



Influence of Chemistry Teachers' Educational Qualification and Teaching Experience on Assessment Competency of Senior Secondary School Chemistry Students' Affective Domain

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Abstract:

The study examined the influence of chemistry teachers' educational qualification and teaching experience on assessment competency of senior secondary school chemistry students' affective domain. The study adopted descriptive survey research design and was guided by three research questions and two null hypotheses. Fifty-seven chemistry teachers in secondary schools managed by PPSMB in Enugu Education Zone were sampled using purposive sampling technique to select 46 chemistry teachers with specific qualifications and experience relevant to the study. A validated questionnaire titled Chemistry Teachers' Competency in Assessment of Affective Domain of Senior Secondary School Chemistry Students which yielded reliability indices of 0.83 with the Cronbach Alpha Statistics through face-to-face data collection method was employed. Research questions were answered using descriptive statistics while ANOVA was used to test the null hypotheses at a 0.05 level of significance. The study revealed that the level of chemistry teachers' competency in assessment of affective domain of chemistry students is low and influenced only by teachers' educational qualifications. The researchers recommended that Chemistry teachers should take proactive steps to enhance their assessment skills.

Keywords: Chemistry Teachers, Assessment, Competency, Affective Domain, Educational Qualification

Introduction

Chemistry is so much a part of our lives, sometimes we do not even notice it. It is a science subject that deals with the composition, properties, and uses of matter; it probes into the principles governing the changes that matter undergoes (Ababio, 2016). Chemistry is at the heart of cooking and eating, breathing and seeing, the clothes we wear and the materials we use to construct our environment, among others. A good knowledge of chemistry is a prerequisite for adequate learning of the science and technology-related courses in universities and other higher institutions of learning thereby providing various career opportunities for graduates of chemistry in the health and agricultural sectors as well as chemical-based industries (Okunuga and Ajeyalemi, 2018). However, amidst the relevance of chemistry, the performance of students in the West Africa Examination Council conducted Senior Secondary Certificate Examinations (SSCE) has been reported to be persistently poor. This

is indicated in the West African Examination Council (WAEC) Chief Examiner's report for 2019 – 2023.

The Chief Examiner's reports from 2019 to 2023 highlight fluctuations in candidates' performance in the WASSCE exams. In 2019, candidates performed better than in 2018 with a raw mean score of 40.00, although candidates still faced challenges with chemical equations and practical tasks. The trend of improvement continued in 2020, where candidates achieved a raw mean score of 54.00. However, in 2021, the performance significantly declined with a mean score of 18.00, and practical chemistry scores dropped to 11.00. In 2022, candidates performed better than in 2021, with a raw mean score of 45.00. Sadly, the performance declined further in 2023 as candidates had a mean score of 34.00. Candidates continued to struggle with experimental procedures, adherence to rubrics, and measurement accuracy as well as issues in following instructions, and chemical equations throughout these five years.

The poor and fluctuation in the performance of chemistry students in the examinations over the years have become the topic of discussion among stakeholders in chemistry education. Students' performance in chemistry has been an issue bothering the minds of individuals, stakeholders, government agencies, and society at large. Research has been conducted on how to enhance students' performance in chemistry yet the failure rate of students in chemistry continues to rise. The poor performance in chemistry can be attributed to various factors such as student-related issues, teacher-related factors, chemistry anxiety, large class sizes, government policies, lack of infrastructure, and ineffective instructional methods (Akinyemi, & Mavhunga, 2021). In the same view, Omorogbe and Ewansiha (2013) noted that the poor performance of students results from inappropriate teaching methodologies, lack of adequate knowledge of subject matter, competencies, skills, inadequate teacher training, and lack of in-service training and refresher courses, and lack of basic teaching-learning resources. Similarly, Sibomana, Karegeya, and Sentongo (2021) highlighted ineffective teaching strategies and limited cooperative learning opportunities as key contributors to poor performance.

It is observed that one key factor of students' poor performance in chemistry examination which is often neglected is the issue of assessment of all domains of behavioural outcomes of students. These domains are the cognitive, affective and psychomotor domains. Majority of teachers focus only on assessment of cognitive domain neglecting the affective and psychomotor domains. The above weaknesses which led to the students' poor performance in chemistry may be solved if students could be assessed holistically in these areas by the teachers. This will help teachers to identify these weaknesses in class during chemistry lessons and hence correct them adequately before writing the West African Senior School Certificate Examination (WASSCE). It is therefore of great importance to investigate if chemistry teachers have the professional abilities to assess holistically the students' learning domains.

Assessment is a powerful educational tool. According to Ekua (2016), assessment can be defined as all activities that teachers and students undertake to get information that can be used to influence the teaching and learning process. It is used to monitor the effectiveness of the system, evaluate education policies and programmes, make important instructional and placement decisions about students, and certify

students' learning outcomes (Ikenyiri, Ordua, & Ezechukwu, 2022). Operationally, assessment is the systematic process of gathering information from many sources to make appropriate educational decisions. The aims of assessment according to the National Policy on Education (FRN, 2013) indicate the importance of holistic assessment in education, encompassing the three domains of learning (cognitive, affective, and psychomotor) domains. According to Owan et al. (2022), the primary reason for teaching and learning is the modification and repositioning of students' cognitive, affective, and psychomotor skills at all levels of education. Research has shown that an adequate assessment of students' learning in schools must focus on these three crucial aspects of learning (Sönmez, 2017; Bitok, 2020; Noor et al., 2020). While assessment practices in chemistry education often prioritize cognitive aspects, the affective and psychomotor dimensions remain largely neglected. This narrow focus overlooks the crucial role of attitudes and values in shaping students' overall chemistry learning outcomes.

The Affective domain refers to learning objectives that emphasize a feeling tone, an emotion, or a degree of acceptance or rejection. The affective domain is most often referred to as the attitudes, interests, and values of students and the resulting behaviours associated with learning (Savickiene, 2010). Hoque (2016) noted that this domain includes how individuals deal with things emotionally, such as feelings, values, appreciation, enthusiasm, motivations, and attitudes. According to Rahayu (2015), the affective domain includes a host of psychological constructs and is often described as attitudes, values, beliefs, opinions, interests, and motivation.

The affective components of learning are not usually assessed by teachers. This negligence by chemistry teachers has made them overlook the important aspects of their student's learning experiences, leading to a less comprehensive understanding of their abilities and potential (Galloway, Malakpa & Bretz, 2016). The failure to measure the affective learning outcomes have negative effects on secondary school chemistry students, (Agustian et al., 2022) as it may make students develop negative attitudes towards chemistry. According to Udo (2016), negative attitudes towards chemistry can lead to a lack of motivation, disengagement from the subject, and lower academic performance. This is especially true for students who struggle with the subject or do not see its relevance to their lives. Studies have shown that students who have positive affective experiences in the

classroom are more likely to be engaged in their learning and achieve higher academic outcomes. The assessment of this learning outcome of chemistry is one of the responsibilities expected of a chemistry teacher who is otherwise known as the implementer of the chemistry curriculum.

A chemistry teacher is a teacher who specializes in the teaching of chemistry. (S)he is a qualified professional who has a good level of competency and mastery of Chemistry (Olanrewaju, 2018). A Chemistry teacher helps to achieve the purpose of teaching Chemistry in schools which is to enable students to develop their skills and knowledge in chemical science and project their efforts in education to be useful to themselves and society (Abbas, 2011). According to the American Chemical Society (ACS, 2018), a truly effective chemistry teacher embodies a unique blend of skills and qualities that ignite curiosity, foster critical thinking, and guide students on their journey of scientific exploration Chemistry teachers seem to pay little or no attention to affective assessment in their teaching.

This lack of attention in affective domain assessment could be a product of their incompetency in assessment of this domain of learning. Competency in teaching can be defined as the knowledge, skills, and attitudes necessary for effective teaching (Omar, Zahar, & Rashid, 2020). It involves not only having a thorough understanding of the subject matter but also being able to effectively communicate that knowledge to students in a way that is meaningful and engaging (Bereiter & Scardamalia, 2014). In addition, competent teachers create a positive learning environment that fosters engagement, motivation, and learning (Corno, 2015). The findings of Adikwu, Atamonokhai, and Fatoki (2018) indicated that the chemistry teacher's knowledge and skills were above average, but their attitude was below average. The knowledge and skills necessary for acquisition by teachers for effective assessment of students' affective components are influenced by several factors such as teachers' gender, experience, and educational qualification (Okpara, 2019).

Educational qualification is the academic and professional degrees acquired after professional training. These qualifications may include the National Certificate in Education (NCE), Ordinary National Diploma (OND), Higher National Diploma (HND), Bachelor of Science (B.Sc), Bachelor of Science in Education (B.Sc.(Ed.)), Postgraduate Diploma in Education (PGDE), Master of Education (M.Ed), and

above. Some of these qualifications can be regarded as teaching qualifications. Teaching qualifications are acquired by teachers to become registered teachers in primary, secondary, and tertiary institutions (Okpara, 2019). There are variations of findings on the influence of teachers' educational qualifications on their assessment skills. According to (Sabria and Ahmad, 2020; and Ademola et al., 2021), the educational qualification of teachers has no significant influence on their assessment literacy as indicated by the academic performance of students. On the contrary, (Etiubon and Benson, 2014; Harrison, 2016; Ajayi, 2017; Okeke and Iwara, 2020; and Obikezie and Abumchukwu, 2021) observed a significant influence of teacher qualification on the quality of chemistry education.

It is impossible to overlook teachers' experiences when it comes to teaching and learning. Teachers' personal experiences combined with professional training enable the achievement of successful teaching and learning that promote accurate assessment of students' learning outcomes. (Okpara, 2019). Experience, in the words of Harris and Sass (2010), is the professional development that an educator undergoes as a result of prolonged employment, on-the-job training, and other associated procedures. Okpara pointed out that instructors' "in-service training" broadens their expertise. Chemistry instructors with expertise in the classroom become used to the material and can accurately assess the affective and psychomotor domains of senior secondary school chemistry students. Teaching experience could influence teachers' assessment practices. The findings of (Okpara, 2019; Alonge, Olayinka, Francis, and Oluwakemi, 2020) indicated by students' performance showed that teaching experience is one of the factors that affects teachers' quality in secondary schools. Meanwhile, Sabria and Ahmad (2020), identified no significant difference in years of experience in teachers' assessment literacy.

From the foregoing it can be deduced that many chemistry teachers lack the necessary skills to effectively assess students' affective domain. Assessment of students' domains of learning have significant influence on students behaviour and contribute greatly to their performance in chemistry. Studies have shown that while teachers are generally competent in cognitive and a little of psychomotor assessments, they often fall short in assessing affective domain (Ira, 2017; Bright, Shani, Mark, & Emmanuel, 2022; & John-Mark, 2024). Previous researches (Innocent, 2023; Abyzbekova, et.al, 2023; and Obialor,

Ebelide, & Egbojiugha, 2024) have addressed related aspects such as the development of test construction skills, overall teaching competency, and specific competencies in some aspect of chemistry. However, these studies often do not delve into the specifics of affective assessment, particularly within the context of chemistry education. To address this gap, this study provided a detailed analysis of chemistry teachers' competencies in these areas. This involves examining how teachers' educational qualifications and teaching experience influence their ability to assess students' affective domain. Understanding these competencies is crucial for developing targeted professional development programs and assessment tools that can enhance teachers' skills in these areas.

The main purpose of this study was to examine how chemistry teachers' educational qualifications and teaching experience influence their competency in assessing the affective domain of senior secondary school chemistry students. Specifically, the researchers sought to determine the:

1. level of chemistry teachers' competency in assessing chemistry students' affective outcomes.
2. influence of educational qualification on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes.
3. influence of teaching experience on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes.

In line with the purposes of the study, the following are the research questions that guided the study:

1. What is the level of chemistry teachers' competency in assessing chemistry students' affective outcomes?
2. What is the influence of educational qualification on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes?
3. What is the influence of teaching experience on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes?

In line with the research questions, the following null hypotheses at 0.05 level of significance were put forward to guide the study:

HO₁. There is no significant influence of educational qualification on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes.

HO₂. There is no significant influence of teaching experience on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes.

Methods

Descriptive survey research design was adopted in carrying out this study. According to Nworgu (2015), survey research is one in which a group of people or items is studied by collecting and analyzing data from only a few people or items considered to be representative of the entire group. The population of the study comprised 57 chemistry teachers in government-owned secondary schools managed by the Enugu state Post Primary School Management Board (PPSMB). The study was carried in Enugu Education Zone (Enugu East, Enugu North, and Isi-Uzo Local Government Areas) because the area represents a diverse mix of urban and rural schools, providing a suitable context for examining variations in teachers' qualifications, experience, and assessment practices. A purposive sampling technique was employed to select 46 chemistry teachers across the three Local Government Areas within the Enugu Education Zone. The selection was guided by specific criteria: schools must offer senior secondary chemistry and have at least one qualified chemistry teacher with a minimum of two years of teaching experience. Accordingly, 21 teachers were selected from 6 schools in Enugu East, 18 teachers from 7 schools in Enugu North, and 7 teachers from 6 schools in Isi-Uzo. The variation in the number of teachers and schools across the LGAs reflects the actual distribution and availability of qualified chemistry teachers in each area, rather than an attempt to achieve numerical equality. The instrument for data collection was a questionnaire titled Chemistry Teachers' Competency in Assessment of Affective Domain of Senior Secondary School Chemistry Students Questionnaire (CTCAADSSSCSQ). The instrument was made-up of two sections, Section A and Section B. Section A captured the demographic information (educational qualification, and years of teaching experience) of the respondents while Section B sought information on chemistry teachers' competency in assessment of affective domain of senior secondary school chemistry students. Section B contained 15 items that describe chemistry teachers' competence to objectively assess students' affective outcomes during chemistry lessons. The questionnaire is a 4-point Likert scale of Very High (VH) = 4, High (H) = 3, Low (L) = 2, and Very Low (VL) = 1. The instrument was

subjected to face validity by two experts in the Measurement and Evaluation unit, and one expert in the Chemistry Education unit, all from the Department of Science Education, University of Nigeria, Nsukka. The reliability of the instrument was determined using Cronbach Alpha and reliability coefficients of 0.83. Cronbach Alpha was used because CTCAADSSSCSQ involved a polytomously scored items. Mean and

Standard deviation were used to answer all the research questions while Analysis of variance (ANOVA) was used to test the null hypotheses. The decision rule for the study is that mean scores: 1.00 – 1.49 stands for Very Low Competence (VLC), 1.50 – 2.49 stands for Low Competence (LC), 2.50 – 3.49 stands for High Competence (HC), and 3.50 – 4.00 stands for Very High Competence (VHC).

Results

Table 1: Mean and Standard Deviation of the mean rating of chemistry teachers' competency in assessing chemistry students' affective domain.

S/N	Affective Outcomes	Mean	SD	Remark
1	Capable of observing students' body language, facial expressions, and attention levels	2.28	0.93	LC
2	Capable of assessing students' participation in class discussions, group work, and laboratory activities.	2.20	0.91	LC
3	Being confident in reviewing students' assignments to assess their ability to apply what they have learned.	2.11	0.94	LC
4	Capable of observing students' attitudes toward chemistry	2.46	0.95	LC
5	Capable of assessing students' motivation to learn chemistry	2.22	0.98	LC
6	Skilled in gauging students' interest in chemistry by observing their participation in class activities and by asking them open-ended questions.	2.72	1.02	HC
7	Being able to inspire students' enthusiasm in chemistry lessons	2.43	0.95	LC
8	Being prepared to identify students' perceived barriers to developing effective study habits	2.54	1.01	HC
9	Proficient in observing their organizational skills in class and in the laboratory.	2.52	0.91	HC
10	Being comfortable with observing students' ability to manage their time effectively by looking at how they complete their assignments and how they participate in class activities	2.39	1.02	LC
11	Being able to work with students to set goals for themselves and to develop a plan for achieving those goals	2.41	0.97	LC
12	Capable of encouraging students to reflect on their learning and to identify their strengths and weaknesses	2.02	0.93	LC
13	Being skilled in observing students each other's work to provide feedback and to help each other learn.	2.46	0.95	LC
14	Being able to elicit students' interest in chemistry lessons	2.30	0.81	LC
15	Capable of assisting students to be honest and diligent in class activities	2.24	0.97	LC
Grand Mean		2.35	0.47	LC

Key: SD = Standard Deviation, LC = Low Competence, HC = High Competence.

The result in Table 1 shows that items 1, 2, 3, 4, 5, 7, 10, 11, 12, 13, and 14 had mean scores in the range of 1.50 – 2.49 which represents low competency. Only items 6, 8, and 9 had mean scores in the interval of 2.50 – 3.49 which represents high competency. Also,

the grand mean of 2.35 is in the range of 1.50 – 2.49 which represents low competency. This implies that the level of chemistry teachers' competency in assessing chemistry students' affective domain is low.

Table 2: Mean and Standard Deviation of the influence of educational qualification on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes.

Educational Qualifications	N	Mean	SD
NCE/OND	7	2.04	0.46
HND	2	2.30	0.14
B.Sc	18	2.23	0.46
B.Sc (Ed)	11	2.42	0.41
PGDE	3	2.66	0.43
M.Ed and Above	5	2.88	0.33

Key: SD = Standard Deviation, N = 46

The result in Table 2 above showed that the mean of chemistry teachers with NCE/OND = 2.04, HND = 2.30, B.Sc = 2.23, B.Sc (Ed) = 2.42, PGDE = 2.66, M.Ed and above = 2.88. This implies that teachers with M.Ed and above qualification are more competent in assessing chemistry students' affective outcomes

than those with NCE/OND, HND, B.Sc, B.Sc (Ed), and PGDE. However, the competency standard deviations of 0.41 indicate that Chemistry teachers with HND show less variability among other educational qualifications possessed by the teachers.

Table 3: ANOVA of the influence of educational qualification on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.640	5	.528	2.822	.028
Within Groups	7.483	40	.187		
Total	10.123	45			

The result in Table 3 above shows that the probability associated with an F-value of 2.822 is 0.028. Since the probability value is less than 0.05 level of significance, the null hypothesis was rejected. Hence,

the ANOVA table shows that that there is a statistically significant influence of educational qualification on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes.

Table 4: Post Hoc Test of the Comparison between the mean ratings of influence of educational qualification on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes.

(I) Educational Qualifications	(J) Educational Qualifications	Mean Difference (I-J)	Std. Error	Sig.	Dec.
NCE/OND	HND	-.25238	.34679	.977	NS
	B.Sc	-.18942	.19266	.921	NS
	B.Sc (Ed)	-.37662	.20912	.477	NS
	PGDE	-.61905	.29847	.321	NS
	M.Ed and Above	-.83238*	.25326	.024	S
HND	NCE/OND	.25238	.34679	.977	NS
	B.Sc	.06296	.32239	1.000	NS
	B.Sc (Ed)	-.12424	.33249	.999	NS
	PGDE	-.36667	.39484	.937	NS
	M.Ed and Above	-.58000	.36188	.602	NS
B.Sc	NCE/OND	.18942	.19266	.921	NS
	HND	-.06296	.32239	1.000	NS
	B.Sc (Ed)	-.18721	.16553	.866	NS
	PGDE	-.42963	.26973	.608	NS
	M.Ed and Above	-.64296	.21865	.057	NS
B.Sc (Ed)	NCE/OND	.37662	.20912	.477	NS
	HND	.12424	.33249	.999	NS

PGDE	B.Sc	.18721	.16553	.866	NS
	PGDE	-.24242	.28172	.954	NS
	M.Ed and Above	-.45576	.23329	.386	NS
	NCE/OND	.61905	.29847	.321	NS
	HND	.36667	.39484	.937	NS
M.Ed and Above	B.Sc	.42963	.26973	.608	NS
	B.Sc (Ed)	.24242	.28172	.954	NS
	M.Ed and Above	-.21333	.31587	.984	NS
	NCE/OND	.83238*	.25326	.024	S
	HND	.58000	.36188	.602	NS
	B.Sc	.64296	.21865	.057	NS
	B.Sc (Ed)	.45576	.23329	.386	NS
	PGDE	.21333	.31587	.984	NS

Key: NS = Not Significant, S = Significant.

The result in Table 4 above is a multiple comparison test of the difference in the mean ratings among NCE/OND, HND, B.Sc., B.Sc.(Ed), PDGE, and M.Ed and above on the influence of educational qualification on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes. The mean difference between NCE/OND and M.Ed and above is -0.83238 with an associated probability value of 0.024. The result showed that there is a significant difference between the mean ratings of Chemistry teachers with NCE/OND and M.Ed and above. This is because the associated probability of 0.024 is less than the 0.05 level of significance. Hence, the significant difference observed in hypothesis one (H_{01}) is between NCE/OND and M.Ed and above only for all the comparisons.

Table 5: Mean and Standard Deviation of the influence of years of teaching experience on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes

Years of Teaching Experience	N	Mean	SD
0-8 years	14	2.24	0.57
9-16 years	11	2.30	0.47
17-24 years	13	2.42	0.45
25 and above	8	2.50	0.32

Key: SD = Standard Deviation

The result in Table 5 shows that teaching experience of chemistry teachers had the following means: 0 – 8 years = 2.24; 6 – 16 years = 2.30; 17 – 24 years = 2.42; and 25 years and above = 2.50. This indicates that teachers with 25 years and above teaching experience ($\bar{X} = 2.50$, $SD = 0.32$) are more competent in assessing chemistry students' affective outcomes followed by 17 – 24 years, 9 – 16 years, and 0 – 8 years being the least among the group. However, the standard deviation of 0.32 indicates that Chemistry teachers with 25 years and above of teaching experience show less variability among other teachers.

Table 6: ANOVA on the influence of teaching experience on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes.

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.439	3	.146	.634	.597
Within Groups	9.685	42	.231		
Total	10.123	45			

The result of Table 6 above shows that the probability associated with an F-value of 0.624 is 0.597. Since the probability value is greater than the 0.05 level of significance, the null hypothesis was not rejected. Hence, the ANOVA table above indicates that there is no statistically significant influence of teaching experience on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes.

Discussion

The result of this study revealed that Chemistry teachers' level of competency in assessing affective domain of the senior secondary chemistry students is low. This revelation could be that teachers may not have received adequate training specifically aimed at assessing students' affective outcomes. Hence, they may therefore be less familiar or comfortable with methods and tools to assess this domain of learning. The result agrees with (Okpara, 2019) who observed that mathematics teachers do not possess the competency to objectively evaluate students' affective areas during mathematics lessons. The result also disagrees with (Copriady, 2014; Adikwu, Atamonokhai, and Fatoki, 2018) whose findings showed a moderate level of competency of teachers in all aspects of designing, planning, implementing, and evaluation of practical training. The findings of this study also in agreement with (Eya, Attah and Umate, 2020) who observed that chemistry teachers do not have the competence to evaluate chemistry practical at the levels of affective domain. Hence, this study revealed empirically that the level of Chemistry teachers' level of competency in assessing affective domain of the senior secondary chemistry students is low.

In addition, the findings of the study showed that there is a significant influence of educational qualification on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes. This result is obtained because higher educational qualifications could correlate with a deeper understanding of pedagogical strategies and theories. This result is in line with (Okeke and Iwara, 2020; Obikezie and Abumchukwu, 2021) who observed that that there was a significant influence of teacher qualification on the quality of chemistry education. The result is in agreement with the findings of Okpara (2019) that revealed a significant influence of qualification on Mathematics teachers' competency to objectively evaluate the students' affective component in SS II Mathematics curriculum during lessons.

Meanwhile, the result of the findings is in disagreement with (Sabria and Ahmad, 2020) who noted that there is no significant difference of educational qualification on teachers' assessment literacy.

Finally, the findings of the study showed that there is no significant influence of teaching experience on the level of chemistry teachers' competency in assessing chemistry students' affective outcomes. The result shown above is because assessing affective outcomes is inherently different from assessing cognitive or psychomotor outcomes. It requires sensitivity to subtle cues, an understanding of student psychology, and often, a qualitative approach rather than a quantitative one. Experienced teachers might not automatically be skilled in these areas unless they have specifically trained or shown interest in them. The findings of the study disagree with (Okpara, 2019; Alonge, Olayinka, Francis, and Oluwakemi, 2020) who found that teachers' teaching experience was significant with students' learning outcomes as measured by their performance in the SSC examinations. However, the result of the findings is in agreement with (Sabria and Ahmad, 2020) who noted that there is no significant difference of years of experience on teachers' assessment literacy.

Conclusion

This study has highlighted the level of chemistry teachers' competency in assessing the affective domain of senior secondary school students. The findings reveal that many chemistry teachers in the Enugu Education Zone lack the necessary skills for effective assessment in this domain. Furthermore, the study shows that educational qualifications significantly influence teachers' assessment competencies, whereas teaching experience does not appear to have a notable impact.

Recommendations

Based on the findings of the study the following recommendations are made:

1. Chemistry teachers should take proactive steps to enhance assessment skills through self-directed learning, participation in workshops, and ongoing professional development opportunities.
2. Chemistry teachers should collaborate with their colleague to educate each other on holistic assessment practices

3. Chemistry teachers should regularly reflect on assessment practices to identify strengths, weaknesses, and areas for improvement.
4. The government should establish clear standards and guidelines for teacher training programs that prioritize the development of assessment competencies, particularly in assessing students' affective outcome.
5. Educational institutions should ensure that chemistry teachers have access to relevant assessment tools, rubrics, and guidelines to support their evaluation of affective outcome

Reference

- Ababio, O. Y. (2016). *New School Chemistry for Senior Secondary Schools*. Onitsha: Africana First Publishers PLC.
- Abbas, A. B. (2011). Achieving National economic empowerment and development strategy through chemistry. *Proceedings of the Science Teachers Association of Nigeria*.
- Abyzbekova, G., Zholdasbayeva, Z., Tapalova, A., Yespenbetova, S., Balykbayeva, G., & Arynova, K. (2023). The effectiveness of the competence approach in the training of chemistry teachers. *Journal of Chemical Education*, 100(9), 3484–3493.
- Ademola, I. A., Okebukola, P. A., Oladejo, A. I., Onowugbeda, F. U., Gbeleyi, O. A., & Agbanimu, D. O. (2021). Teachers' qualifications and teaching experience: Impact on quality assurance in Nigeria secondary education. *NOUN Journal of Management and International Development*, 6(1), 260-272.
- Adikwu, O., Atamonokhai, S., & Fatoki, J. O. (2018). Assessment of chemistry teachers' competence in practical chemistry in secondary schools in Makurdi, Benue state, Nigeria. *International Journal of Research and Review*, 5(5), 179-186.
- Agustian, H. Y., Finne, L. T., Jørgensen, J. T., Pedersen, M. I., Christiansen, F. V., Gammelgaard, B., & Nielsen, J. A. (2022). Learning outcomes of University chemistry teaching in laboratories: A systematic review of empirical literature. *Review of Education*, 10(2), e3360.
- Ajayi, V. O. (2017). Relationship between teachers' content knowledge, qualifications, experience and students' achievement in chemistry. *Scholarly Journal of Education*, 6(1), 14-20.
- Akinyemi, O. S., & Mavhunga, E. (2021). Linking pre-service teachers' enacted topic-specific pedagogical content knowledge to learner achievement in organic chemistry. *Chemistry Education Research and Practice*, 22(2), 282-302.
- Alonge, B. D., Olayinka, K. A., Francis, F. A., & Oluwakemi, A. (2020). Teachers' teaching experience and educational qualification as correlates of academic performance of students in public secondary schools in Ekiti State, Nigeria. *Journal of Education Practice*, 11, 108-110.
- American Chemical Society (2018). *ACS Guidelines and Recommendations for Teaching Middle and High School Chemistry*. <https://www.acs.org/content/dam/acsorg/education/policies/guidelines-teaching-mshs-chemistry/mshs-guidelines-final-2018.pdf>
- Bereiter, C., & Scardamalia, M. (2014). Knowledge building and knowledge creation: One concept, two hills to climb. *Educational Psychology Review*, 26(2), 205-223.
- Bitok, E. C. (2020). Teacher perception on the three domains of learning in Uasin Gishu County, Kenya. *Journal of Research Innovation and Implications in Education*, 4, 25-36.
- Bright, K. A., Shani, O., Mark, G. A., & Emmanuel, K. (2022). Social studies teachers' competence in assessing learning outcomes in affective domain. *Universal Journal of Social Sciences and Humanities*, 2(2), 70–84.
- Corno, L. (2015). Growth mindset and attribution theory. *Journal of Experimental Education*, 83(1), 38-52.
- Ekua, T. A. (2016). Assessment, student learning, and classroom practice: A review. *Journal of Education and Practice*, 7(21), 1 – 6.
- Eya, N. M., Attah, F. O., & Umate, B. A. (2020). Competencies possessed and utilized by chemistry teachers for effective teaching of chemistry in secondary schools in Nsukka Education Zone of Enugu State. *International Journal of Research and Innovation in Social Science*, 4(2), 237-245.
- Federal Republic of Nigeria. (2013). *National Policy on Education (6th ed.)*. Lagos: Nigerian Educational Development Council (NEDRC) Press.
- Galloway, K. R., Malakpa, Z., & Bretz, S. L. (2016). Investigating affective experiences in the undergraduate chemistry laboratory: Students' perceptions of control and responsibility. *Journal of Chemical Education*, 93(2), 227-238.
- Harris, D. N. & Sass, T. R. (2010). What makes a good teacher and who can tell? A paper presented at the 2010 summer meeting of the National Bureau of Economic Research (NBER) Cambridge, M, A. Retrieved from www.teacherqualityresearch.org
- Hoque, M. E. (2016). Three domains of learning: Cognitive, affective and psychomotor. *The Journal of EFL Education and Research*, 2(2), 45-52.
- Ikenyiri, E., Ordua, V. N., & Ezechukwu, I. R. (2022). Evaluation of teachers' assessment practices in the three domains of learning in public primary schools in Owerri Education Zone, Imo State, Nigeria. *Journal of Guidance and Counselling Studies*, 6(1), 24-36.
- Innocent, L. C. (2023). Competencies required by chemistry teachers for effective teaching and learning of



- chemistry in secondary schools in Orumba South LGA, Anambra State. *UNIZIK Journal of Education Graduate*, 9, 15–27.
- Ira, M. (2017). Issues in designing instrument for affective assessment based on scientific approach: English teachers' reflection. In *Proceedings of ELTAR Conference* (Vol. 1, No. 1, pp. 142–151). Padang State University, Indonesia.
- John-Mark, M. M. (2024). Development of affective learning assessment package for the enhanced basic education curriculum. *International Journal of Research and Innovation in Social Science (IJRISS)*, 8(3), 5474–5482.
- Noor, N. A. M., Saim, N. M., Alias, R., & Rosli, S. H. (2020). Students' performance on cognitive, psychomotor and affective domains in the course outcome for embedded course. *Universal Journal of Educational Research*, 8, 3469-3474. <https://doi.org/10.13189/ujer.2020.080821>
- Nworgu, B. G. (2015). *Educational research: Basic issues and methodology*. 3rd Ed. Nsukka: University trust publishers.
- Obikezie, M. C., & Abumchukwu, A. A. (2021). Assessment of contemporary issues in development of chemistry teaching among secondary school chemistry teachers in Anambra state Nigeria. *UNIZIK Journal of Educational Research and Policy Studies*, 7, 142-165.
- Obialor, C. O., Ebelide, M. C., & Egbojiugha, S. C. (2024). Chemistry teachers' knowledge of test construction procedures in chemistry objective tests and its implications on student achievement in chemistry in Awka Education Zone, Anambra State. *Journal of Theoretical and Empirical Studies in Education*, 8(2), 23–38.
- Okeke, S. U. & Iwara, H. B. (2020). Influence of teachers' professional qualifications and years of teaching experience on academic achievement of students in economics. *Journal of Practicing Teachers (JOPRAT)*, 4(1), 1-22.
- Okpara, I. L. (2019). *Assessment of teachers' competency in the evaluation of students' affective and psychomotor components of the senior secondary school mathematics curriculum*. [Unpublished master's degree thesis, University of Nigeria, Nsukka].
- Okunuga, R. O., & Ajeyalemi, D. (2018). Relationship between knowledge and skills in the Nigerian undergraduate chemistry curriculum and graduate employability in chemical-based industries. *Industry and Higher Education*, 22(3), 183-191. UK: Sage Publications.
- Olanrewaju, Y. B. (2018). Problems of teaching chemistry in Nigerian secondary schools: implication for chemistry teacher education in Nigeria. <file:///C:/Users/USER/Downloads/64-Article%20Text-110-1-10-20200523-1.pdf>
- Omar, M. K., Zahar, F. N., & Rashid, A. M. (2020). Knowledge, skills, and attitudes as predictors in determining teachers' competency in Malaysian TVET institutions. *Universal Journal of Educational Research*, 8(3), 95-104.
- Omorogbe, E., and Ewansiha, J. C. (2013). The Challenge of Effective Science Teaching in Nigerian Secondary Schools. *Academic Journal of Interdisciplinary Studies*, 2(7), 181. DOI:10.5901/ajis.2013.v2n7p181.
- Owan, V. J., Ekpenyong, J. A., Chuktu, O., Asuquo, M. E., Ogar, J. O., Owan, M. V., & Okon, S. (2022). Innate ability, health, motivation, and social capital as predictors of students' cognitive, affective and psychomotor learning outcomes in secondary schools. *Frontiers in Psychology*, 13, 01 - 19. <https://doi.org/10.3389/fpsyg.2022.1024017>
- Rahayu, S. (2015). Evaluating the affective dimension in chemistry education. In *Affective dimensions in chemistry education* (pp. 29-49).
- Sabria, S. J., & Ahmad, M. S. (2020). The impact of specialty, sex, qualification, and experience on teachers' assessment literacy at Saudi higher education. *International Journal of Learning, Teaching and Educational Research*, 19(5), 200-216. <https://doi.org/10.26803/ijlter.19.5.12>
- Savickiene, I. (2010). Conception of learning outcomes in the Bloom's taxonomy of affective domain. *Quality of Higher Education*, 7, 37-59. Retrieved from <http://www.eric.ed.gov/PDFS/EJ900258.pdf>
- Sibomana, A., Karegeya, C., & Sentongo, J. (2021). Effect of cooperative learning on chemistry students' achievement in Rwandan day-upper secondary schools. *European Journal of Educational Research*, 10(4), 2079–2088.
- Sönmez, V. (2017). Association of cognitive, affective, psychomotor and intuitive domains in education: Sönmez model. *Universal Journal of Educational Research*, 5, 347-356. <https://doi.org/10.13189/ujer.2017.050307>
- Udo, M. (2016). Secondary school students' attitudes towards chemistry in Nigeria: Effects of gender and school location. *Eurasian Journal of Educational Research*, 16(64), 207-222.
- West African Examination Council, (WAEC, 2019). May/June. *Chief Examiner's Report*. Lagos.
- West African Examination Council, (WAEC, 2020). May/June. *Chief Examiner's Report*. Lagos.
- West African Examination Council, (WAEC, 2021). May/June. *Chief Examiner's Report*. Lagos.
- West African Examination Council, (WAEC, 2022). May/June. *Chief Examiner's Report*. Lagos.
- West African Examination Council, (WAEC, 2023). May/June. *Chief Examiner's Report*. Lagos.