



ASSESSING PROFESSIONAL EDUCATION AND THE DEVELOPMENT OF 21ST-CENTURY SKILLS AMONG HIGHER NATIONAL DIPLOMA STUDENTS IN MFOUNDI DIVISION, CAMEROON

Kenneth Yuomeyseⁱ

Faculty of Education,
University of Yaoundé 1,
Cameroon

Abstract:

This research explored the relationship between professional education and the development of 21st-century skills among Higher National Diploma (HND) students in professional higher education institutions. The impetus for this study arose from concerns about the employability of HND graduates, despite the ongoing initiatives by the Cameroonian higher education system to professionalize training and align curricula with the demands of the labor market. Specifically, the research examined the relationships among professional curriculum content, innovative teaching methods, school infrastructure, and the development of 21st-century skills. A descriptive survey research design was utilized. The study included 200 HND students who were selected through a simple random sampling method. Data collection was conducted using structured questionnaires, and the analysis was performed using descriptive statistics, Pearson product-moment correlation, and multiple regression analysis. The results indicated significant positive correlations between 21st-century skills and innovative teaching methods ($r = .770$, $p < .001$), curriculum content ($r = .898$, $p < .001$), and school infrastructure ($r = .540$, $p < .001$). The multiple regression analysis revealed that the three predictors collectively accounted for 89.6% of the variance in students' 21st-century skills (R^2 adjusted = .896), with the overall model being statistically significant, $F(3,196) = 569.786$, $p < .001$. These findings underscore the importance of curriculum relevance, innovative pedagogy, and supportive learning infrastructure in fostering employability-oriented 21st-century skills. The study advocates for enhanced collaboration among higher education institutions, government entities, employers, and other stakeholders to modernize HND curricula, bolster innovative teaching practices, broaden digital and practical learning opportunities, and improve educational infrastructure to boost graduate employability in Cameroon.

ⁱ Correspondence: email kenneth.yuomeyse@fse-uy1.cm

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1. Introduction

One of the most essential requirements for delivering quality education is the creation of a pertinent curriculum that emphasizes the cultivation of 21st-century skills aimed at enhancing employment prospects and careers to eliminate poverty and unemployment. There has been an increasing emphasis on the significance of higher education institutions in fostering career readiness and graduate employment, as evidenced by the rise in university graduate employment destinations being a critical criterion for assessing the value of a university education (Burke, Scurry, Blenkinsopp, & Graley, 2016). Universities must develop programs while ensuring that sufficient educational infrastructure, human resources, and a relevant curriculum are established to provide students with quality educational experiences (Mavrino & Mingaleva, 2017). Higher Education is vital for the economic advancement of the nation as it produces a trained and skilled workforce for all sectors of the economy (Singh, 2019). To fulfill its objectives, higher education must be supported by adequate resources, sufficient educational infrastructure, and a relevant curriculum (Nyenty, 2023).

One of the objectives of the 1993 university reforms in Cameroon was to diversify, professionalize, and tailor educational programs to meet the demands of the job market, thereby enabling graduates to secure employment in the private sector and pursue self-employment (Nyenty, 2023). The professionalization of Higher Education is characterized by Doh (2012) as a strategy aimed at modernizing the curriculum and its related technologies to align with socio-professional needs and practical applications. According to Article 6, subsection (1) of the 2001 Law of Orientation of Higher Education, the primary mission of Higher Education, as outlined in Article 2, encompasses several objectives: striving for excellence across all fields of knowledge, fostering science, culture, and social advancement, promoting social mobility with the involvement of competent national entities and communities, and socio-professionals, particularly in defining programs and organizing theoretical lessons, practical training, and internships; supporting developmental initiatives; training and developing executives; enhancing ethical awareness and national consciousness; promoting democracy and cultivating a democratic culture, as well as encouraging bilingualism.

Furthermore, Section 8 of the 2023 law on higher education policy in Cameroon stipulates that all higher education training programs must be structured to enable learners to acquire knowledge, skills, and competencies pertinent to a specific profession or trade, or a cluster of professions or trades. Successfully completing these programs should lead to the attainment of certificates that are recognized in the labor market and acknowledged as professional qualifications by the relevant national authorities and the labor market.

The Partnership for 21st Century Skills, a prominent advocacy organization dedicated to integrating 21st-century skills into education, has established a framework for 21st-century learning. This framework outlines the skills, knowledge, and competencies that students need to effectively enter the contemporary job market. The expected student outcomes encompass: Core Subjects and 21st Century Themes; Learning and Innovation Skills; Information, Media, and Technology Skills; and Life and Career Skills (Partnership for 21st Century Skills 2009). As stated by the United Nations (2016), the cultivation of 21st-century skills is a global issue aimed at ensuring that the education provided meets the learning needs and aspirations for sustainable development. The era of the knowledge economy has necessitated that educational systems realign their curricula across various educational levels to guarantee that learners sufficiently acquire the 21st-century skills essential for the labor market (Goldberg, 2012).

A training program is defined as a sequential arrangement of educational activities that are designed and organized with the objective of achieving predetermined learning goals over a sustainable timeframe. Within such training programs, teaching and learning activities should be categorized into subcomponents, which are separately identified as courses, modules, or integrated subjects. The program should encompass key components regarded as courses, units, or modules, including socio-professional immersion, game-based activities, research projects, and dissertation writing. The teaching module, which represents one of the various components of a semester within a training program, should be structured in a cohesive manner alongside theoretical courses and tutorials, as well as student practical, research, or personal work (The Law of Higher Education Policy in Cameroon, 2023).

One of the professional programs established by the Ministry of Higher Education in Cameroon is the Higher National Diploma (HND) program. This program spans two years and was initiated by Ministerial Order No. 02/0069/MINESUP/DDES in 2002. In 2018, the program experienced significant curricular changes and improvements to align with contemporary employment opportunities and job market requirements. To obtain the HND certificates, students are required to complete the approved curriculum, which includes an internship and a research project, at any institution of Higher Learning recognized by the Ministry of Higher Education. Upon completion of the program, students must take a national examination organized by the Ministry of Higher Education through the National Committee for the Organization of Higher National Diploma (HND) Examinations each year.

2. The Research Problem and Hypotheses

Despite the growing emphasis on professionalization as a framework of rules and processes that regulate the training system for the issuance of certificates facilitating direct employment by the Ministry of Higher Education in Cameroon, a significant number of graduates holding a Higher National Diploma encounter difficulties in

securing employment and establishing themselves as entrepreneurs following their professional training. They lack essential critical thinking and problem-solving abilities, information and technological literacy, entrepreneurship and innovation skills, as well as communication, leadership, and collaboration competencies necessary for job opportunities and successful integration into the labor market. The absence of these skills can be attributed to the content of the professional curriculum, the innovative teaching methodologies employed by instructors, and the quality of school infrastructure. These young graduates from vocational institutions demonstrate inflexibility and a lack of adaptability to the ever-evolving workforce, which diminishes their capacity to work effectively across cultures and limits their potential to assume leadership roles and thrive as entrepreneurs.

The primary aim of this study is to investigate the significant correlation between professional education and the cultivation of 21st-century skills that enhance employment prospects in higher education. Consequently, this research is structured around the following hypotheses:

- There exists a significant correlation between professional curriculum content and the enhancement of 21st-century skills for employment in professional higher education in Cameroon.
- There exists a significant correlation between innovative teaching methods and the enhancement of 21st-century skills for employment in professional higher education in Cameroon.
- There exists a significant correlation between school infrastructure and the enhancement of 21st-century skills for employment in professional higher education in Cameroon.

3. Literature Review

The notion of employability is perceived as a collection of competencies, encompassing both general skills (such as organizational abilities, teamwork, and communication) and specific skills related to particular disciplines (including the knowledge and skills pertinent to law, social work, and engineering), along with personal qualities (like resilience, self-confidence, and discipline) that are relevant to securing employment and jobs offer by employers (Rowe & Karsten, 2017).

Oliver (2015) posited that employability encompasses the ability to recognize, acquire, adapt, and continually enhance the skills, knowledge, and personal attributes that elevate the chances of students securing and creating meaningful paid and unpaid roles that benefit themselves, the community, the workforce, and the economy. The skills required for the 21st century are essential for the comprehensive development of learners, who are anticipated to function as a workforce at both international and local levels, thereby fostering the production of goods and services for economic and social advancement (Upendo & Thabita, 2023). The societal demand for 21st-century skills has imposed a new obligation on educators to ensure that teaching and learning are focused

on the acquisition of these skills (Sulaiman & Ismail, 2020). As noted by Suto and Eccles (2014), educators must facilitate the acquisition of 21st-century skills by implementing skills-centered pedagogy in their teaching and promoting skill development through extracurricular activities.

According to Beswick and Fraser (2019), many educators encounter challenges in facilitating the acquisition of 21st-century skills due to insufficient resources, limited competencies, and subpar teaching and learning environment. Teaching and learning in the 21st century must transcend traditional boundaries that rely solely on academic knowledge and incorporate the skills necessary for future challenges. The curriculum, which serves as the foundation of any educational system, is crucial in equipping students to be proficient in the demanding era of global development. In this context, innovation and learning skills encompass creativity, critical thinking, collaboration, and communication. The primary trends driving 21st-century curriculum innovation include interdisciplinary approaches, technology integration, project-based learning, adaptive personalized learning, and an emphasis on character education (Kalayo, Aisan & Fathia 2024).

3.1 Professional Curriculum Content and the 21st Century Skills

According to Nyenty (2023), the shift towards a knowledge economy has generated a need for enhanced skills across various occupations. Countries aiming to transit into a knowledge economy face the challenge of implementing reforms to improve the quality of training through changes in pedagogy and curriculum. To effectively promote employability, integrated learning activities must be relevant, meaningful, and purposefully aligned with the university curriculum (Clarke, 2018; Johnston, 2011; Patrick et al., 2008; Sachs et al., 2017). The implementation of a 21st-century curriculum should encompass knowledge, critical thinking, media literacy, innovation skills, Information and Communication Technology proficiency, and practical experiences within the framework of core academic subjects (Paige, 2009; Alismail & McGuire, 2015). This curriculum must prioritize knowledge construction and motivate students to generate information that holds significance or value for them, thereby fostering the development of new skills. The necessity for cultivating 21st-century skills is driven by technological advancements and the demands of a competitive market at both global and local scales (Upendo & Thabita, 2023).

The development of a curriculum that connects with the real world can enhance students' motivation, engagement, comprehension of academic subjects, and readiness for adult life (Lombardi, 2007). The curriculum ought to be structured in a manner that enables students to acquire knowledge and grasp the core academic disciplinary concepts. This curriculum should provide students with the chance to learn and cultivate various literacies, including financial, civic, environmental, health, and global awareness (Alismail & McGuire, 2015). Employability skills can be somewhat fostered through 'bolt-on' activities that exist outside of formal academic programs (co-curricular work

integrated learning), or more effectively through holistic approaches that integrate employability within the academic curriculum (Rowe & Karsten, 2017).

The advancement of information and communication technology (ICT) has transformed the methods by which individuals learn, interact, and work, generating new requirements for teaching and learning in the 21st century. Curriculum development should aim to create individuals who are not only proficient in academic knowledge but also possess the vital skills necessary to contribute and compete in the globalization era (Kalayo, Aisan & Fathia 2024). The Organization for Economic Cooperation and Development (OECD) and the United Nations Educational, Scientific and Cultural Organisation (UNESCO) emphasize the importance of education that focuses not only on mastering academic content but also on developing social, emotional, and digital skills, which encompass learning and innovation skills, digital literacy skills, and life and career skills (Kalayo, Aisan & Fathia 2024).

Mantz, Yarle, and Knight (2012) asserted that effective learning and the intention to gain employment must be underpinned by learning, teaching, and assessment strategies that align with curricular goals. Davies (2002) emphasized that programs and their curriculum content ought to be crafted with employability policies in consideration. Wiggins and McTighe (2005) noted that linguistic diversity can empower students to make informed choices that equip them to tackle the challenges posed by globalization and provide them with opportunities for success in the job market. Ellis (2004) argued that a knowledge-centered curriculum is one where learners are expected to gain an understanding of their world, serving as a foundation for their adult lives, and that the curriculum should be periodically evaluated and redesigned to incorporate future skills. Herrington and Kervin (2007) posited that a thinking curriculum fosters a profound comprehension of the subject matter and equips students with the capability to apply that understanding to the intricate, real-world issues they will encounter as adults.

3.2 Innovative Teaching Methods and the 21st Century Skills

The capability of classroom instructors to effectively translate strategies and integrate skills and knowledge significantly influences the development of 21st-century skills among learners (Sulaiman & Ismail, 2020). Instructors are able to organize lessons, create materials, and establish teaching and learning activities that emphasize the acquisition of 21st-century skills. This can be achieved through engaging in plays, facilitating group discussions, preparing for debates, and conducting oral presentations (Erdoğan, 2019). The competencies of teachers in their subject areas are linked to their ability to foster 21st-century skills in their students within that specific subject (Sulaiman & Ismail, 2020). The necessity for teachers to possess the competence to cultivate 21st-century skills in students underscores the need for a customized training program aimed at enhancing critical thinking and creativity among students (Beswick & Fraser, 2019). Numerous innovative methodologies, such as collaborative learning, project-based learning, and interdisciplinary approaches, have been implemented in various societies to develop curricula that are relevant to global dynamics. Furthermore, the incorporation of

educational technologies, including learning applications, artificial intelligence, and virtual simulations, has created significant opportunities for developing more adaptive and interactive learning experiences (Kalayo, Aisan & Fathia, 2024).

According to Alismail & McGuire (2015), educators ought to employ contemporary learning technologies and innovative strategies that facilitate the integration of social and cognitive skills with content knowledge, as well as enhance learners' engagement in the educational environment to foster these essential future skills. Problem-based learning represents a methodology wherein students can engage in discussions and analyze various topics and issues pertinent to the real world. The project-based learning methodology enables learners to explore problems, offer clarifications, generate ideas, analyze data, and make informed judgments to identify suitable solutions. This methodology enhances students' involvement in classroom activities and encourages the development of critical thinking skills (Joyce et al., 2009). The implementation of a problem-solving approach can cultivate critical thinking abilities that assist students in navigating challenges they may encounter in real-life situations (Knowlton, 2003). This approach empowers learners to engage in creative thinking and transcend cognitive barriers to attain distinctive 21st-century learning competencies (Alismail & McGuire, 2015).

A crucial element in cultivating 21st century skills that connect knowledge to the real world is authentic learning. In this educational approach, instructors enhance the learning atmosphere by boosting student engagement in classroom activities and applying knowledge in real-time (Alismail & McGuire, 2015). Utilizing real-world contexts enables students to gather information from various sources beyond the confines of the school, such as interviewing specialists and experts to obtain insights in a specific field. Connecting content to reality allows students to effectively engage in the learning environment and fosters 21st century skills such as problem-solving, critical thinking, and collaborative learning (Herrington & Kervin, 2007). Students actively participate in their own knowledge construction and generate information that holds significance for them, thereby achieving true collaborative work. When students are given the chance to recognize the relationship between real-life issues and their learning, they are more likely to succeed in their future careers (Alismail & McGuire, 2015).

Cooperative learning represents an innovative pedagogical approach that fosters the development of 21st-century skills among students. As noted by Alismail and McGuire (2015), this strategy organizes learners into various groups characterized by diverse interests and abilities, resulting in significant learning outcomes that yield unique results. The collaborative efforts of the group are more inventive due to the profound consideration and amalgamation of the talents and strengths of the learners, while the variety of skills and abilities among the participants can stimulate creative endeavors, ensuring that each learner is actively engaged (Knowlton, 2003). Furthermore, Trilling and Fadel (2009) assert that students collaborating in different groups can enhance numerous facets, such as fostering mutual respect among team members, evaluating the

teamwork necessary to accomplish collective tasks, and striving for compromises essential to reach a shared objective.

Jacobsen (2001) noted that various technological tools can enhance skills such as critical thinking, problem-solving, collaborative learning, and the overall learning environment. Tools like WebQuests, portfolios, wikis, quizzes, Google Sites, digital ePortfolios, storytelling, SoftChalk, LessonBuilder, blogs, and others can foster these skills and provide learners with opportunities to engage in collaborative groups, potentially boosting their motivation and enhancing critical thinking. Additionally, multimedia tools promote a deeper comprehension necessary for completing class activities, and students who utilize multimedia resources in their education tend to exhibit higher-level thinking skills (Kanuka et al., 2007).

Teaching and learning must promote the utilization of Information and ICTs to support the cultivation of 21st-Century skills and competencies (Angrisani et al., 2018). Those who thrive in the contemporary world will belong to a society characterized by creativity, innovation, and proficiency in technology (Gaol et al., 2018). Consequently, it is crucial to equip students with sufficient preparation throughout their basic education years, as this lays the groundwork for the development of the skills and competencies essential for success in higher education. The early acquisition of these vital skills and competencies increases the likelihood of students having a positive and enriching experience during their studies at institutions of higher learning (Silva et al., 2023). The integration of educational software, augmented reality (AR), virtual reality (VR), and online learning applications should be a fundamental component of the 21st-century curriculum. These advanced technologies enable learners to visualize intricate concepts interactively and facilitate access to teaching and resources from various global locations. ICTs, including artificial intelligence (AI), assist educators in analyzing learners' educational needs and crafting personalized learning experiences. Through this methodology, students can enhance their digital literacy while preparing for an increasingly technology-driven workforce (Kalayo, Aisan & Fathia 2024).

Incorporating these tools into the educational process provides learners with the chance to improve their social and academic abilities as they organize their thoughts, communicate, and share information, as well as express their opinions while conducting research or preparing a project through online experiences. The Internet enables learners to broaden their understanding of various issues and grasp social values across multiple topics such as famine, global warming, health concerns, poverty, the global population surge, and other environmental and social challenges. Numerous options exist in the virtual realm from which educators can select to impart genuine meaning, allowing students to perceive the real world through their online experiences. Technologies related to video games, role-playing in an online simulated learning environment, and YouTube videos can serve as effective tools to present different subjects and issues in a realistic manner (Alismail & McGuire, 2015).

3.3 School Infrastructure and the 21st Century Skills

School infrastructure facilities are recognized as one of the outcomes of education. According to Keating et al. (2003), the primary factors influencing educational objectives include teacher quality, curriculum, public relations, and the organization of school infrastructure facilities. When the condition of the classroom, which is a component of the school building, is well-maintained, it will enhance the continuity of learning. Students will experience excitement, comfort, and support during the learning process (Lawanson & Gede, 2011). The impact of school facilities and infrastructure on learning in the 21st century is highly significant, especially as learning infrastructure facilities are increasingly diversifying in response to evolving functions that align with the strategies and methods employed (Nugroho1 & Wibowo, 2020). The effective utilization of school infrastructure is influenced by the interaction between teachers and students, as well as the engagement of students in the learning process (Owoeye & Yara, 2011).

According to Uwimana and Andala (2020), school infrastructures must reflect environments that are conducive and responsive to the educational needs regarding the adaptation of learners' wellbeing. These infrastructures should serve as essential components that promote an effective teaching and learning process. Teaching and learning infrastructures encompass physical facilities that support educational activities, including laboratories, classrooms, offices for teaching staff, workshops, administrative offices, reading rooms, restrooms, libraries, health dispensaries, dining areas, and assembly halls. Physical infrastructures in schools, such as libraries, laboratories, classrooms, and staff accommodations, create a conducive physical learning environment that fosters the development of technical skills and the qualitative and adequate aspects necessary within the school context (Maron & Brooth, 2007). Health and sanitation facilities, which include waste disposal systems, sufficient water supply, drainage for personal hygiene, clean restrooms, and other materials, enhance cleanliness levels that attract and motivate learners to excel academically (Kinder, 2013; Uwimana & Andala, 2020). Additionally, co-curricular infrastructures, such as theater and music rooms, enable learners to engage in various school activities, thereby enhancing their social, mental, emotional, and physical development (Nganga, 2003; Uwimana & Andala, 2020). In the 21st century, infrastructure must prioritize the enhancement of elements that foster educational development, including the creation of science laboratories, libraries, public spaces, and computer labs (Nugroho & Wibowo, 2020). The insufficient infrastructure provided by educational institutions and universities leads to further challenges concerning the employability of graduates (Bola & Dhanawade, 2017). Universities in Cameroon face a shortage of adequate infrastructural resources, which obstructs their capacity to elevate the quality of education available to students, consequently restricting their development of vital competencies for employability (Nyenty, 2023).

Educational infrastructures, such as school buildings, classrooms, libraries, technology, machinery, computer centers, tools, equipment, and laboratories, are essential elements of the learning environment within universities (Janssen, 2017). The

limitations in infrastructure and technology create considerable obstacles to curriculum development aimed at equipping students with the skills necessary for the 21st century, particularly in underdeveloped countries. Numerous educational institutions lack access to basic facilities like digital devices, internet connectivity, and sufficient learning spaces that are crucial for technology-enhanced education. Additionally, inadequate infrastructure presents a major barrier to the integration of technologies such as augmented reality, online learning, and artificial intelligence, which are vital for a modern curriculum (Kalayo, Aisan & Fathia, 2024).

4. Methodology

4.1 Participants

The participants in this study comprised 200 Higher National Diploma students from private higher professional institutions situated in the Mfoundi Division of the Centre Region in Cameroon. The sample size for these participants was determined using the Krejcie and Morgan (1970) sample size determination table. A simple random sampling method was utilized to select the participants from the overall population. The demographic characteristics of the participants are outlined in the table below:

Table 1: The demographic information of the respondents

Variables	Indicators	Frequency	Percentage
Gender	Male	48	24.0
	Female	152	76.0
Age range	20-30years	194	97.0
	31-40years	4	2.0
	41-50years	2	1.0
Department	Education	52	26.0
	Computer Engineering	22	11.0
	Custom Transit and Management	12	6.0
	Business and Finance	32	16.0
	Medicine and Biomedical Sciences	70	35.0
	Management	12	6.0

As indicated in Table 1 above, the research process included 48 male respondents (24.0%) and 152 female respondents (76.0%). A total of 194 participants were aged between 20 and 30 years (97.0%), while 4 respondents were aged between 31 and 40 years (2.0%), and 2 participants were aged between 41 and 50 years (1.0%). The selection of participants comprised 52 individuals from the Department of Education (26.0%), 22 from the Department of Computer Engineering (11.0%), 12 from Custom Transit and Management (6.0%), 32 from Business and Finance (16.0%), 70 from Medical and Biomedical Sciences (35.0%), and 12 participants (6.0%) from the Department of Management.

4.2 Material and Design

The research data were gathered from participants through a questionnaire within a descriptive survey research framework. The professional curriculum content was evaluated using a Curriculum Evaluation Questionnaire (Karacaoğlu, 2023). Innovative teaching methods and school infrastructure were examined through a questionnaire adapted from Apochi, Okpaje, Joseph (2022). The 21st-century skills were assessed using a questionnaire scale for 21st-century skills, which was adapted by Cevik and Senturk (2019) and categorized into four dimensions: the information and technological literacy dimension, the critical thinking and problem-solving dimension, the entrepreneurship and innovative skills dimension, and the leadership skills dimension. These tools were adopted and tailored to fit the research participants and the context. All instruments were designed using a four-point Likert scale format to evaluate students' responses for each relevant section (strongly agree =1, agree =2, disagree=3, strongly disagree =4).

The validity of the questionnaire's content and face was evaluated. Test-retest reliability was employed to assess the reliability of the research instrument. Initially, the questionnaire was administered to a cohort of 20 students, and after a two-week interval, the same questionnaire was re-administered to this group prior to its distribution to the sampled participants. The reliability was measured using Cronbach's alpha, yielding values of 0.81 for professional education and 0.72 for the development of students' 21st-century skills.

4.3 Analysis of Data

Version 27.0 of the Windows Statistical Package for Social Sciences (SPSS) was utilized for the analysis of data. In order to interpret the research data, several statistical tools were employed, including descriptive statistics, mean, standard deviation, Pearson product-moment correlation, and regression analysis, to evaluate the data and test the research hypotheses. The outcomes of the correlation and regression analyses were deemed statistically significant at a 95% confidence level ($p < 0.05$).

5. Findings

The verification of research hypotheses using Pearson correlation coefficient and multiple regression. We assessed the predictive nature of the development of 21st century skills from professional education.

Table 2: Correlation matrix between the study variables

		The 21st century skills	Innovative teaching methods	Curriculum content	School infrastructure
The 21st century skills	Pearson Correlation	1	.770**	.898**	.540**
	Sig. (2-tailed)		.000	.000	.000
	N	200	200	200	200
Innovative teaching methods	Pearson Correlation	.770**	1	.694**	.884**
	Sig. (2-tailed)	.000		.000	.000
	N	200	200	200	200
Curriculum content	Pearson Correlation	.898**	.694**	1	.559**
	Sig. (2-tailed)	.000	.000		.000
	N	200	200	200	200
School infrastructure	Pearson Correlation	.540**	.884**	.559**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	200	200	200	200

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

Table 2 displays the Pearson correlation matrix that investigates the relationships among innovative teaching methods, curriculum content, school infrastructure, and the development of 21st-century skills among HND students. The results reveal statistically significant positive correlations between 21st-century skills and innovative teaching methods ($r = .770$, $p < .001$), curriculum content ($r = .898$, $p < .001$), and school infrastructure ($r = .540$, $p < .001$). These findings suggest that students who report more favorable innovative teaching methods, curriculum content, and school infrastructure also tend to report higher levels of 21st-century skills. The strength of these associations is strong for innovative teaching methods and curriculum content, while it is moderate for school infrastructure.

The correlations among the independent variables were also statistically significant: innovative teaching methods exhibited a strong correlation with school infrastructure ($r = .884$, $p < .001$) and a moderate-to-strong correlation with curriculum content ($r = .694$, $p < .001$), whereas curriculum content showed a moderate correlation with school infrastructure ($r = .559$, $p < .001$). These intercorrelations imply that the predictors are interconnected and should be taken into account when interpreting the multiple regression results. In summary, the correlation findings lend support to the hypothesized associations between the three dimensions of professional education and 21st-century skills. However, they do not, on their own, establish causal relationships.

Table 3: Model summary of multiple regression analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.947 ^a	.897	.896	2.58007	.897	569.786	3	196	.000

a. Predictors: (Constant), School infrastructure, Curriculum content, Innovative teaching methods

A multiple linear regression analysis was performed to assess the degree to which innovative teaching methods, professional curriculum content, and school infrastructure predict the development of 21st-century skills. As shown in Table 3 above, the regression model exhibited a strong overall fit. The multiple correlation coefficient ($R = .947$) signifies a robust positive relationship between the combined predictor variables and the development of 21st-century skills. The coefficient of determination ($R^2 = .897$) reveals that 89.7% of the variance in students' 21st-century skills is jointly explained by innovative teaching methods, professional curriculum content, and school infrastructure. The adjusted R^2 of .896 indicates that, after accounting for the number of predictors in the model and the sample size, approximately 89.6% of the variance in 21st-century skills is still explained by the three predictors. The remaining 10.4% of the variance can be attributed to other factors not included in the model. The model was statistically significant, $F(3, 196) = 569.786$, $p < .001$, suggesting that the three predictor variables, when considered together, significantly predict the development of 21st-century skills among HND students. Consequently, the findings provide evidence that innovative teaching methods, professional curriculum content, and school infrastructure collectively contribute significantly to the development of 21st-century skills necessary for employability in professional higher education in Cameroon.

Table 4: ANOVA for the Multiple Regression Model Predicting 21st-Century Skills

Table 11.11.15: ANOVA for the Multiple Regression Model Predicting 21st Century Skills						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	11378.794	3	3792.931	569.786	.000 ^b
	Residual	1304.726	196	6.657		
	Total	12683.520	199			
a. Dependent Variable: The 21st century skills						
b. Predictors: (Constant), School infrastructure, Curriculum content, Innovative teaching methods						

The ANOVA results shown in Table 4 reveal that the overall multiple regression model is statistically significant; $F(3, 196) = 569.786$, $p < .001$. This finding indicates that the collective set of predictor variables: innovative teaching methods, professional curriculum content, and school infrastructure significantly forecasts the development of 21st-century skills. The regression sum of squares amounted to 11,378.794, in contrast to a residual sum of squares of 1,304.726, suggesting that a considerable portion of the variation in 21st-century skills is accounted for by the predictors included in the model. This conclusion aligns with the model summary in Table 3, where $R^2 = .897$, signifying that the three predictors collectively account for approximately 89.7% of the variance in

21st-century skills. Consequently, the overall regression model is statistically significant at the 0.05 level. The results provide evidence that professional curriculum content, innovative teaching methods, and school infrastructure collectively play a significant role in the development of 21st-century skills among HND students.

Table 5: Coefficients of the Multiple Regression Model Predicting 21st-Century Skills

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.593	1.181		4.734	<.000
	Innovative teaching methods	.563	.043	.742	12.959	<.000
	Curriculum content	1.312	.065	.652	20.215	<.000
	School infrastructure	-.601	.062	-.480	-9.652	<.000

a. Dependent variable = 21st-century skills. Predictors: innovative teaching methods, curriculum content, and school infrastructure

Table 5 presents the coefficients from the multiple regression model that examines the predictive relationships between innovative teaching methods, curriculum content, and school infrastructure in relation to 21st-century skills. The innovative teaching methods exhibited a positive and statistically significant coefficient ($B = 0.563$, $\beta = 0.742$, $t = 12.959$, $p < .001$), suggesting that, when controlling for the other predictors, a one-unit increase in innovative teaching methods corresponds to a 0.563-unit increase in 21st-century skills. Similarly, curriculum content demonstrated a positive and statistically significant association ($B = 1.312$, $\beta = 0.652$, $t = 20.215$, $p < .001$), indicating that a one-unit increase in curriculum content is linked to a 1.312-unit increase in 21st-century skills, while controlling for the other variables. Conversely, school infrastructure presented a negative and statistically significant coefficient ($B = -0.601$, $\beta = -0.480$, $t = -9.652$, $p < .001$), indicating that, after accounting for innovative teaching methods and curriculum content, a one-unit increase in the infrastructure score is associated with a 0.601-unit decrease in 21st-century skills. In summary, innovative teaching methods and curriculum content serve as positive predictors, whereas school infrastructure reveals a negative conditional relationship with 21st-century skills.

6. Discussion

The research investigated the crucial relationship between professional education and the cultivation of 21st century skills necessary for the employment prospects of HND graduates in higher education. The results revealed a significant positive correlation between the curriculum content and the enhancement of 21st century skills for job opportunities. The material provided to HND graduates hampers the development of essential skills such as leadership, information literacy, problem-solving, communication, and collaboration, which are vital for employment. If the curriculum content lacks clarity, comprehensibility, and organization, and if the students'

perspectives on the objectives, content, and structure of the curriculum are not considered, HND graduates may emerge with inadequate 21st century skills for career advancement.

When the subject matter is irrelevant, graduates are less likely to develop the necessary 21st century skills and competencies that facilitate employability and smooth integration into the workforce. A curriculum that is overly theoretical, primarily focused on cognitive assessments, and created without the involvement of all stakeholders and employers, fails to foster creativity and innovation, resulting in graduates who encounter difficulties in securing employment and becoming entrepreneurs following their professional training.

The research conducted by Nyenty (2023) confirms that the curriculum content of degree programs at state universities in Cameroon has a significant, positive, and very strong impact on the acquisition of employability skills by graduates. Additionally, this research is corroborated by Baradei and Kadry (2022), who conducted a study on bridging the employability skills gap in Higher Education. Stakeholders indicated that the existing curricula are not aligned with the labor market, as educational institutions fail to keep up with developments in the labor market. The curricula primarily emphasize technical skills and do not adequately address other essential skills, such as language and personal skills, which university students often lack.

The research also identified a notable positive correlation between innovative teaching techniques and the enhancement of 21st-century skills relevant to employment prospects for HND graduates. The contemporary teaching strategies utilized by course instructors to convey information and foster student interactions hinder the development of 21st-century skills among HND students. The study revealed that innovative teaching approaches, including collaborative teaching, discovery methods, inquiry-based learning, field trips, group discussions, personalized learning, computer-assisted instruction, project-based learning, problem-solving techniques, flipped classrooms, multimedia methods, and virtual science experiences, are not effectively executed by course instructors, which diminishes the acquisition of employability skills necessary for the 21st century.

This research corroborated by Jacobsen (2001) indicates that numerous contemporary technological tools can facilitate various skills such as critical thinking, problem-solving, and collaborative learning. Joyce et al. (2009) supported the notion that students who engage in problem-based learning tend to increase their participation in class activities and improve their critical thinking abilities. The cognitive skills and creative ideas of students can be nurtured through ICT teaching, professional development, online interactions before, during, and after class, self-directed learning, demonstrations, videos, group discussions, effective communication of skills, problem-solving instruction, utilization of digital tools and reusable learning objects, critical thinking and analysis, essential qualities, an interactive approach, activity-based learning, experimental class design methods, project-based teaching, smart board classrooms, and research-informed teaching and learning, as well as understanding the

best special practices and resources for learning and teaching in the classroom (Saidu; Ekpoki & Dukku, 2021).

The research also identified a notable positive correlation between school infrastructure and the enhancement of 21st-century skills necessary for the employment prospects of HND graduates. The investigation noted that there is a lack of adequate school infrastructural facilities, such as lecture halls, sufficient seating for instructors and students, health services, as well as well-equipped libraries and multimedia rooms, which hinder the development of 21st-century skills for job opportunities.

The educational environment and infrastructure form the foundation of the outcomes that educators aspire to achieve as the ultimate objective in their profession: performance, student achievement in school, and success in daily life (Yangambi, 2023). The resources related to school infrastructure have a significant, positive, and very strong influence on graduates' acquisition of skills for employability in higher education (Nyenty, 2023). The research also validated findings by Tezera and Yadesa (2017), indicating that material resources significantly impact the quality of training provided to graduates in educational institutions. There is compelling evidence that insufficient high school infrastructure contributes to the development of 21st-century skills for the employment opportunities of HND graduates.

7. Conclusion

The professionalization of education and the integration of graduates into the job market have led to an increased demand for higher skill levels relevant to the 21st century across various occupations. Cameroon, aiming to transition towards a knowledge-based economy, faces the challenge of implementing reforms in the curriculum of Higher National Diplomas to enhance the quality of education and training through modifications in content, teaching methods, and infrastructure. Effective learning and the intention to enhance employability must be underpinned by educational approaches to learning, teaching, and assessment that align with curricular goals and the requirements of the job market.

The curriculum for the 21st century ought to incorporate critical thinking, knowledge acquisition, media literacy, innovation skills, Information and Communication Technology (ICT) proficiency, and practical experiences within the framework of core academic subjects. It should emphasize knowledge construction and motivate students to generate meaningful information, thereby equipping them with the essential skills for the job market. Furthermore, the curriculum's development should prioritize connections to the real world, fostering student motivation, engagement, and comprehension of academic subjects, while also preparing them for their future adult lives.

Higher education institutions that provide Higher National Diploma programs must collaborate closely with various stakeholders, including employers, parents, and educators from advanced societies that benefit significantly from their university

education systems. These systems are designed to cultivate 21st-century skills that enhance graduates' employability. There is a need for policy adjustments and collaboration among higher education institutions, stakeholders, government entities, innovative technologies, and the adoption of a comprehensive modern approach to curriculum development that aligns with the demands of the 21st century. This curriculum should ensure that students acquire critical thinking, collaboration, and digital literacy skills essential for the job market. Engaging HND students in practical activities provides them with the opportunity to apply their classroom knowledge in real-world situations, thereby equipping them with the entrepreneurial skills necessary for life after graduation.

Private professional higher education institutions ought to furnish their facilities with contemporary and virtual libraries, flipped classrooms, internet access, project-based teaching methodologies, as well as modern laboratories and equipment suitable for the 21st-century classroom. Furthermore, these institutions should be adequately supplied with sufficient classrooms, appropriate furniture, well-equipped laboratories, and health amenities such as sports facilities, restrooms, and playgrounds. The HND programs should not solely concentrate on standardized testing; rather, they should incorporate aspects of skills development, including social empathy, decision-making, and problem-solving. It is essential for the government and private higher education institutions to collaborate and implement inclusive, innovative policies aimed at enhancing the curricula for HND students.

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Conflict of Interest Statement

The author declares no conflicts of interest.

About the Author(s)

Kenneth Yuomeyse holds a PhD in Curriculum and Evaluation, with specialization in Evaluation and Docimology. He is a Lecturer at the Faculty of Education, University of Yaoundé 1, Cameroon.

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