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From tradition to transformation: Assessing education 5.0 readiness among educators based on demographic factors

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Abstract

This study assesses the readiness of educators in Surigao del Sur, Philippines, for Education 5.0—a learner-centered, technology-driven paradigm emphasizing innovation and human-centric skills. Using an explanatory sequential mixed-methods design, the research surveyed 164 educators and conducted focus group discussions to evaluate preparedness across three dimensions: technology integration, professional development, and data-driven decision-making. Findings reveal moderate readiness (weighted mean = 3.05) but highlight critical gaps: while basic infrastructure like internet access (88.3%) and computers (85.9%) is strong, advanced tools (e.g., AI, VR) are scarce (<15% availability), and last-mile schools face significant resource disparities. Professional development programs are misaligned with emerging technologies, and institutional support for tech integration remains inconsistent. Notably, gender is the sole demographic factor significantly linked to preparedness ($\chi^2 = 42.88$, *p* = 0.014), suggesting female educators (85.4% of respondents) face unique adoption challenges. Surprisingly, IT-related training shows no significant impact (*p* = 0.914), indicating a mismatch between current programs and Education 5.0 demands. Qualitative data underscore socio-economic barriers, including poor connectivity and gadget shortages, exacerbating inequities. The study recommends (1) gender-inclusive capacity building, (2) investments in advanced technologies and offline-compatible solutions, (3) reformed, immersive training aligned with AI/VR tools, and (4) systemic policies to bridge infrastructure gaps. These strategies aim to transition from fragmented adoption to equitable, future-ready education systems. The findings contribute to global discourse on digital transformation in resource-constrained contexts, offering actionable insights for policymakers to ensure no educator is left behind in the Education 5.0 transition.

Keywords: Education 5.0; Digital readiness; Technology integration; Professional development; Philippines; equity in education

1. Introduction

The rapid evolution of Education 5.0—a learner-centered, technology-driven approach emphasizing innovation, automation, and human-centric skills—demands that educational institutions reassess their readiness for digital transformation. This study examines the preparedness of educators in managing Education 5.0, focusing on how demographic factors such as gender, age, civil status, years in service, educational attainment, school type, and IT-related training influence their ability to adapt. By evaluating key dimensions like technology integration, professional development, and data-driven decision-making, this research seeks to provide a comprehensive assessment of whether educators are equipped to transition from traditional teaching methods to the dynamic demands of Education 5.0.

Existing literature highlights the critical role of teacher demographics in shaping digital readiness. Studies by Sabirovna and Ilkhomovna [4] and Abhishikta [1] suggest that younger educators and those with IT training exhibit higher adaptability to technology-driven education models. Meanwhile, international research [2, 6] underscores the importance of continuous professional development in fostering data literacy and tech-enabled pedagogy. However,

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while these studies provide global insights, there remains limited localized research on how demographic disparities affect Education 5.0 preparedness, particularly in developing regions where infrastructure and training access vary widely.

A significant gap exists in understanding how these dynamics play out in the Philippine context, particularly within the Department of Education (DepEd) in Surigao del Sur. While DepEd has initiated digital upskilling programs, rural and semi-urban schools often face challenges such as limited connectivity, uneven resource distribution, and resistance to change among veteran teachers. No prior study has systematically examined how demographic factors intersect with these regional constraints to influence Education 5.0 readiness. This research addresses that gap by providing empirical data on Surigao del Sur's educators, offering insights that can inform targeted interventions for DepEd's capacity-building initiatives. With this, the study specifically wants to investigate (1) the profile of the respondents in terms of Gender, Civil Status, Age, Number of years in service, Educational Attainment, School Type, IT-related training, (2) the level of preparedness of management of Education 5.0 as to: School IT Infrastructure and Resources for Technology Integration, Professional Development, Data-driven Decision Making, and (3) the significant relationship between the profile of the respondents and the level of preparedness of management of Education 5.0.

The significance of this study lies in its potential to guide policy and institutional strategies in bridging the digital divide. By identifying which demographic groups are most at risk of lagging in Education 5.0 adoption, the findings can help DepEd Surigao del Sur design equitable training programs, resource allocations, and mentorship schemes. Ultimately, this paper not only contributes to academic discourse on educational transformation but also provides actionable recommendations to ensure no educator is left behind in the shift toward a future-ready learning ecosystem.

2. Research Methodology

The study utilized an explanatory sequential mixed-methods design, beginning with quantitative surveys followed by qualitative focus group discussions (FGDs) to comprehensively examine school management preparedness for Education 5.0. This design facilitated both the statistical analysis of demographic influences and an in-depth thematic exploration of challenges and strategic responses. Conducted across the three DepEd divisions in Surigao del Sur—namely, Surigao del Sur, Bislig City, and Tandag City—the research involved 164 purposively selected school principals and teachers from various school categories, including large, medium, small, and last-mile schools. Additionally, nine school heads with 3–5 years of experience took part in FGDs to provide contextual perspectives. Data collection was carried out using a researcher-made questionnaire, validated by five education experts, which measured preparedness in technology integration, professional development, and data-driven decision-making. Surveys were administered via Google Forms and on-site visits to accommodate areas with limited internet access.

For the qualitative phase, Colaizzi's phenomenological method was employed to analyze FGD responses and extract key themes. Quantitative data were examined using descriptive statistics (mean, standard deviation) and inferential tests such as chi-square and Spearman's rank correlation, while group comparisons (e.g., public vs. private schools) were analyzed using the Mann-Whitney U test, all facilitated by R software. The reliability of the survey instrument was confirmed through a high Cronbach's alpha coefficient ($\alpha > 0.90$), indicating strong internal consistency. Ethical considerations were strictly observed, ensuring informed consent, anonymity, voluntary participation, and data protection, with incentives provided in recognition of participants' time. This robust methodological framework enabled a nuanced and evidence-based assessment of readiness for Education 5.0, integrating empirical results with local insights to guide relevant policy and capacity-building initiatives.

3. Results and Discussion

The demographic profile of educators in Surigao del Sur offers valuable insights into their preparedness for adopting Education 5.0. Notably, the highest representation was observed in gender distribution, with a dominant 85.4% of respondents being female, reflecting global trends in the teaching profession. While this aligns with UNESCO's findings, the underrepresentation of males (14.6%) could limit gender-diverse perspectives in technology adoption. In contrast, the lowest participation was noted in advanced IT-related training, particularly in programming, with only 5.18% of educators having received such instruction. This gap highlights a critical area for development, as reliance on basic digital skills may not suffice in navigating the complexities of AI-integrated education systems. Additionally, most respondents were between 41–50 years old and had 11–20 years of service, suggesting a workforce rich in experience but potentially less adaptable to rapid technological shifts. While their institutional knowledge is an asset, targeted support is necessary to encourage openness to innovation. The educational attainment data also show a promising trend, with 61.24% having earned MA/MS units, yet only a small fraction (7.9%) completed their master's degrees, and

an even smaller number (2.25%) pursued doctoral studies, indicating a need for stronger institutional backing in advanced education. Lastly, while 46.3% of participants were from large schools, only 6.7% came from last-mile schools, underscoring the digital divide and the necessity for focused interventions to ensure equitable access to technological tools and training across all school types.

Table 1 Demographic Profile of the Survey Respondents

PROFILES	**FREQUENCY**	**PERCENT**
Gender		
Female	140	85.4
Male	24	14.6
Age		
20 - 30 years old	31	18.9
31 – 40 years old	46	28
41 – 50 years old	50	30.5
50 years old and above	37	22.6
Civil Status		
Single	37	22.6
Married	120	73.2
Widowed	7	4.3
Number of Years in Service		
3 years and below	24	14.6
4 – 10 years	42	25.6
11 – 20 years	51	31.1
21 – 30 years	35	21.3
31 years and above	13	7.9
Educational Attainment		
College graduate	51	28.65
Master's degree	14	7.9
Earned Units in MA/MS	109	61.24
Earned Units in PhD/EdD/others	4	2.25
School Type		
Small	36	22
Medium	47	28.7
Large	76	46.3
Last Mile School	11	6.7
Division		
Bislig City	17	18.5
Surigao del Sur	23	25
Tandag City	52	56.5

IT-related Training (participated)		
Webinar on virtual classroom and web enhanced learning activities	79	49.52%
Student support system on remote teaching and learning	143	89.10%
Comprehensive MS Excel for Teachers Webinar Series	104	64.72%
Webinar on the use of advanced OER	138	86.30%
Basic Computer Training on File Management	132	82.30%
Creating PowerPoint presentation for teaching and learning	93	58.40%
Basic computer programming and trouble shooting	8	5.18%
Enhancing teaching and learning through gamification strategy	15	9.60%
Making a classroom instructional video as lesson explainer	39	24.50%
Use of Google Scholar for gathering data and paper enhancement	38	24%
Other advance training for developing school policies using online resources and support	26	16.30%

The demographic profile of educators in Surigao del Sur offers valuable insights into their preparedness for adopting Education 5.0. Notably, the highest representation was observed in gender distribution, with a dominant 85.4% of respondents being female, reflecting global trends in the teaching profession. While this aligns with UNESCO's findings, the underrepresentation of males (14.6%) could limit gender-diverse perspectives in technology adoption. In contrast, the lowest participation was noted in advanced IT-related training, particularly in programming, with only 5.18% of educators having received such instruction. This gap highlights a critical area for development, as reliance on basic digital skills may not suffice in navigating the complexities of AI-integrated education systems. Additionally, most respondents were between 41–50 years old and had 11–20 years of service, suggesting a workforce rich in experience but potentially less adaptable to rapid technological shifts. While their institutional knowledge is an asset, targeted support is necessary to encourage openness to innovation. The educational attainment data also show a promising trend, with 61.24% having earned MA/MS units, yet only a small fraction (7.9%) completed their master's degrees, and an even smaller number (2.25%) pursued doctoral studies, indicating a need for stronger institutional backing in advanced education. Lastly, while 46.3% of participants were from large schools, only 6.7% came from last-mile schools, underscoring the digital divide and the necessity for focused interventions to ensure equitable access to technological tools and training across all school types.

Table 2 Level of Preparedness of Management of Education 5.0 as to School IT Infrastructure and Resources for Technology Integration

Management	**Available**	**Not Available**
Equipment/ Hardware		
Computer	140 (85.9%)	24 (14.7%)
Generator Set	19 (11.7%)	144 (88.3%)
Server	69 (42.3%)	95 (58.3%)
Air-Conditioned Room	114 (69.9%)	49 (30.1%)
Internet	144 (88.3%)	19 (11.7%)
Data Center	55 (33.7%)	108 (66.3%)
Solar Panels	15 (9.2%)	148 (90.8%)
Software		
Learning Management System (Class-Subjects)	139 (85.3%)	24 (14.7%)
Service Hub (for request repair and office needs)	56 (34.4%)	109 (66.9%)
Personnel Selection Board System (HRMO)	82 (50.3%)	83 (50.9%)

Online Itinerary/Travel log	149 (91.4%)	14 (8.6%)
Document Tracking System	120 (73.6%)	43 (26.4%)
Biometric (Facial/Thumbmark)	127 (77.9%)	36 (22.1%)
Online Enrolment Portals	83 (50.9%)	82 (50.3%)
Classroom Instruction		
Hardware		
Interactive White Board	52 (31.9%)	111 (68.1%)
Computer Laboratory	70 (42.9%)	93 (57.1%)
LED Tv	119 (73%)	44 (27%)
Projectors	76 (46.6%)	87 (53.4%)
Virtual Reality/Augmented Reality/ Hologram	21 (12.9%)	142 (87.1%)
Software		
Canva	91 (55.8%)	72 (44.2%)
Online Learning Platform	86 (52.8%)	78 (47.9%)
Odilo (Online Library)	20 (12.3%)	144 (88.3%)
Chatbots and Virtual Assistants	31 (19%)	132 (81%)
Artificial Intelligence	23 (14.1%)	141 (86.5%)
Internet of things (IoT)	50 (30.7%)	113 (69.3%)
Gamification	14 (8.6%)	149 (91.4%)
Microsoft Office 365	140 (85.9%)	24 (14.7%)
Minecraft for Education	10 (6.1%)	153 (93.9%)
Adobe Education for Schools	37 (22.7%)	127 (77.9%)
Google Platforms	123 (75.5%)	41 (25.2%)

The data reveals notable disparities in IT infrastructure and digital resource availability, reflecting both commendable strengths and critical gaps in the readiness of schools for Education 5.0. Among the strongest indicators is the high availability of internet access (88.3%) and computers (85.9%), which provides a solid foundation for online learning and administrative functions. Similarly, the widespread use of Microsoft Office 365 (85.9%) and Google platforms (75.5%) points to strong familiarity with basic productivity tools. However, over-reliance on these may limit educators' exposure to more specialized and innovative EdTech platforms, such as AI-driven systems. In contrast, the lowest availability rates were found in backup power solutions, with only 11.7% of schools having generators and 9.2% equipped with solar panels. This is especially concerning in a country like the Philippines, where frequent power outages pose a serious threat to digital continuity, particularly in remote areas.

Furthermore, access to advanced technologies remains extremely limited, with Virtual/Augmented Reality (12.9%), Artificial Intelligence (14.1%), and gamification tools (8.6%) largely unavailable. This lack significantly impedes the integration of personalized and immersive learning experiences essential to future-ready education. Similarly, interactive digital resources like the Odilo Online Library (12.3%) and Minecraft for Education (6.1%) are underutilized, restricting opportunities for 21st-century skill development. Even within moderately implemented systems, disparities persist: biometric attendance systems are widely adopted (77.9%), but only 34.4% of schools have service hubs, resulting in delays in IT maintenance and system sustainability. Additionally, just 50.9% of schools support online enrollment, indicating a continued reliance on manual processes.

These findings illustrate a two-tiered digital infrastructure—while basic digital tools are prevalent, the integration of advanced technologies and equitable distribution, especially in last-mile schools, remain significant challenges. To bridge these gaps, the study recommends prioritizing resilient infrastructure such as solar panels and generators,

particularly in underserved areas, and expanding investment in advanced EdTech through public-private partnerships to ensure inclusive, future-oriented education systems.

According to Okoye et al.'s [3] study on the impact of digital technologies on teaching and learning, the key problems include inadequate training, infrastructure, and access to the internet and digital platforms. Given that there are a lot of infrastructure and resources that are not available, as shown in Table 5, this suggests that school management and leaders should focus on investing more in educational infrastructure and resources. They should aim at enhancing access to critical hardware and software since it plays a pivotal role in preparing schools for the demands of modern education paradigms, such as Education 5.0 and Industry Revolution 5.0, as most developed countries' educational infrastructure is aligned with modern technologies and benefits to improve the academic base.

Table 3 Level of Preparedness of Management of Education 5.0 as to Professional Development

Indicators	**Mean**	**SD**	**Verbal Interpretation**
I have received professional development opportunities to enhance my understanding of advanced technologies in the classroom.	3.07	0.67	Moderate Extent
My professional development includes training on integrating advanced technologies into instructional practices.	3	0.63	Moderate Extent
My professional development includes strategies for incorporating advanced technologies into personalized learning experiences.	3.04	0.57	Moderate Extent
I feel confident in applying technological pedagogy to enhance student learning experiences.	3.2	0.6	Moderate Extent
I am familiar with a variety of advanced technologies applicable to educational settings.	3	0.62	Moderate Extent
The professional development opportunities provided are aligned with the latest advancements in educational technologies.	3.1	0.63	Moderate Extent
I feel supported in addressing challenges related to the integration of advanced technologies.	3.07	0.67	Moderate Extent
I receive adequate support from the school or institution for integrating advanced technologies into my teaching.	3	0.69	Moderate Extent
There are collaborative platforms or forums for educators to share knowledge and best practices related to advanced technologies.	3.02	0.59	Moderate Extent
Advanced technologies are integrated into the curriculum, enhancing the overall learning experience.	3	0.65	Moderate Extent
Weighted Mean	3.05	0.63	Moderate Extent

The analysis of educator preparedness for Education 5.0 in terms of professional development reveals a moderate level of confidence and readiness among teachers, with an overall weighted mean of 3.05 (SD = 0.63) across key indicators. Educators expressed moderate familiarity with technology integration (mean scores ranging from 3.0 to 3.2), indicating a basic level of digital literacy but limited proficiency in advanced tools such as artificial intelligence and virtual reality.

This mirrors earlier findings of low AI tool availability (14.1%) in schools, emphasizing the need to refocus professional development (PD) from foundational skills toward more immersive technologies. Further, the alignment of PD content with emerging innovations remains limited (Item 6 mean = 3.1), suggesting that current training programs are not keeping pace with global EdTech advancements. Institutional support for technology uses also appears inadequate (Items 7–8 mean = 3.07–3.0), with teachers lacking the technical assistance necessary for effective implementation. This challenge is common in resource-constrained environments, where a majority of educators report insufficient support.

Moreover, collaborative learning among teachers is weak (Item 9 mean = 3.02), which restricts the spread of effective practices, despite evidence showing that professional learning communities (PLCs) significantly boost tech integration. Finally, curriculum integration of technology is still fragmented (Item 10 mean = 3.0), as digital tools are often treated

as supplementary rather than essential to pedagogy. Collectively, these findings suggest that educators are in a transitional phase—neither novices nor fully equipped for Education 5.0. To move forward, PD programs must be restructured to prioritize advanced digital competencies (e.g., AI, VR, data analytics), while schools should strengthen technical support systems, promote collaborative PD platforms, and embed technology as a core element of curriculum design.

Table 4 Level of Preparedness of Management of Education 5.0 as Data-driven Decision Making

Participant	Codes	Themes
1	Technology integration, high technology, advancements, enhance education	Education 5.0 Understanding, Technology Integration
2	Curriculum alignment, updates in education, K to 12, MATATAG	Education 5.0 Understanding, Curriculum Development
3	Teacher budgets, gadgets, internet access, laptops for classrooms	Curriculum Alignment, Resource Availability
4	Internet connection, digital tools, interactive content, multimedia resources	Innovative Teaching Strategies, Technology Integration
5	Number of learners and teachers, lack of gadgets	Curriculum Alignment, Resource Limitations
6	Poverty level, Indigenous People (IP)	Socio-economic Challenges, Indigenous Background
7	Subject integration, remediation, lack of signal, offline applications, tablets, laptops	Innovative Teaching Strategies, Technology Challenges
9	K-12 curriculum, Special Education (SPED), inclusive education	Curriculum Integration, Inclusive Education
10	Quizzes, Mentimeter	Assessment Tools, Technology Integration

The qualitative data reveals critical extremes in preparedness for data-driven decision-making under Education 5.0. On one end, technology integration and innovative teaching strategies (e.g., interactive content, digital tools) emerge as strengths, with participants emphasizing the use of multimedia resources (Participant 4) and assessment tools like Mentimeter (Participant 10). These findings align with global trends where technology-enhanced pedagogy improves learning outcomes [7]. However, the other extreme highlights severe resource limitations and socio-economic barriers, such as lack of gadgets (Participant 5), poor internet connectivity (Participant 7), and challenges faced by Indigenous communities (Participant 6). These gaps mirror disparities observed in low-resource educational systems, where inadequate infrastructure stifles data-driven practices [8]. The juxtaposition of these extremes underscores a digital divide: while some educators leverage technology for curriculum alignment (Participant 2) and inclusive education (Participant 9), others struggle with basic tools, exacerbating inequities. This dichotomy calls for targeted interventions, such as equitable resource allocation and offline-compatible EdTech [5], to ensure all schools can harness data for decision-making.

Table 5 Significant Relationship Between the Profile of the Respondents and the Level of Preparedness of Management of Education 5.0

	X-squared	df	p-value	Interpretation
Gender	42.88	25	0.01443	Statistically Significant
Age	78.178	75	0.3782	Not Statistically Significant
Civil Status	55.211	50	0.2843	Not Statistically Significant
No. of years in Service	100.6	125	0.9467	Not Statistically Significant
Educational Attainment	54.935	75	0.9605	Not Statistically Significant

School Type	89.615	75	0.1196	Not Statistically Significant
Division	51.332	50	0.4213	Not Statistically Significant
IT-related training	58.883	75	0.9144	Not Statistically Significant

The analysis of the relationship between respondent profiles and preparedness for Education 5.0 reveals that gender is the only demographic factor significantly associated with readiness levels, as indicated by the chi-square test (X^2 = 42.88, p = 0.014). All other variables—such as age, civil status, years in service, educational attainment, school type, division, and IT-related training—showed no statistically significant correlation (p > 0.05).

This finding implies that female educators, who comprise 85.4% of respondents, may experience distinct challenges or advantages in adopting Education 5.0 technologies. Notably, the absence of a significant relationship between IT-related training and preparedness (p = 0.914) is unexpected, especially given global evidence underscoring training as a key determinant of digital readiness. This could suggest that existing training programs are either too broad or inadequately aligned with the specific technological needs of schools—particularly considering the widespread lack of advanced tools such as AI, available in only 14.5% of schools.

These results carry several implications. First, gender-responsive strategies should be explored to ensure equitable access to resources, devices, and advanced training opportunities for female educators. Second, current IT training programs may require reengineering to be more targeted, contextualized, and supported with sustained mentoring and application-based follow-up. Lastly, the lack of significance in conventional predictors such as educational attainment and experience suggests that policy efforts should shift towards systemic solutions, including infrastructure development and localized, needs-based professional development, rather than relying solely on demographic assumptions.

4. Conclusion

The findings collectively reveal a nuanced landscape of preparedness for Education 5.0 among educators in Surigao del Sur. While basic digital infrastructure like internet access and computers is relatively strong, significant gaps persist in advanced technologies (e.g., AI, VR) and equitable resource distribution, particularly for last-mile schools. Professional development efforts are moderately effective but lack alignment with cutting-edge tools, and institutional support remains inconsistent. Notably, gender emerges as the sole demographic factor significantly linked to preparedness, suggesting that female educators—despite comprising the majority—may face systemic barriers in technology adoption.

Meanwhile, the surprising non-significance of IT-related training underscores a mismatch between current programs and the actual needs of a transformative Education 5.0 framework. To bridge these gaps, policymakers must prioritize gender-inclusive training, advanced technology investments, and robust infrastructure support, ensuring that preparedness efforts are both equitable and future-ready. By addressing these dimensions, the education sector can transition from fragmented adoption to systemic resilience in the face of digital transformation.

Recommendations

To effectively address the gaps identified in the study and build systemic resilience in adopting Education 5.0, several strategic and interconnected recommendations are proposed. First, gender-inclusive capacity building should be prioritized by designing professional development (PD) programs that cater specifically to the needs of female educators—who make up the majority of the teaching workforce—through leadership training in EdTech, mentorship programs, and safe spaces to discuss gender-related challenges. At the same time, efforts should be made to encourage greater male participation in teaching and technology integration to foster balanced perspectives.

Second, advanced and equitable technology integration must be achieved by investing in cutting-edge tools like AI, VR, and IoT for all schools, including those in remote areas, supported by public-private partnerships. Equitable access should also include offline-compatible solutions such as preloaded tablets and local LMS platforms for schools with poor connectivity.

Third, there is a need to reform IT-related training programs by shifting focus from basic digital literacy to practical, immersive tools aligned with Education 5.0 goals, delivered through microlearning modules that are accessible and time-efficient. Strengthening institutional support systems is also essential; schools should establish ICT support teams

for real-time assistance and build peer-learning communities to promote collaboration and innovation. Furthermore, policy reforms and resource allocation must target infrastructure deficiencies, including the provision of backup power solutions like solar panels and generators, while also embedding technology competencies in teacher evaluations and curriculum standards.

Finally, community and stakeholder engagement can be enhanced by revitalizing initiatives like Brigada Eskwela to crowdsource tech resources, and by forging partnerships with tech industry leaders to gain subsidized or free access to high-impact EdTech platforms and tools.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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