The Quality of Multimedia Based Pedagogy Program Evaluation and Students' Professional Development in Higher Education Institutions in Cameroon: A Quantitative Perspective

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Abstract*: This study quantitatively examine the relationship between the quality of some multimedia based pedagogy variables and their influence on students' professional development of 3rd year higher education students in Cameroon, from the perspective of academic, pedagogic, didactic, and technical qualities. The popularity multimedia has gained in higher education and the need to enlighten institutions on the qualities to be taken into consideration in its exploitation for students' professional development was a motivating force behind the study. Therefore, a survey was developed and a questionnaire was used for data collection; four institutions with professional orientation and 439 students in the 3rd year of their respective degree programs were used as the sample. Data collected was analysed with respect to hypotheses using mean, standard deviation, and Pearson correlation. Findings revealed that the quality of multimedia based pedagogy significantly influence students' professional development at a significant level of 0.01 (2-tailed). From these findings, recommendations have been made to institutions and stake holders on supporting and improving the quality multimedia technology in the instructional and learning processes, and in the entire educational system.*

Key words: *Evaluation, multimedia based pedagogy, quality, and professional development.*

I. Introduction

Cameroon has gone through a series of university to higher education reforms especially in the years 1961, 1993, and 2001. The country has 8th state universities, a series of specialize institutions, and a good number of private higher education institutions. Technological and professional development wise, the Cameroonian higher has been consistent in its move to improve these components to meet up with the modern educational trends and evolutions. According to Tambo (2012) key actors in curriculum implementation are instructors (teachers/lecturers) and their qualification, and materials resources used evolve around instructional and learning materials of which multimedia in this digital age is a key element. These are the determinants of quality education output. Fouda Ndjodo et al. (2016) considers Information and Communication Technology (ICT) of which multimedia is an important element, as a factor catalysts for quality development in Cameroon. These qualities have to first manifest in multimedia (ICT) as instructional tool for students' (human) development. Examining quality in education Bernard (1999) in United Nations Children's Fund (2000) focuses the strengthening of students capacities through knowledge, skills exploitation, positive attitudes which culminates in creativity and independence. Quality in education creates a sense of safety and security, production academic and professional interactions.

According to Ngamo and Karsenti (2007) the integration of ICT (multimedia) into the pedagogic system in the context of Cameroon has greatly evolved the teaching and learning processes in the educational system. Also, Mballa Zé et al. (2019) make it very clear that relationships in dissertation management in terms of educational quality is meant to create opportunities and conditions for students' personal and professional development. Quality of program evaluation is very important to an educational system and most important to the higher education sector. That is why section three (3) of law N° 005 of 16 April 2001 introducing reforms in the Cameroonian higher education system focuses on evaluations of programs and systems (law N° 005 of 16 April 2001). This has as purpose to improve in the quality of higher education programs and system in general. Also Len-Kibinkiri (2018) presents a series of communication techniques that could be used by lecturers in the

instruction and learning process to ensure quality participation of students in all the activities contained in the curriculum. This concept is reinforced by Andrew (2011) who holds that the quality of students' engagement also determines the quality of retentions, mastery, attitude, attention span, task duration, and basic skills (reading and writing, communication, interaction, critical thinking, creativity).

Furthermore, Chiafie (2011) holds that institutions, government, and international organisations have invested a lot of resources in Information and Communication Technologies (ICTs) of which multimedia is a key component in the instruction and learning process. They emphasise its quality use in the instruction and learning process, as well as its integration into the educational system and the society as contemporary quality development tool. Also, Billa and Makoge (2019) hold that curriculum is the only roadmap to attain or achieve quality exceptional levels as well as dimensions in educational, socio-cultural, political, economic and development; and this is being facilitated today through quality Multimedia Based pedagogy. This study examines the academic, pedagogic, didactic, and technical qualities of multimedia based pedagogy and their impact on students' professional development.

II. Conceptual Background

1.1. Academic Quality

In higher education in particular and educational institutions in general the instrument used to establish existence or non-existence of quality and its level is evaluation. Evaluation in higher education in recent times is aim at bringing out limitations so as to foster amelioration by implementing corrective measures. These corrective measures improve quality of program planning, and implementation, why not evaluation itself. Yarmohammadiana et al. (2011) hold that in education; evaluation is the key to determining higher education academic quality. Through data collection, analysis, and interpretation valuable information is provided on the efficiency, efficacy and pedagogic level of academic program implementation.

1.2. Pedagogical Quality

Onguene Essono (2008) investigated the role of multimedia resources in the Cameroonian educational system. He affirm that the creation of multimedia resource centres in both public and private structures, high schools and higher education institutions as well as universities contribute greatly to the pedagogic quality in these institutions. Experience and science has proven that higher education has higher chances of providing efficient and effective services to local and international communities when the pedagogic quality is constantly being improved upon (Weber , 2003; Yarmohammadian ,2004; in Yarmohammadiana et al. (2011). Furthermore, the various methods, strategies, techniques, and styles used in a higher education institution to develop knowledge and skills determine their quality which in return determine the quality of services graduates will offer for societal development

1.3. Didactic Quality

Didactic quality has as determinants methods, techniques, strategies and instructional didactic aids. Koper (2000) in Padrón et al. (2005) affirm that didactic tools (materials) represent all types and kind of aids that facilitate educational actors especially instructors in achieving planned objectives in the teaching and learning process. He further examines two types of didactic aids, instructional and learning didactic aids. According to Hummel et al. (2004) in Padrón et al. (2005) the advent of modern technologies has created numerous opportunities that facilitate integration of instruction and learning into all aspects of an individual's daily life, as well as it improve globalization of quality education. It has also greatly promoted life-long learning through the availability of higher didactic quality.

1.4. Technical quality

According Rengkung et al. (2017) technical quality is perception a client develop as a result of service interaction and results obtain from the service process. With respect to multimedia based pedagogy technical quality therefore, refers to the perception of the clients (students) or an assessment based response to the multimedia based teaching method rendered by an institution and the higher education system in general. It focuses students' professionalism through multimedia based instruction, taking into consideration from the perspectives of design, browsing, and technological ingenuity. Also, physical resources available, teachers' professionalism and skills, and the operational system exploited to meet students' academic, pedagogic, and didactic needs (Tjiptono, 2014 in Rengkung et al., 2017).

III.   Theoretical Framework

This work is guided by a number of theories and models. The work relates with Richard E. Mayer's Cognitive theory of multimedia learning. Mayer (2003) affirm that the goal of multimedia learning is promoting comprehension in learners through combining sounds (words) and visuals (pictures, text and images), respecting nature and human learning chronology. Also, there is ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model. According to McGriff, (2000) ADDIE model has as focal point of interest and approach that is systematically instructional design which is structured carry out Analysis, Design, Development, Implementation, and Evaluation of instructional and learning activities and materials. It is leaner-centred and takes into consideration learners' needs analysis. Furthermore, Daniel Stufflebeam CIPP (Context, Input, Process, and Product) Evaluation model, Stufflebeam and Shinkfield (2007) affirm the focus of CIPP evaluation is on improving programs both educational and non- related educational programs, and not just examining programs mode or functioning. Four level Kirkpatrick's evaluation model; Wang (2009) gives more insight to Kirkpatrick's model from the perspective of recognition and training programs evaluations, due to its focus on learning, behaviour, reaction, and results. And Albert Bandura's Social learning theory, which Borko (2004) in Watson (2013) related Bandura's theory closely with professional development because of its cognitive and social learning elements and components, that changes knowledge, beliefs, and bring about participation for professional development.

A series of research works have focus on ICTs in the professional development process in higher education in Cameroon. However, there has little exposed on evaluating qualities of multimedia based pedagogy. To guide the study, research hypotheses were formulated as follows:

1.5. General Research Hypothesis

The quality of multimedia based pedagogy program has a significant influence on students' professional development.

1.6. Specific Research Hypothesis

1. The academic quality of multimedia based pedagogy program has a significant influence on students' professional development.
2. The pedagogical quality of multimedia based pedagogy program has a significant influence on students' professional development.
3. The didactic quality of multimedia based pedagogy program has a significant influence on students' professional development.
4. The technical quality of multimedia based pedagogy program has a significant influence on students' professional development.

III.   Research Methodology

This study was carried out in four (4) higher education professional oriented institutions in the Republic of Cameroon. Cameroon is constituted by ten regions (Adamawa, Centre, East, Far North, Littoral, North West, South, South West, and West). These ten regions are further administratively partition into Divisions and these Divisions Subdivisions. Cameroon has eight (8) full-fledged universities and a series of specialized institutions, while private institutions of higher learning are in their hundreds. The researcher used the survey research design to investigate the phenomenon under study. Therefore, a representation sample was use to facilitate inferences as well as generalizations to the population under study, and also the collection of quantitative data. To obtain the target population, probability sampling technique type of the simple random sampling (SRS) was used. The researchers used observation and collective judgment to select the level that were considered would provide data needed for the studies due to their knowledge and prior experiences with multimedia quality and professional training. From this perspective the 3rd year students were chosen.

Cluster sampling technique was exploited to obtain the four target institutions. Therefore, regions and their respective state higher education institutions were considered as clusters. The names of the respective regions and institutions were written on pieces of papers and folded while being put into a container. These folded pieces of papers were shuffled and four blindly hand-picked, then unfolded and recorded respectively. Department Curriculum Studies and Teaching in the Faculty of Education, University of Buea, Department of

Communication and Development Studies, Faculty of Arts, University of Bamenda, Faculty of Petroleum industries and Mines (Faculté des Mines et des Industries Pétrolières avec les Départements d'Economie, Gestion et Législation Minière Pétrolière et Gazière (EGLM), Génie Mécanique Pétrolier et Gazière (GMPG), Ingénierie Minière et Traitement Des Minières (IMTM), Exploration Minière et Pétrolière et des Ressources en Eaux (XMPE), Sécurité et qualité de l'Environnement (SQE), Raffinage et Pétrochimie (RPC)), and ICT University Campus Cameroon, Yaounde were picked. From four regions (Centre, Extreme North, North West and South West) were therefore selected. It is important to note that this procedure provided equal chance to each region as well as institution to be selected for the study. The number students selected from the third year level in each institution to the required calculated sample size with the help of an Online Sample size calculator in www.surveymonkey.com . The researchers then employed simple random sampling to arrive at a1619 respondents (students), confidence level (%) of 95, and a margin of error (%) of 4. This gave a total sample size of 439 sample size. This sample size was made up of 27% (121) of male, 56% (245) of female, and 17% (73) undeclared.

Table 1: Sample population according to schools and regions

REGION	INSTITUTION	SAMPLE
Centre	ICT University Campus, Yaounde, Cameroon	67
Extreme North	Petroleum Industries and Mines, Kaele (University of Maroua)	97
North West	Communication and Development Studies (FA, UBA)	30
South West	Curriculum studies and teaching (FE, UB)	245
Total		439

A questionnaire concisely constructed respecting variables under study was used as the instrument for data collection. It was made up of four (4) sections (A, B, C, and D) designed to investigate "The potential relationship between the quality of multimedia based pedagogy and students professional development in Cameroon". Demographic information such as institution, region of origin, gender, age were requested in section A; measurement of respondents experiences on the quality of multimedia based pedagogy and students' professional development was contained in sections B, C, and D. Likert scale questions with four graduation was used, 4 for Strongly Agree, 3 for Agree, 2 for Disagree, and 1 for Strongly Disagree. Section B focused on academic quality of multimedia based pedagogy, section C examined pedagogical quality of multimedia based pedagogy, section D examined didactic quality of multimedia based pedagogy, section E examined technical quality of multimedia based pedagogy, and section F was designed to assess respondents' experiences on how students' professional development is affected by the quality of multimedia based pedagogy. Pearson correlation, mean, and standard deviation were used to analyse the 4 hypotheses.

IV. Presentation of Findings and Discussions

1.7. Research Hypothesis 1: The academic quality of multimedia based pedagogy program has a significant influence on students' professional development (SPD).

RH1 (the first hypothesis) suggest that academic quality of multimedia based pedagogy program has a significant influence on students' professional development. The correlation between academic quality and students' professional development show from the results in table 2 that, academic quality of multimedia based pedagogy program has a significant influence on students' professional development.

Table 2: Correlation between academic quality and students' professional development

			1	2
1	Academic quality	Pearson Correlation	1	0.431[**]
		Sig. (2tailed)		0.000
		N	439	439
2	SPD	Pearson Correlation	0.431[**]	1
		Sig. (2tailed)	0.000	
		N	439	

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

Table 2 presents Pearson correlation for academic quality of multimedia based pedagogy and students' professional development, which resulted in a coefficient of 0.43. Significance stood at 0.00, indicating a significance level of 0.01 (2-tailed). N represents the total number of respondents (students). To obtain coefficient of determination (r^2), given that Pearson correlation coefficient stands at 0.43, $(0.43)^2 = 0.19$.

Multiplied by a hundred (100), the result is 19.00. This 19% variance value indicates that, 19% of the variance in the dependent variable has as cause the independent variable. Therefore, 19% of the variance in students' professional development is explained by academic quality of multimedia based pedagogy. This case is a two tailed significance and correlation is bidirectional. This therefore means that 19% of the variance in academic quality of multimedia based pedagogy is influenced by students' professional development.

1.8. Research Hypothesis 2: The pedagogical quality of multimedia based pedagogy program has a significant influence on students' professional development.

Table 3: Correlation between pedagogical quality and students' professional development

			1	2
1	Pedagical quality	Pearson Correlation	1	0.339[**]
		Sig. (2tailed)		0.000
		N	439	439
2	SPD	Pearson Correlation	0.339[**]	1
		Sig. (2tailed)	0.000	
		N	439	

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

Table 3 presents Pearson correlation for pedagogic quality of multimedia based pedagogy and students' professional development, which resulted in a coefficient of 0.34. Significance stood at 0.00, indicating a significance level of 0.01 (2-tailed). N represents the total number of respondents (students). To obtain coefficient of determination (r^2), given that Pearson correlation coefficient stands at 0.34, $(0.34)^2 = 0.12$. Multiplied by a hundred (100), the result is 12.00. This 12% variance value indicates that, 12% of the variance in the dependent variable has as cause the independent variable. Therefore, 12% of the variance in students' professional development is explained by pedagogic quality of multimedia based pedagogy. This case is a two tailed significance and correlation is bidirectional. This therefore means that 12% of the variance in pedagogic quality of multimedia based pedagogy is influenced by students' professional development. Therefore, hypothesis 2 is confirmed.

1.9. Research Hypothesis 3: The didactic quality of multimedia based pedagogy program has a significant influence on students' professional development.

RH3 suggest that didactic quality of multimedia based pedagogy program has a significant influence on students' professional development. The correlation between didactic quality and students' professional development show from the results in table 4 that, didactic quality of multimedia based pedagogy program has a significant influence on students' professional development.

Table 4: Correlation between didactic quality and students' professional development

			1	2
1	Didactic quality	Pearson Correlation	1	0.288[**]
		Sig. (2tailed)		0.000
		N	439	439
2	SPD	Pearson Correlation	0.288[**]	1
		Sig. (2tailed)	0.000	
		N	439	

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

Table 4 presents Pearson correlation for didactic quality and students' professional development, which resulted in a coefficient of 0.29. Significance stood at 0.00, indicating a significance level of 0.01 (2-tailed). N represents the total number of respondents (students). Coefficient of determination (r^2) with Pearson correlation coefficient being 0.29, resulted in 08.00. This 8% variance value shows that, 8% of the variance in the dependent variable has as cause the independent variable. Therefore, 8% of the variance in students' professional development is explained by didactic quality of multimedia based pedagogy. This case is a two tailed significance and correlation is bidirectional. This therefore means that 8% of the variance in didactic quality of multimedia based pedagogy is influenced by students' professional development.

1.10. **Research Hypothesis 4: The technical quality of multimedia based pedagogy program has a significant influence on students' professional development.**

Table 5: Correlation between technical quality and students' professional development

			1	2
1	Pedagical quality	Pearson Correlation	1	0.283**
		Sig. (2tailed)		0.000
		N	439	439
2	SPD	Pearson Correlation	0.283**	1
		Sig. (2tailed)	0.000	
		N	439	

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

Table 5 presents Pearson correlation for didactic quality and students' professional development, which resulted in a coefficient of 0.28. Significance stood at 0.00, indicating a significance level of 0.01 (2-tailed). N represents the total number of respondents (students). Coefficient of determination (r^2) with Pearson correlation coefficient being 0.28, resulted in 08.00. This 8% variance value shows that, 8% of the variance in the dependent variable has as cause the independent variable. Therefore, 8% of the variance in students' professional development is explained by technical quality of multimedia based pedagogy. This case is a two tailed significance and correlation is bidirectional. This therefore means that 8% of the variance in technical quality of multimedia based pedagogy is influenced by students' professional development. Therefore, hypothesis 4 is confirmed.

1.11. **Summary presentation of the mean(s) and standard deviation of the statistics on qualities Descriptive Statistics**

Table 6: Summary presentation of the mean(s) and standard deviation

		Mean	Std. Deviation	N
1	Academic Qualiy	16.42	.872	439
2	Pedagogic Quality	15.96	.976	439
3	Didactic Quality	15.97	.900	439
4	Technical Quality	16.01	.973	439
5	SPD	16.09	1.058	439

Table 6 presents the summary of means, academic quality stands at 16.42, pedagogic quality at 15.96, while didactic quality is 15.97 and that of technical quality of multimedia based pedagogy stands at 16.01 against 16.09 for responses on students' professional development for all the 439 respondents. The standard deviation for academic quality is 0.9 for, while that of pedagogic quality is 0.98, 0.90 for didactic quality, and that of technical quality stands at 0.93, against 1.06 for students' professional development. This shows that most of the scores were closer to the mean.

1.12. **Summary of all the correlations from respondents**

Table 7: Summary of all the correlations from respondents

		Pearson Correlation	Sig. (2tailed)	N	Students Grades
1	Academic Qualiy	0.431**	0.000	439	0.431**
2	Pedagogic Quality	0.339**	0.000	439	0.339**
3	Didactic Quality	0.288**	0.000	439	0.288**
4	Technical Quality	0.283**	0.000	439	0.283**

The summary of Pearson correlation for academic quality, pedagogic quality, didactic quality, and technical quality and students' professional development is presented on table 7; a coefficient of 0.43, 0.34, 0.29, and 0.28 with significance levels of all at 0.00 respectively. This shows significance levels of 0.01 (2-tailed) for all the variables. N represents the total number of respondents (students). Coefficient of determination (r^2) was gotten at 0.19 for academic quality, 0.12 pedagogic quality, and o.08 for both didactic quality and

technical. The 19% variance value show that 19% of the variance in the dependent variable of students' professional development has as a cause the independent variables of academic quality, as well as 12% for pedagogic quality, while didactic and a technical quality is at 8%. Therefore, 19% of the variance in students' professional development is explained by academic quality, 12% by pedagogic quality, and while 8% of the variance in students' professional development is explained by didactic and technical qualities. These cases are two tailed significance and correlation is bidirectional. These therefore explain that 29% of the variance in academic, 12% in pedagogic quality, and 08% of the variance in didactic and technical qualities are influenced by students' professional development.

Therefore, it can objectively be concluded that, there exist a significant relationship between the academic, pedagogic, didactic, and technical qualities of multimedia based pedagogy program and students' professional development. With this, main hypothesis is confirmed.

V. Conclusion And Recommendation

One of the goals of program evaluation is to assess strengths and weaknesses of a program, seek and recommend ways of improving the quality and standards of educational programs in particular and programs in general. Curriculum and program implementation in contemporary times are being facilitated by technology of which multimedia technology is a key component. The introduction and implantation of the use of multimedia technology in the instruction and learning processes in the Cameroonian higher education system was meant to improve quality and standards of curriculum and program implementation, through efficacy and efficiency. This explain why Richey (2008) view the effective use of technology in education as a concept that brings together diverse tools, machines, media (multimedia), networking hardware and above all efficacy in their usage to improve on quality. Therefore, the quality of technology used in education should be constantly evaluated alongside educational variables to ensure improvement in quality and standard. This why individuals, educational institutions, the educational community, and governments should hugely invest in educational technologies, equip students and staff, lecture halls and classrooms with modern technological tools; get quality evaluation specialist to determine the quality value of these technologies on the instruction and learning process so as to improve both technological and educational (student development) quality and standards. If not individual, institution, educational community and public investments will be wasted and results will be negative students' professional development, poor quality and substandard educational system.

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