positive correlation of the mentioned variables affirms the statements of Axelrod et al.,(1995); Rysman, Simcoe, (2008) as cited in Adatto, (2018) that standards have a major impact on business performance and technological efficiency Our world now is driven by digital technologies, and as we establish more on this era, implementing digital policies and digital standards are consequently involved and a prerequisite thus, school administrators need to have a good grasp of these matters. However, pearson r values of .378, .080, .348 and .311 were obtained for digital strategy, digital guidelines, digital processes and digital team structure respectively which denoted not significant relationships. This means that level of digital competence along using information and data literacy had low association with the digital governance score along digital strategy, digital guidelines, digital processes and digital team

structure dimensions. The biggest challenge for digital transformation isn't the technology-it's the people (Newhouse,2021). It is contradicting to the result garnered that administrators' level of digital competence along information and data literacy and their digital governance score along digital strategy, digital guidelines, digital processes and digital team structure are all not significant since digital competences of the workforce, primarily heads and administrators, should be first developed in the event or even prior to embarking on digital transformation.

Table 9. Relationship between the School Administrators' Level of Digital Competence along Communication and Collaboration and their Digital Governance Score

Communication and Collaboration	Pearson r	p-value	Decision	Interpretation
Digital strategy	.347	.076	Null Hypothesis Not Rejected	Not Significant
Digital Policy	.171	.394	Null Hypothesis Not Rejected	Not Significant
Digital Standards	-.024	.905	Null Hypothesis Not Rejected	Not Significant
Digital Guidelines	-.327	.096	Null Hypothesis Not Rejected	Not Significant
Digital Processes	.063	.757	Null Hypothesis Not Rejected	Not Significant
Digital Team Structure	-.070	.729	Null Hypothesis Not Rejected	Not Significant

*Significant at 0.05

For the relationship between the administrators' level of digital competence along information and data literacy and their digital governance score, pearson r values of .347, .171, -.024, -.327, .063 and -.070 were obtained for digital policy and digital strategy, digital policy, digital standards, digital guidelines, digital processes and digital team structure respectively. P-values of .076, .394, .905, .757 and .729 were obtained respectively which were lower than the test of significance at 0.05, leading to the acceptance of the null hypothesis. The results show that there is no significant relationship among all the variables mentioned. This means that level of digital competence along using information and data literacy had low association with the digital governance score along all its dimensions. It is important that in order to overcome challenges of digital transformation, it is important to build digital capabilities and competences of our leaders. Contrary to the yielded results, leaders must acquire new tasks and knowledge in the digital transformation process or this change can lead to significant cost overruns and poor execution (Matt, Hess, & Benlian, 2015). Digital transformation requires significant organizational changes to take place and a shift in strategy which may be difficult to accomplish without a dramatic change in organizational culture and processes (Demirkan, et al., 2016). This view supported the need for digitally competent leaders and good e-governance in the event of an organization's digital transformation process.

Table 10. Relationship between the School Administrators' Level of Digital Competence along Digital Content Creation and their Digital Governance Score

Digital Content Creation	Pearson r	p-value	Decision	Interpretation
Digital strategy	.371	.057	Null Hypothesis Not Rejected	Not Significant
Digital Policy	.751**	.000	Null Hypothesis Rejected	Significant
Digital Standards	.583**	.001	Null Hypothesis Rejected	Significant
Digital Guidelines	.421**	.029	Null Hypothesis Rejected	Significant
Digital Processes	.470*	.013	Null Hypothesis Rejected	Significant
Digital Team Structure	.522**	.005	Null Hypothesis Rejected	Significant

**Significant at 0.01

*Significant at 0.05

For the relationship between the administrators' level of digital competence along digital content creation and their digital governance score, pearson r values of .751, .583, and .522

were obtained for digital policy, digital standards and digital team structure. P-values of .000, .001 and .005 were obtained respectively which were all lower than the test of significance at 0.05, leading to the rejection of the null hypothesis. The results show that there is a significant relationship among the variables mentioned. This means that the higher is the level of digital competence along digital content creation, the higher is the respondents' level of digital governance score along digital policy, digital standards and digital team structure dimensions. Meanwhile, pearson r values of .421 and .470 were obtained for digital guidelines and digital processes. P-values of .029 and .013 were obtained which were both lower than the test of significance at .01 also leading to the rejection of the null hypothesis. The results show that there is a significant relationship among the variables mentioned. This means that the higher is the level of digital competence along digital content creation, the higher is the respondents' level of digital governance score along digital guidelines and digital processes.

However, digital strategy obtained a pearson r of .371 and p-value of .057 was obtained leading to the acceptance of the null hypothesis. This means that level of digital competence along digital content creation may not affect the digital governance score along this dimension. Leadership role has become vital to capture the real value of digitalization, notably by managing and retaining talent via better reaching for, connecting and engaging with employees (Harvard Business Review Analytic Services, 2017; World Economic Forum, 2018). Enormous changes occur in the process of digitization, and it can be presumed that it also changed leadership roles in this new context. In relation to such, Lu et al. (2014) as Cited in Cortellazzo et al. (2019) said that it cannot be assumed that leadership skills identified in offline context should be transferred to virtual leadership without any adjustment and that effective leadership behaviors are determined by the situation in which leadership is developed. Therefore, leaders and school administrators, have to face this multifaceted phenomenon by equipping themselves with right digital competences that may help them match these digital context requirements. One specific competence area that leaders need to primarily focus on is their ability in terms of digital content creation as it means a whole range of different things – from planning and strategy phase all the way through to the content and analytics phase of the creation process. Connection and appeal to audience is also an integral part of this competence. Such statement is strengthened by the report made by Bolden and O'Regan (2016): “there is no one approach to leadership,” since leadership is context specific and must to be adapted to the needs of the day; as the needs of the day - is to face the requirements set forth by digital transformation.

Table 11. Relationship between the School Administrators' Level of Digital Competence along Safety and their Digital Governance Score

Safety	Pearson r	p-value	Decision	Interpretation
Digital strategy	.464*	.015	Null Hypothesis Rejected	Significant
Digital Policy	.282	.155	Null Hypothesis Not Rejected	Not Significant
Digital Standards	-.055	.784	Null Hypothesis Not Rejected	Not Significant
Digital Guidelines	-.220	.271	Null Hypothesis Not Rejected	Not Significant
Digital Processes	-.061	.764	Null Hypothesis Not Rejected	Not Significant
Digital Team Structure	-.155	.441	Null Hypothesis Not Rejected	Not Significant

*Significant at 0.05

For the relationship between the administrators' level of digital competence along safety and their digital governance score, pearson r value of .464 and p-value of .015 were obtained. Since p-values is lower than the test of significance at 0.05, it leads to the rejection of the null

hypothesis. The results show that there is a significant relationship between the variables mentioned. This means that the higher is the level of digital competence along safety, the higher is the respondents' level of digital governance score along digital strategy. However, Pearson r of .282, -.055, -.220, -.061 and -.155 were obtained for digital policy, digital standards, digital guidelines, digital processes and digital team structure dimensions. P-values obtained were .155, .784, .271, .764 and .441 respectively, denoting the acceptance of the null hypothesis. This means that level of digital competence along safety may not affect the digital governance score along the mentioned variables.

Governments all over the world are in pursuit of Information and Communication Technologies (ICT)-based solutions for facilitating good governance. The phenomenon is popularly known as e-governance or e-government as per varying country contexts (Suri & Sushil, 2017). Implementation of new form of governance, in this digital era, therefore, is urged. Digitization brings new form of problems and challenges, in a statement made by Arcot, he said: on one side, technologies and competition is attempting business to try new things to develop effectiveness; on the other side, data is becoming a threat at various levels. With such, e-governance mechanisms must be put in place to generate norms, processes, standards, policies, guidelines and protocols – to combat threats to safety and security. As ensuring that safety risks within the organization are properly controlled, are crucial matters of governance. Therefore, the results presenting no significant relationships, are clearly contradictory to the needs implied in Suri & Sushil's and Arcot's statements.

Table 12. Relationship between the School Administrators' Level of Digital Competence along Problem Solving and their Digital Governance Score

Safety	Pearson r	p-value	Decision	Interpretation
Digital strategy	.839**	.00	Null Hypothesis Rejected	Significant
Digital Policy	.607**	.00	Null Hypothesis Rejected	Significant
Digital Standards	.258	.195	Null Hypothesis Not Rejected	Not Significant
Digital Guidelines	.224	.261	Null Hypothesis Not Rejected	Not Significant
Digital Processes	.209	.296	Null Hypothesis Not Rejected	Not Significant
Digital Team Structure	.231	.247	Null Hypothesis Not Rejected	Not Significant

**Significant at 0.01

Table 12 shows the relationship between the administrators' level of digital competence along problem solving and their digital governance score, Pearson r values of .839 and .607 were obtained for digital strategy and digital policy dimensions. P-values of .000 and .001 were also obtained which were lower than the test of significance at 0.01 leading to the rejection of the null hypothesis. Therefore, the results show significant relationships among the variables mentioned. This means that the higher is the level of digital competence along problem solving, the higher is the respondents' level of digital governance score along digital strategy and digital policy dimensions.

However, Pearson r of .258, .224, .209, and .231 were obtained for digital standards, digital guidelines, digital processes and digital team structure. P-values obtained were .195, .261, .296 and .247 respectively, denoting the acceptance of the null hypothesis. This means that respondents' level of digital competence along problem solving do not affect the digital governance score along the mentioned variables. Previous research concerning digital skills has tended to focus on technical operations, but many scholars have moved toward considering higher-order or content-related skills (Claro et al., 2012; Janssen et al., 2013 as Cited in Laar

et al., 2020). Main cognitive competences for the 21st century are critical thinking, creativity, and problem solving (Wechsler et al., 2018). Skills required for our 21st-century workforce and leaders, involve the ability and competence to search for relevant information, justify choices they made, generate innovative and worthwhile solutions and ideas for their applicable in this digital era. Hence, problem solving, in any type of platform, is indeed a vital skill for our modern leaders as they develop strategies and formulate policies in response to the needs of digitization.

The results showing weak association of respondents' level of digital competence along problem solving and digital governance score along digital standards, digital guidelines, digital processes and digital team structure somewhat oppose the statement made by the Claro et al., 2012; Janssen et al., 2013 as Cited in Laar et al., 2020 regarding higher-order or content-related skills specifically problem solving, that should also be given more focus in this digital era. Problem solving is a skill related to mathematical knowledge, general intelligence, general creativity, and verbal abilities (Bahar & Maker, 2015). Problem solving is related with conceptual understanding and procedural knowledge (Saygılı, 2017). Problem solving can improve critical thinking ability (Wahyuddin, & Syahri, 2018). How Bahar & Maker, Saygılı and Wahyuddin, & Syahri defined problem solving clearly show the importance of this skill and how it can contribute positively in managing any type organization. Hence, the negative association results are conflicting with the above given statements.

Proposed ICT Roadmap (2022-2027)

Figure 1 illustrates the building blocks of the ICT Roadmap for SUCs/LUCs and identifies as well its key components. These building blocks highlight the importance of establishing a structure that will help in the digital transformation process of Public Higher Educational Institutions (HEIs).


Enhancing Curriculum and Instruction	Automating and Integrating Processes & Services	Governance Framework
DEVELOPMENT AND TRANSFORMATION OF PROCESSES & SERVICES		
Connectivity	Enterprise Architecture	ICT Packages
INFRASTRUCTURE DEVELOPMENT		
ICT Standards	Competency	Professional Development
PEOPLE INTEGRATION AND EMPOWERMENT		

Figure 1. Building Blocks of the ICT Roadmap

Rationale

This proposed ICT Roadmap for SUCs and LUCs for 2022-2027 is a guideline to ensure the ICT initiatives and functions are on-point and in place. The undeniable importance of ICT in education calls for the development of this roadmap. ICT permeates the business environment, it underpins the success of modern schools and universities, and it provides an efficient

infrastructure. At the same time, ICT adds value to the processes of learning, and in the organization and management of learning institutions. This proposed ICT Roadmap is a view of the suggested projects that's SUCs/LUCs will take from the current state to the future state described within the suggested programs and initiatives directly linked to the results of the study, understanding current and anticipated ICT challenges, intensive research and anchored on the presented building blocks of the ICT roadmap. This proposed ICT Roadmap for SUCs and LUCs in the Province of Batangas for 2022-2027 aims to ensure that the PHEIs have the essential technology, tools, and expertise to advance technology, accelerate the translation of data to knowledge to action, and enhance governance.


 PEOPLE INTEGRATION AND EMPOWERMENT						
1. ICT Competency Standards						
Goal: Enhance ICT competencies of personnel, faculty members and administrators for self-directed & collaborative work environment through the effective use of ICT tools and devices, as well as become discerning & responsible ICT users.						
Program/ Initiative	Description	Goals	Mechanisms	Timeline	Persons Involved	Success Indicator/Expected Results
1.1 i-Learn Program	Facilitate access and use of ICT tools and devices such as laptops, smart phones, computers, printers, biometric device, software, computer programs & apps, etc.	a. Workforce can operate, utilize and integrate ICT tools and devices in performing various tasks in the workplace. b. Workforce to make appropriate choices regarding utilization of ICT tools and devices to improve efficiency and promote collaboration in the workplace	a. Conduct of a once month training and hands-on program regarding the use of different ICT tools and devices b. Partnership with Department of Communications and Information Technology (DICT) for supplemental training programs c. Provision of free laptop/Personal Computer/devices for key employees	Q1, 2022 Q1, 2022	Personnel Faculty Members Administrators Human Resources Management Office (HRMO)	a. Utilization and integration of ICT tools and devices in performing various tasks in the workplace. b. Appropriate and judicious use of ICTs tool and devices c. Established partnership with DICT for facilitating ICT training programs
1.2 e-Learning Academy	Conduct of core ICT Trainings for personnel, faculty members, and administrator	a. Knowledge deepening, where workforce acquire ICT competencies that will enable them to facilitate working environments that are digitally collaborative and cooperative in nature.	a. Conduct of training and hands-on program regarding Office Productivity Tools, ICT end-to-end integration, Communication and Collaboration Tools, Digital Content Creation, Safety, Netiquette, and other ICT related training programs essential to work. b. Partnership with Department	Every Quarter (for Personnel) Per Semester (for Faculty Members) Monthly (for Administrators) from 2022-2027	Personnel Faculty Members Administrators Human Resources Management Office (HRMO)	a. Workforce are upskilled and judiciously embed digital practices in the workplace. b. Established partnership with known IT learning companies for facilitating ICT training. c. Attendees passed the examination / assessment of every training program

			of Communications and Information Technology (DICT), Microsoft, CISCO, Google and other known IT learning companies for additional training programs			
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2. Professional Development

Goal: Further upgrading and development of ICT skillsets and professional capacity building of personnel, faculty members and administrators.

Program/ Initiative	Description	Goals	Mechanisms	Timeline	Persons Involved	Success Indicator/Expected Results
2.1 ICT- Professional Development (ICT-PD)	ICT skillsets and capacity building, specifically training programs on deeper ICT integration in curriculum, pedagogy, assessment, operations, sustained professional learning, digital leadership, research, innovation and scaling.	<p>a. Design Develop ICT Skills Upgrading Programme and IT Certification Road Map</p> <p>b. Development of digital leadership skills.</p> <p>b. Pass assessment and certification exams related to ICT</p>	<p>a. Conduct of comprehensive training and hands-on program that builds digital competence of personnel, faculty members and administrators such as ICT Mentorship, Digital Citizenship, Digital Governance, Google Educators Training, Microsoft Educators Programme, Cyber wellness.</p> <p>b. Coordinate with agencies that provide and assess ICT professional skills such as Microsoft, Google, DICT, TESDA.</p>	2023-2027	Key Personnel Key Faculty Members Administrators Human Resources Management Office (HRMO)	<p>a. Integration of ICT in daily tasks and operations, management and monitoring of processes that increase work efficiency and productivity.</p> <p>b. Administrators act and play the role of digital mentors; exhibit digital leadership skills.</p> <p>c. Attendees earned certification / passed the examination / assessment of every training program.</p>

 INFRASTRUCTURE DEVELOPMENT						
1. Connectivity						
Goal: Addressing strategic digital needs (hardware, software, people ware) with regards to telecommunication infrastructure, business operations and regulations.						
Program/ Initiative	Description	Goals	Mechanisms	Timeline	Persons Involved	Success Indicator/Expected Results
Digital Rise Project (Connectivity)	Establish an ICT infrastructure as a basis for digital transformation.	a Development of plans and policies relative to the implementation and adoption	a. Form a core team to review the specific ICT infrastructure	Q1, 2022 Purchase of equipment	Key Personnel Administrators ICT Department Budget Department	a. Implementing rules and regulations (IRR) and Work Instructions (WI) on establishment and strengthening of ICT infrastructure.

		of infrastructure, systems, and applications and other related framework. b. Purchase of ICT equipment tailored to the specific needs of the HEI.	needs of the HEI. b. Conduct benchmarking to HEIs with established ICT infrastructure set-up. c. Consult with experts regarding building and setting-up of ICT infrastructure designed for schools.	(2022 – 2027)		b. Purchase of ICT equipment as part of the Annual Procurement Plan (APP) and establishment of ICT infrastructure as part of the Operational Plan. c. Schools use a variety of ICT equipment and delivery models for supporting their learning activities with demonstrable cost effectiveness and shared learning. d. Major functions of in schools are digitally supported, enabled and connected
i-Connect All	Improve internet connectivity through the use of appropriate technology that can provide ICT access to all stakeholders.	a. Higher bandwidth and higher level of network infrastructure b. Increase digital equity strategies.	a. Adoption of wireless standards. b. Put more access points. c. Partnership with DICT for adoption of Free-Wi-Fi for All project.	Q1-Q2, 2022	Administrators ICT Department	a. Wireless standards are in place. b. More people are connected/ wired. c. Increased network speed and connectivity.

2. Enterprise Architecture

Goal: Design and implement an Enterprise Architecture (EA) to guide the development of interoperable ICT processes and systems in the organization.


Program/ Initiative	Description	Goals	Mechanisms	Timeline	Persons Involved	Success Indicator/Expected Results
EA 2.0	Various hardware and software for pedagogy, operations, communications, professional development and as well as governance and management are interconnected.	a. Develop University's EA Administration and Management Plan. b. EA Plan adoption.	a. Form a core team to facilitate SWOT analysis and development of EA Administration and Management Plan. b. Consult with experts regarding EA Administration and Management Plan development and adoption. c. Conduct benchmarking to HEIs with established EA.	Q1 – Q2, 2022 2022-2027 (Implementation)	Administrators ICT	a. Approved EA Administration and Management Plan. b. Systems and processes are digitally integrated and interoperable.

3. ICT Packages

Goal: Provide HEIs with appropriate technologies/ICT packages that would enhance the teaching-learning, operations and support processes that will meet the challenges of the 21st century.

Program/ Initiative	Description	Goals	Mechanisms	Timeline	Persons Involved	Success Indicator/Expected Results
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Digital Rise Project (ICT P)	Procurement of ICT goods and services tailor-fit to the needs of the HEI.	<p>a. Purchase of ICT devices:</p> <input type="checkbox"/> Laptop <input type="checkbox"/> Terminal <input type="checkbox"/> Tablet <input type="checkbox"/> Projector <input type="checkbox"/> Smart TV / Digital Classrooms.	<p>a. Identify ICT packages needs of the University; to be included in the Operational Plan (OP) and Annual Procurement Plan (APP);</p> <p>b. Develop a provision for purchase and utilization of ICT goods and services.</p>	Q1, 2022 2022-2027 (Procurement)	Administrator ICT Department Budget Department	<p>a. Inclusion of ICT packages in OP and APP.</p> <p>b. Deployment and utilization of purchased ICT packages.</p>
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 DEVELOPMENT AND TRANSFORMATION OF PROCESSES & SERVICES						
1. Enhancing Curriculum and Instruction						
<i>Goal: Designing an ICT-infused curriculum, instruction delivery and assessment.</i>						
Program/ Initiative	Description	Goals	Mechanisms	Timeline	Persons Involved	Success Indicator/Expected Results
ICT-enhanced curriculum (e-Curriculum)	Infusing ICT in the curriculum in response to Education 4.0.	<p>a. To provide a more dynamic, collaborative and innovative curriculum via ICT integration.</p> <p>b. Faculty members and students will use digital technology effectively, whereby learners are actively involved in a process of determining meaning and knowledge for themselves, leading to enhanced outcomes.</p>	Invite industry and technology experts in the curriculum review process.	Q1, 2023 2023-2027	Academic Heads Faculty Experts Industry Experts Technology Experts	<p>a. Approved ICT-infused curriculum.</p> <p>b. Implementation and continuous review of ICT-infused curriculum.</p>
ICT-enriched teaching and learning environment. (Classroom 2.0)	Provide a responsive and flexible ICT Teaching and Learning Environment.	a. Faculty members and students utilizing existing and emerging	<p>a. Develop ICT teaching and learning standards.</p> <p>b. Adopt the developed ICT</p>	Q1, 2023 2023-2027	Faculty Members Students Academic Heads	<p>a. Approved ICT teaching and learning standards.</p> <p>b. Utilization of ICT teaching and learning standards.</p>

		technologies that responds to the call of Education 4.0.	teaching and learning standards. c. Intensify faculty members' and administrators' capacity in terms of digital skills and competence via intensive trainings and workshops.			c. Digital empowered faculty members and administrators. Faculty members and administrators develop the capacity to plan and deliver ICT-enriched learning experiences.
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2. Automating and Integrating Processes & Services

Goal: Streamline operational processes and services via workflow automation which shall serve as the basis for coordination, communication, interaction, and harmonization of actions of stakeholders.

Program/ Initiative	Description	Goals	Mechanisms	Timeline	Persons Involved	Success Indicator/Expected Results
WAS (Workflow Automation for Schools) Project	Automation and harmonization of school's processes and services.	a. Identify ways on how can existing processes be improved and simplified via automation and integration with other processes. b. Develop initiatives to optimize available resources, encourage information and resource-sharing and database-building, and ensure the development and protection of an integrated ICT infrastructures.	a. Form a team to perform process review and come-up with recommendations. b. Consult with experts regarding workflow automation. c. Conduct benchmarking to HEIs with established automated processes.	Q1, 2023 2023-2027 (By phase implementation)	Academic Heads Faculty Experts Industry Experts Technology Experts	a. Approved automation and integration plan. b. Schools use a variety of ICT equipment, software and delivery models for supporting their operations with demonstrable cost effectiveness, shared yet safe environment.

3. Governance Framework

Goal: Streamline digital governance in support of achieving the digital transformation process.

Program/ Initiative	Description	Goals	Mechanisms	Timeline	Persons Involved	Success Indicator/Expected Results
Digital Governance Framework	Specifying the decision rights and accountability framework to encourage desirable behavior in the use of ICT and digital transformation process.	a. Develop set of principles applicable to digital projects and processes. b. Establish decision-making hierarchy.	a. Conduct review of processes. b. Consult with experts regarding digital governance. c. Conduct benchmarking to HEIs with digital governance framework.	Q1, 2022 2022-2027	Administrators Technical Experts	a. Good protocols are in place to assist schools in managing their digital resources with robust relationship with industry, business and other higher educational institutions. b. Balanced Scorecard for digital

		c. Form a digital reporting, monitoring and evaluation processes.				services performance
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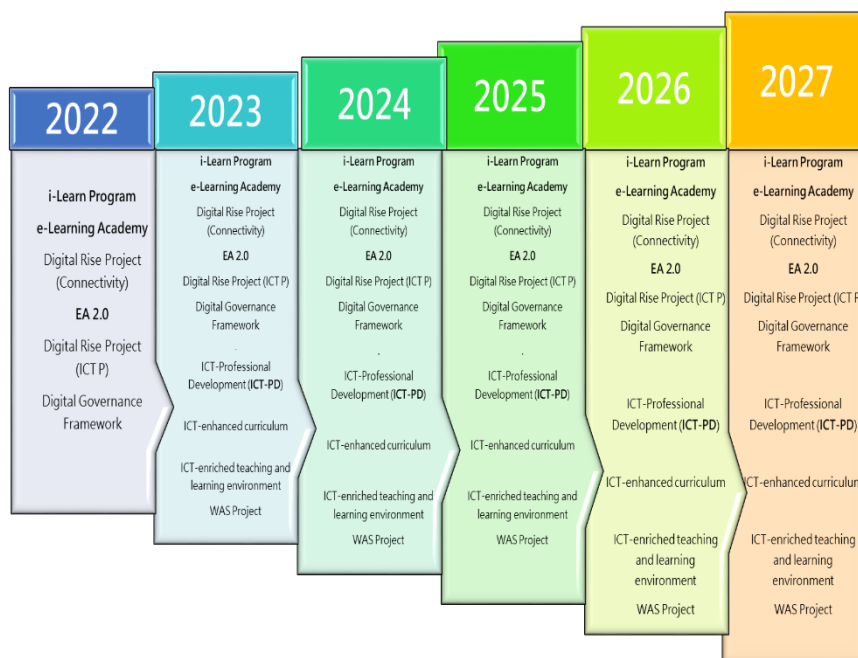


Figure 2. Proposed ICT Roadmap for SUCs/LUCs

CONCLUSIONS

In view of the fact that the overall weighted mean of digital literacy skills level is interpreted as quite confident, it can be concluded that respondents have the ability and awareness to use emerging technologies, ICT tools confidently in the workplace. Considering as well, that the overall weighted mean of digital confidence level is interpreted as competent, it can be concluded that the respondents have the attitude and proficiency that enable them to embrace technology, collaborate with others and work effectively in a modern, digital environment. For the digital governance score of the administrators, the overall weighted mean of their digital governance score is interpreted as satisfactory, it can be concluded that the administrators are somewhat cognizant in the strategic use of organizations’ digital resources, can establish directions and rules and can help the organization navigate towards digital transformation process.

For the relationship between the respondents’ level of digital literacy skills and level of digital competence, no relation was established among all the dimensions. Thereby signifying that the respondents’ level of digital literacy skills does not directly affect the respondents’ level of digital competence. Looking at the relationship between the administrators’ level of digital competence and digital governance score: The higher the administrators’ level of digital competence along information and data literacy, the higher is their digital governance score along digital policy and digital standards. However, the administrators’ level of digital competence along information and data literacy denotes no relation on the administrators’

digital governance score along digital strategy, digital guidelines, digital processes and digital team structure. The administrators' level of digital competence along communication and collaboration denotes no relation on their digital governance score along all its dimensions. The higher the administrators' level of digital competence along digital content creation, the higher is their digital governance score along digital policy, digital standards, digital guidelines, digital processes and digital team structure. However, the administrators' level of digital competence along digital content creation denotes no relation on the administrators' digital governance score along digital strategy dimension. The higher the administrators' level of digital competence along digital safety, the higher is their digital governance score along digital strategy. However, the administrators' level of digital competence along safety denotes no relation on the administrators' digital governance score along digital policy, digital standards, digital guidelines, digital processes and digital team structure. The higher the administrators' level of digital competence along problem solving, the higher is their digital governance score along digital strategy and digital policy. However, the administrators' level of digital competence along problem solving denotes no relation on the administrators' digital governance score along digital standards, digital guidelines, digital processes and digital team structure.

Indeed, the undeniable importance of digitalization, as major driver of any organization's initiative for improvement, innovation and as a critical tool for better governance, performance and achievement, calls for the formulation and development of an ICT Roadmap. Such roadmap would enumerate strategies and programs to ensure an informed and integrated approach to enhance and innovate the organization's services and products, involving personnel, infrastructures and processes.

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