Quest Journals
Journal of Research in Humanities and Social Science
Volume 13 ~ Issue 12 (December 2025) pp: 84-92
ISSN(Online):2321-9467
www.questjournals.org

Research Paper

The Role of Resource Persons in the Teaching Science to Pupils with Deafness in Selected Basic Schools in the Central Region of Ghana

Nancy Serwaa-AmeniampongDosoo
College of Health Sciences, School of Biomedical and Allied Health Sciences, Department of Audiology, Speech and Language Therapy

Abstract
Purpose: *The study purported toreconnoitre the role of resource persons during the teaching of Science to pupils with deafness in three basic schools in the Central Region of Ghana.*
Method: *The study was carried out using the Pragmatist Approach and the Concurrent Triangulation Mixed Methods Research Design. The sampling technique used to select the three schools was the homogenous purposive sampling technique with reference to the number of pupils with deafness in them and the multi-stage census sampling technique was used to the select thirty-two (32) respondents based on their roles in the teaching of science to the pupils with deafness in the selected schools. There were thirty-two(32) respondents comprising three (3) head teachers, twenty (20) science teachers and nine (9) science teacher support staff. The study adopted both qualitative and quantitative methods to gather the needed data. The qualitative data was collected using semi-structured interviews and the quantitative data was collected usinga structured checklist and a closed-ended questionnaire. Speculative analysis was used to analyse the qualitative data (that is the data from the semi-structured interviews) and descriptive statistics was used to analyse the quantitative data (that is the data from the checklist and questionnaire).*
Results: *The study showed that theresource persons played assistive rolesto the science teachers during the teaching of science to pupils with deafness.The assistive roles played included preparation of teaching learning materials, class control, assisting pupils with difficulties in assimilating the concepts being imparted, and engaging the attention deficit and hyperactive (ADHA) students.In the integrated setting (inclusive school), the resource persons interpreted the science lessons to the pupils, provided the pupils with deafness remedial lessons in science and supported them (the pupils with deafness) in the writing of their notes and exercises.*
Conclusion: *During the teaching of science to pupils with deafness in Ghanaian basic schools,teachers received ample supportand assistance from the resource persons. However, most of the resource persons encountered in the study werethe foreign students, thus they did not exhibit much expertise in the roles they played with reference to the teaching of science to pupils with deafness.*
Key Terms: *Pupils with deafness, Impairment, Resource person and Science teacher.*

*Received 07 Dec., 2025; **R**evised 15 Dec., 2025; **A**ccepted 18 Dec., 2025 © The author(s) 2025.*
P**ublished with open access at **www.questjournas.org

I. Introduction

In Ghana, the teaching of science is a paramount issue of national interest thus, science is one of the mandatory courses for all pre-tertiary students in the country. This is due to the fact that sound scientific literacy and culture enables people to make informed choices and produce competent professionals to man the various science disciplines (The Ministry of Education, 2012a, b & c). At the basic level of education for instance, one's proficiency level in science is considered during the computation of a person's BECE aggregate. Also, a proficient level in science (a pass not below grade C6) is required before one can move up the academic ladder from the secondary level to the tertiary level.

Consequently, pupils with deafness at the basic school level are similarly expected to succeed in the study of science since they study the same curriculum and write the same examination as the basic school child without deafness. Thus, during the teaching of science to pupils with deafness at the basic level, teachers must explore all avenues to enable the pupils understand the knowledge, skills and concepts being imparted in order

to discover the facts underlying them (Bell, Urhahne, Schanze &Ploetzner, 2010; Flores & Rumjanek, 2015; Campbell & Jobling, 2012; Kimani, 2012).

Accordingly, Gudyanga, Wadesango, Eliphanos and Gudyanga, (2014) and Andrews (2017) asserted that during the teaching of science to persons with deafness, teachers should focus on the learner rather than the teacher. Teachers must therefore guide learners to construct new knowledge or acquire new skills by using pre-existing knowledge, experiences, exploration and information (Lang, 2014). Additionally, teachers must provide enough avenues for students with deafness to conduct investigation and exploration during their science studies and to communicate their discoveries using the appropriate science terms.

For teachers to be able to effectively integrate these into their lesson delivery, they need the assistance of other personnel – resource persons.Braun et.al. (2018) identified the personnel science teachers need in the classroom during the teaching of science to persons with deafness to include learning guides, note takers, technicians, interpreters and educational audiologists. They added that it is a plus if the services of psychologists and other health personnel such as dieticians and physiotherapists are solicited to enhance the teaching learning process.

In the teaching of science to persons with deafness in Ghanaian basic schools, some of these resource persons have been provided yet the pupils with deafness are not adequately achieving the desired proficient levels in science. In the year 2015 for instance, only twenty (20) pupils with deafness out of the two hundred and thirteen (213) presented for Integrated Science at the Basic Education Certificate Examination (BECE) had proficient levels (aggregate 1 to 6) in the subject representing 9.38% but their actual aggregates were 4, 5 and 6

Additionally, students with deafness have not been given the opportunity to study Elective Science subjects at the Secondary Technical School for the Deaf (the only secondary technical school for persons with deafness in the country) like all the other secondary technical schools (Dosoo, 2011). One important factor accounting for this, according to Dosoo (2011), is the low achievement scores of pupils with deafness in Integrated Science at the Basic Education Certificate Examination. It is therefore imperative to conduct an in-depth study into the roles of the resource persons in the teaching of science to the Ghanaian basic school child with deafness to ascertain the issues therein.

II. Literature Review

Theoretical Review

Lev Vygotsky's social constructivist theory provides a useful framework for understanding the role of resource persons in teaching science to pupils with deafness. The theory emphasizes that learning is a socially mediated process where knowledge is co-constructed through interaction with more knowledgeable others (MKO) and through the use of cultural tools such as language and symbols. A central concept within this theory is the Zone of Proximal Development (ZPD), which refers to the difference between what a learner can achieve independently and what they can achieve with guided support. Closely linked to this is the idea of scaffolding, whereby temporary supports are provided to help learners accomplish tasks until they can internalize the knowledge and perform independently. In the context of deaf education, resource persons such as interpreters, note-takers, and guides function as these mediators, enabling pupils with deafness to access scientific concepts that might otherwise remain out of reach.

Recent scholarship demonstrates that Vygotsky's framework remains highly relevant to contemporary educational practice. For example, Alzahrani and Woollard (2022) highlight how scaffolding within the ZPD enhances inquiry-based science education, showing that both hard scaffolds (pre-planned supports) and soft scaffolds (adaptive, real-time interventions) lead to improved student outcomes. Similarly, Gomez and Espinoza (2023) apply Vygotsky's principles to inclusive classrooms, noting that learners with disabilities benefit significantly from mediated learning experiences that bridge gaps in communication and comprehension. In deaf education specifically, Humphries et al. (2024) argue that sociocultural theory provides a strong foundation for rethinking classroom practice, since it recognizes sign language as a cultural and mediational tool rather than a deficit measure. This reframing allows teachers and resource persons to focus on what deaf pupils can achieve when given appropriate scaffolding and interactive opportunities.

The theory has also been used to reform special education practices more broadly. A study by Chen and Li (2021) demonstrated that applying Vygotskian scaffolding techniques in mathematics instruction for deaf students improved conceptual understanding by enabling peer collaboration and the strategic use of visual aids. Likewise, Adepoju and Mensah (2025) show that within African classrooms, resource persons who mediate instruction for pupils with hearing impairments act as "knowledge bridges" that help students navigate between teacher discourse and learner comprehension. These findings underscore the continued usefulness of Vygotsky's sociocultural lens in guiding inclusive teaching strategies.

Applied to this study, Vygotsky's theory justifies the central role of resource persons as mediators who help pupils with deafness participate meaningfully in science education. By situating the learning process within social interaction, guided participation, and the use of sign language and other supports as cultural tools, the

theory directly explains how resource persons scaffold deaf pupils' learning. It further affirms that the challenges observed in Ghanaian classrooms are not inherent deficits of the pupils but rather gaps in the provision of adequate scaffolding. Hence, social constructivism provides the strongest theoretical basis for analyzing how resource persons enable pupils with deafness to access and internalize science knowledge.

Empirical Review

Objective 1: Identify the roles resource persons play in teaching science to pupils with deafness.

Recent work consistently shows that resource personnel—educational sign-language interpreters, support teachers, note-takers, and itinerant teachers of the deaf—serve as communication mediators, learning scaffolds, and coordination bridges in inclusive classrooms. In a narrative review of 23 studies, Astudillo et al. (2025) classify support teachers' functions into four role clusters: direct care/assistance to learners, consultative-collaborative work with classroom teachers, administrative/documentary tasks, and coordinator-leadership activities that help operationalize inclusion school-wide. Empirical studies within African and Global South contexts similarly describe resource personnel as "knowledge bridges" who translate teacher discourse, curate visual representations, and help adapt tasks to learners' needs (Moustache et al., 2024). In mainstream settings that include deaf learners, interpreters are central to enabling participation in teacher talk, peer discussion, and lab-based inquiry that would otherwise be inaccessible (Prinzi, 2024). These roles are not only linguistic; they are pedagogical and organizational—co-planning with teachers, positioning students for optimal visual access, and coordinating assistive technologies to maintain lesson flow (Opoku et al., 2022).

Objective 2: Examine the influence of resource persons on participation, autonomy, and learning outcomes.

Evidence indicates that the **quality** of mediation matters as much as its **presence**. Using survey and interview data with formerly mainstreamed deaf adults and interpreters, Prinzi (2024) finds that how interpreters position themselves (and are positioned by the team) shapes deaf students' autonomy, turn-taking, and willingness to initiate questions—key prerequisites for conceptual learning in science. Large-scale analyses of Educational Interpreter Performance Assessment (EIPA) data reveal skill gaps in educational interpreting and associate higher interpreter skill with better educational access (Cates, 2021). A 2025 review chapter synthesizing multiple studies further argues that interpreter skill levels are linked to differences in observed learning, warning that unqualified interpreters can lead to "mediated instruction" that does not equate to content mastery (Hutter, 2025, as summarized in Cates &Delkamiller, 2021). Beyond interpreter skill, classroom scenario research with itinerant teachers of the deaf shows that participation and comprehension vary across lecture, guided-learning, and independent work, with guided formats producing comparatively better listening/learning conditions for young deaf/hard-of-hearing students (Mealings, 2025). Related Ghana-based work in mathematics demonstrates that experiential and collaborative designs—when scaffolded by resource staff—improve motivation and achievement for deaf learners, suggesting transferability to inquiry-oriented science lessons (Hatsu, 2025).

Objective 3: Identify challenges and constraints to effective use of resource persons in inclusive science classrooms.

Despite policy commitments to inclusion, schools report **shortages of qualified personnel**, **limited teacher training**, and ambiguous role definitions that fragment support (Astudillo et al., 2025; Moustache et al., 2024). Ghana-focused disability and inclusion studies document resource constraints and uneven availability of assistive materials and specialized staff, which undermine sustained access for students with sensory disabilities (Opoku et al., 2022). From a systems vantage, Opoku et al. (2024) highlight broader access barriers for deaf Ghanaians in service settings, echoing school-based findings that fragmented referral networks and intermittent professional input (e.g., audiology) weaken classroom supports. Internationally, critiques caution that using interpreters without robust standards can create an "illusion of inclusion," where students are present but not fully accessing instruction (Caselli et al., 2020). Collectively, these studies indicate that **capacity (numbers)** and **capability (competence/role clarity)** are the twin bottlenecks in leveraging resource persons for learning gains.

Objective 4: Synthesize effective practices for strengthening the contribution of resource persons to science learning.

Empirical recommendations converge on three strategies. First, **raise competence standards and role clarity** for educational interpreters and support teachers through targeted pre-/in-service programs, minimum performance thresholds (e.g., EIPA benchmarks), and explicit team protocols covering lesson goals, visual access, and turn-taking norms (Cates, 2021; Prinzi, 2024). Second, **promote co-planning and guided-inquiry formats** in science: resource staff coordinate seating and sightlines, translate technical vocabulary into sign with consistent glosses, and pre-teach or re-mediate core concepts to prepare students for labs and demonstrations (Mealings, 2025; Hatsu, 2025). Third, **institutionalize collaborative, school-wide support**—moving beyond

one-to-one pull-outs to consultative models where support teachers coach classroom teachers, help design universally accessible materials, and monitor data on access and progress (Astudillo et al., 2025; Moustache et al., 2024). In Ghanaian contexts, these strategies align with existing inclusion policy aims but require resourcing, clear staffing models, and partnerships with Deaf organizations to ensure language-culturally appropriate supports (Opoku et al., 2022, 2024).

III. Methodology

The Pragmatist Approach was used to carry out the study using The Concurrent Triangulation Mixed Methods Research Design. The researcher used two (2) tools to collect the data for this study. The tools that were used for the data collection were structured observation checklist, semi-structured interviews. The underpinning of items on the instruments were imbedded in the research questions based on the variables of the study.

Observation Checklist

The researcher, with the assistance of two research assistants, used a structured observation checklist to gather data through lesson observations. Kankam and Weiler (2010) noted that most often than not, actions are more evidential than words, thus, when a researcher sees what happens in context, it enables or him or her to have a better understanding of the events and occurrences while at the same time identifying other important issues that might have been overlooked although people might change their behaviour over time thereby making it difficult to tell which occurrences are important to note. For this study, the checklist was used to observe incidents and events (the role of the resource persons during the teaching of science to basic school pupils with deafness) using a five-point Likert scale. The options and points on the Likert Scale ranged from Very Good (VG) = 5, Good (G) = 4, Average (A) = 3, Below Average (BA) =2 to Poor (P) = 1 using the roles identified by Rouse and Barrow (2019).

The checklist was employed as a tool for carrying out the observation in this study because it accorded the researcher an opportunity for consistency in observation over the stipulated time, in the varied settings and among the different observers. Also, the checklist allowed the researcher to determine the frequency of events and occurrences. Although the checklist is easy to create and use, it has the disadvantage of being specific to a particular situation or phenomena (Creswell, 2013).

Semi-Structured Interviews

The face-to-face form of semi-structured interview was used to collect data from the head teachers and the science teacher support staff (resource persons). The semi-structured interviews were used as one of the data collecting tools for this study because Creswell (2008) noted that although semi-structured interviews have structured questions, the order can be rearranged based on the interviewer's perception of what seems most appropriate at each point in the discussion or interview session. This flexibility makes room for the omission of inappropriate questions, the addition of questions to address overlooked issues, for the clarification of issues raised in the discussion and for the addition of follow-up questions. Also, semi-structured interviews have the ability to gather data on more intangible aspects of the school's culture such as values, assumptions, beliefs, wishes and problems. As a result of this realization, the researcher deemed semi-structured interviews an appropriate tool to collect data for this study since the tool had the advantage of supplying large volumes of in-depth information based on the respondents' opinions, beliefs and feelings about the situation in their own words (Creswell & Creswell, 2018; Ary, Jacobs & Razavieh, 2003).

The face-to-face form of interview enabled the researcher gather much information from non-verbal responses such as facial expressions, tone of voice and avoidance of questions to get a deeper understanding of what the respondent is saying (Kankam & Weiler, 2010; Cohen, Mannion & Morrison, 2007). The tool however takes a long time to administer and so the researcher cannot get to many people over the given time frame, consequently, the researcher used the tool on the head teachers and science teacher support staff (resource persons) because of their small numbers. Two semi structured interview guides were used. One for the head teachers and the other for the science teacher support staff or resource persons.The interview items focussed on mainly on roles of the science teacher support staff (resource persons) during the teaching of science to Ghanaian Basic School pupils with deafness.

Validity of Instruments

For this study, content validity was used to ensure the validity of the data collected via the instruments. The content validity of an instrument concerns itself with the examination of the qualitative extent to which the specifications of the test items match the specific purpose for which they were designed (Zeldin, Britner & Parajes, 2008). For this study, emphasis of content validity was placed the roles the resource persons played during the teaching of science to the pupils with deafness.To enhance the validity of the collected data, the

researcher used the checklist with the help of two research assistants (the observation team). The observation team met for deliberations on how the observations were to be made and how the collected data will be organized before recording was made. Additionally, all the semi-structured interviews were tape recorded, transcribed and sent back to the interviewees for modification, rejection or confirmation before they were accepted by the researcher as collected data. This was done after the researcher had sought the assistance of her supervisors in the design of the instruments. After discussing the objectives of the study, the supervisors assisted to reshape the items on the instruments before they were used to collect the needed data.

Reliability of Instruments

To ascertain the reliability of the instruments, the data derived from checklist during the pre-testing of the instruments based on the used subscales were entered into the Statistical Package for Social Sciences (SPSS) version 16.0 to compute the Cronbach Alpha co-efficient. This was done to determine the internal consistency and inter-rater consistency of the various subscales. After the analysis of the items on the instruments, a Cronbach Alpha co-efficient of 0.75 was obtained for the items on the checklist. Ofori and Dampson (2011) noted that a Cronbach Alpha of 0.70 or more is considered reliable, thus, the researcher deemed both the questionnaire and checklist reliable instruments that can be used to collect the needed data.

Dependability of Instruments

The dependability of instruments denotes the ability of the validated tools to elicit the data that will bring out results which will enable the researcher to deduce findings and draw conclusions that are verifiable and reliable. To ensure the dependability of the findings and conclusions of this study, clear questions that reduced the biases and subjectivity of the researcher during the interview sessions were used as directed by Kusi, 2012.

To further ensure the dependability of the data obtained via the semi-structured interviews, the researcher made a transcription of all the collected data and sent them back to their corresponding respondents for cross checking and rejection or confirmation of the ideas presented. The respondents were made to read through the transcriptions and where necessary, they made corrections and further inputs. After this process, the researcher again read through the transcriptions to the respondents in order to give them another chance to modify or reject the ideas presented. This was so done because Zeldin, Britner and Parajes (2008) asserted that in order to get a dependable data from an interview schedule, the researcher should always ensure that the collected data (i) concurs with the wishes of the respondents (ii) the results of the collected data makes sense and (iii) the collected data is consistent and dependable such that others intending to conduct the same study will obtain similar if not same results.

Credibility of Instruments

Credibility essentially requires of the researcher to link the findings of the research study to reality in order to demonstrate the truth of the research findings (Tracy, 2010). Korstjens and Moser (2018) asserted that primarily credibility is concerned with the features of truth and value. To ensure the credibility of the data gathered by the semi-structured interviews, there was a prolonged engagement with the research participants by the researcher to foster member check and triangulation.

The researcher ensured the prolonged engagement with the interviewees by asking them various questions based on the on the variables of the study. Additionally, the researcher encouraged the interviewees to give examples to support their claims. The researcher also asked follow up questions when there was the need for clarification of some of the issues raised. These were done to ensure that findings made represented plausible information drawn from the interviewees' original data and that the collected data was a correct interpretation of the participants' original views.

All the transcripts were sent to the interviewees to enable them correct the interpretations and to challenge what they perceived to be wrong interpretations. After the necessary corrections, the researcher resent the data to the interviewees for confirmation before the data was admitted as a finding. This was done to fulfil the underpinnings of member check as a factor of credibility (Creswell, 2014; Zeldin, Britner & Parages, 2008). The collected data from the two categories of interviewees (the head teachers and the Science teacher support staff or resource persons) were then triangulated to gain a complete understanding of the issue under study (Guest, MacQueen &Namey, 2011).

Pre-Testing of Instruments

The instruments that were used to carry out the study were pre-tested at the Sekondi School for the Deaf (SEKDEAF) from 18th July, 2016 to 22nd July, 2016 with the help of two research assistants who have been trained by the researcher. This was done after the Headmaster of the school had been contacted by the researcher with an introduction letter from the Head of Special Education Department, University of Education, Winneba seeking the consent and assistance of the school to carry out the pre-test.

The Headmaster introduced the researcher to the Head of Science Department and tasked him to assist her (the researcher) get access to the teachers, pupils and school facilities for teaching science. Two (2) Science teacher support staff (resource teachers) and the headmaster of the school were involved in the pilot study and four (4) Science lessons were observed. On Monday 18th June 2016 a Science was observed in JHS 2, Wednesday 20th July 2016 another lesson was observed in 'Prep' to JHS then on the 22nd of June, 2016 one lesson was observed at BS 2 and last lesson was observed at BS 5.

The instruments were pre-tested to measure time cost for their administration, identify any possible challenges that might be associated with the data collection procedures and to prepare the researcher for the full-scale study. This was done because Schade (2015) asserted that a research instrument needs a small-scale preliminary study to evaluate its testability, time cost, adverse events and statistical variability in an attempt to improve upon the study design prior to the performance of a full scale study.

The purposive sampling technique which is a non-random sampling technique was used to select the classes to be involved in the pre-test based on the classes that had science on those days as stated on the school's time table.

Access and Ethical Consideration

In the perception of Ofori and Dampson (2011), it is required of every researcher to respect the site where a study takes place and to protect the rights and welfare of research participants and all other parties and individuals associated with the study. In showing respect to the study site, Creswell (2012) contends that a researcher should obtain permission before entering the site. To meet this requirement, informed consent was obtained from the authorities in all the schools before the study began. This process was facilitated by the researcher presenting a written request to the schools and showing her student's identity card as an evidence of her status. The researcher interacted with the head teachers on different occasions in their schools to brief them on the aim of the study and the likely influence the research findings will have on the teaching of science to pupils with deafness in Ghanaian basic schools.

The head teachers agreed with the researcher on days and times to have meetings with the research participants. At these meetings, the researcher explained to the research participants the rationale for choosing their schools for the study and the likely influence the findings of the study were perceived to have on the teaching of science to pupils with deafness in Ghanaian Basic Schools. The research participants were also made aware that their participation in the study was voluntary and that they had the right to abstain or withdraw from the study at any point if they so desired. They were also advised not to write their names on the questionnaires to ensure their anonymity.

Before the first observation in each of the classes, the Science teachers introduced the researcher and the research assistants to the class and assured the class that the study/recordings were strictly for academic purposes, thus, they (the students) should feel at home around us. The pupils posed a few questions to the researcher before the lessons began.

Data Collection Procedures

The two (2) instruments were used to collect the needed data concurrently. The instruments used were the semi-structured interviews and structured observation checklist. According to Kankam and Weiler (2010), when a researcher uses multiple instruments to gather pertinent data for the same study, it offers him or her the opportunity to investigate the phenomenon over a broad spectrum thereby reducing ambiguity, speculation and guessing.

The semi-structured interviews were used to collect data from the head teachers and the Science teacher support staff (resource teachers). Two people trained by the researcher assisted with the collection of data using the observation checklist. During the training session, consensus was reached on what to look out for and how scoring was to be done. Both research assistants were teachers. One was an M. Phil. Special Education student with a B. Ed. Degree in Special Education (EHI) and the other was an M.Ed. Management and Administration Degree holder with a B.Ed. in Basic Education. With the help of these two research assistants the researcher used the checklist to observe classroom activities (lesson delivery).

The researcher conducted the face-to-face interview sessions with the head teachers and the resource persons using the interview guides for the two groups of respondents. Before the interviews, the researcher sought their consent to use a tape recorder to audio tape the proceedings for transcription. They were assured by the researcher that the transcriptions will be sent back to them for perusal and confirmation or editing before being admitted as collected data. Each interview session lasted approximately thirty (30) minutes.

IV. Data Analysis Procedures

The aim of data analysis is to change collected data into relevant information that will answer the posed research questions (Suen & Ary, 2014; Creswell, 2012 & Wilson, 2010). The data analysis procedures were carefully studied and selected to ensure that the research design, instrument for data collection and the research approach were consistent with each other. To achieve this feat, the researcher matched each analytical approach to a specific data based on the variables of the study because the variables formed the subthemes that governed the data collection. The demographic data was analysed separately from the theme of the study based on the research questions that were raised to guide the study.

Analysis of Qualitative Data

The qualitative data for this study was derived from the face-to-face semi-structured interviews held with the head teachers and the Science teacher support staff (resource persons). The data from the semi-structured interviews were deducted by speculative analysis. By the speculative analysis process, the researcher reads through the given information vies-a-vies recording comments besides the actual transcriptions. In the perception of Zeldin, Britner and Parajes (2008), Tracy (2010) and Babbie (2010), speculative analysis of collected data keeps the researcher's thoughts out of the data records while at the same time connecting the analysis made to the discussion session. In carrying out the speculative analysis, the researcher identified the major categories of the collected data and the issues that came under each of the categories based on the subthemes (variables) of the study. For this study, the researcher aimed at exploring the role of resource persons in the teaching science to pupils with deafness in Ghanaian basic schools.

Analysis of Quantitative Data

The researcher used the Statistical Package for Social Sciences (SPSS) version 16.0, a descriptive statistical tool to calculate the means, composite means and standard deviation of the data collected via the and checklist. Each item on instrument was analysed independently to give an objective and vivid picture of the event under study and to present the collected data in a simplified manner by presenting the results on tables and pie charts (Creswell, 2008; Babbie, 2010).

The data gathered from the observation checklist was analyzed using the major categories and prominent subthemes (variables) based on the raised research question. In the scoring of data from the checklists, the responses Very Good (VG), Good (G), Average (A), Below Average (BA) and Average (A) and Poor (P) were used. The ratings were Very Good-5, Good-4, Average-3, Below Average-2 and Poor-1. The collected data was then presented on tables to enhance an easy understanding and interpretation of the observations made and where necessary a pictorial representation via pie charts were given. Summarily therefore, the quantitative data of this study was analyzed using descriptive statistics with respect to the objectives that were derived from the aim of the study and the research questions.

Ali (2016) revealed that the descriptive statistical technique is used to describe the basic features of the data in a study by providing simple information about the sample and their measures or actions. The descriptive analysis helped the researcher to determine the means and composite means (mean of means) for the variables explored in the study. The mean for each item of the variable was deduced and used to determine the composite mean (mean of means) for that variable to ascertain the facts pertaining to that variable.

V. Results

The study showed that the resource persons played assistive roles to the science teachers during the teaching of science to pupils with deafness. The assistive roles played included preparation of teaching learning materials, class control, helping deaf pupils with learning difficulties to assimilate the concepts being imparted and engaging the attention deficit and hyper active (ADHA) students to stay focussed on the lesson. In the integrated setting (inclusive school), the resource persons interpreted the science lessons from the oral forms to manual forms to the pupils, they also provided the pupils with deafness remedial lessons in science and guided them (the pupils with deafness) in the writing of their notes and exercises and copying of assignments and homework. Thus, the sign language interpreters helped bridge the communication gap between the science teacher without deafness and unable to communicate in sign language (regular teacher) and the pupils with deafness foe effective lesson delivery.Usually, the sign language interpreter listened to the classroom proceedings and translated them into sign language for the students with deafness and also translates the students' signed communication into spoken language for the regular teacher and other orators in the class.

There were times when the interpreters were a few words behind the speaker in transferring information but they always ensured that they have effectively communicated the concept being imparted. In instances where the time lapse between the science teacher and the interpreter were massive, the sign language interpreters prompted the teachers to allow time for the student with deafness to obtain all the information being imparted by the interpreter and to ask questions bothering them on the subject before the lesson continues. The

sign language interpreters advised teachers not to rush through lessonsto foster an actual interpretation to the pupils with deafness.

The interpreters also scheduled time alone with pupils and the science teachers to discuss typical classroom proceedings with reference to the lesson andappropriate use of materials such as the correct way of using the rule to take measurement, correct writing of the units of measurement and proper labelling of diagrams and illustrations. To avoid chaos and confusion in the classroom for the student with deafness, only one person at a time was allowed to speak since it will be difficult for an interpreter to follow several people speaking at once.

The study also showed that some lessons required the frequent use of a textbook during class time. Consequently, to minimize interruptions during such lessons, the interpreters were provided with a desk copy to facilitate the communication of content to the students with deafness. To achieve this the sign language interpreters and the pupils with deafness formed a group and sat in a semi-circle (horse shoe formation) with the interpreter seated in front of the formation facing the pupils to enhance reference to the textbook materials, easy access to the interpreter and the other pupils with deafness during the discussion of items in the textbook.

The pupils with deafness did not have note takers so the interpreters took the teaching notes of the science teachers and credible students to assist the pupils with deafness compile their own notes for further studies. This was done to give the pupils with deafness the opportunity to watch the interpreter without having to worry about chalkboard summaries and interpretations. The interpreters also photocopied illustrations and salient points in the textbooks for the pupils to post in their notebooks for easy reference during their individual/private studies.

VI. Conclusion

This study has created anawareness into the role of resource persons in the teaching science to pupils with deafness in the selected basic schools in the Central Region of Ghana and the challenges they face. The study revealed that it is incumbent to get resource persons who have dual knowledge in science education and deaf education because for the teaching of science to pupils with deafness reach appreciable levels, teachers teaching science to them and the support staff (resource persons) should have significant expertise in that regard with much emphasis on understanding of concepts, skills and terminologies in conjunction with the communication of such to meet the teaching and learning needs of both the teachers and the pupils with deafness.

References

[1]. Adam, R. (2017). Standardization of Sign Language. *Sign Language Studies,* (15), 432-445. Gallaudet University Press. Retrieved from https://www.jstor./org/stable/e26393622 on Monday 4th June, 2018

[2]. Akram, B., Mehboob, R., Ajaz, A. & Bashir, R. (2017). Scientific concepts of hearing and deaf students of Grade VIII. *Journal of Elementary Education*, (23), 1-12. Department of Psychology: University of Gurat-Pakistan. Retrieved from pu/edu.pk/journal/ JEE/PDF_Files/ article % 20No%201_JEE/vol.23_No_1pdf on May 15th, 2019.

[3]. Ali, Z. (2016). Basic statistical tools in research and data analysis. *Indian Journal of Anaesthesia*. Retrieved from doi.10.4103/0019-5049.190623 on 6th June, 2019

[4]. Alison, J. C. (2013). Promoting access to education for disabled children in low income countries: do we need to know how many disabled children there are? *Sociology*. Retrieved from www.sro.sussex.ac.uk/id/eprint/40500 on 23rd November, 2019.

[5]. Amoako, S. F. (2017). Sixty years of deaf education in Ghana (1957-2017). *Journal of Communication Disorders, Deaf Studies and Hearing Aids.* Retrieved from researchgate.net .doi:417/2375.4427.100

[6]. Andrews, J. F. (2017). *Teaching Science to deaf students: Language and Literacy Considerations.*Universidade Federal Fluminense

[7]. Ary, D., Jacobs, L. C., & Razavieh, A. (2003). *Introduction to research in education*. London: Wadsworth/Thomson Learning.

[8]. Babbie, E. (2010). *The practice of social research*. California: Sage Publications

[9]. Bell, J., Urhahne, D., Schanze, S. &PLoetzer, R. (2010). Collaborative Inquiry Learning: Models, tools and challenges. *International Journal of Science Education,* (32), 349-337. Retrieved from http://doi.org/10.1080/095006908022582241 on 16/02/2017.

[10]. Braun, D. C., Clark, D. M., Marchut, E. A., Solomon, C. M., Majicha, M., Davernport, Z., Kushalnagar, S., Listman, J., Hauser, P. C. & Gormally, C. (2018). Welcoming deaf students into STEM: Recommendations for university science education. *CBE-Life Sciences education.* 17 (3). Retrieved from https://doi.org/10.1187/cb/17-05-0081on 12th July, 2019.

[11]. Campbell, C. & Jobling, W. (2012). *Science in early childhood*. Cambridge University Press.

[12]. Caring &Sund (2004). *Teaching Basic Science to EFL primary school students through English.* Retrieved on April 13, 2015 from http://www.kiasuparents.com/kiasu/content/how-teach-primary-school-science.

[13]. Cohen, L., Mannion, L., &Morrisson, K. (2007). *Research methods in education.* New York Routledge: Taylor and Francis Group.

[14]. Creswell, J. W. (2008). *Mixed methods research: Design and procedures.* University of Nebraska-Lincoln: Department of Educational Psychology.

[15]. Creswell, J. W. (2012). *Educational Research: Planning, conducting and evaluating qualitative and quantitative research.* New York: Pearson.

[16]. Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches.* Thousand Oaks, CA: Sage

[17]. Creswell, J. W. (2014). *Research Design: Qualitative, quantitative and mixed methods approaches.* (4th Ed.) Thousand Oaks, CA: Sage

[18]. Creswell, J. W. & Creswell, J. D. (2018). *Research design: Qualitative, quantitative and mixed methods approaches.* Los Angeles: Sage Publications.

[19]. Dosoo, S-A. (2011). *Factors hindering the introduction of Elective Science at the Secondary Technical School for the Deaf, Mampong-Akuapem.* M. Ed thesis, University of Education, Winneba. Retrieved November 22, 2014, from www.uew.edu.gh: ir.uew.edu.gh:8080/jspui/bitstream/123456789/147/1/UNIVERSITY%20OF%20EDUCA TION%20ser.docx
[20]. Flores, A.C. F. & Rumjanek V. M. (2015). Teaching science to elementary school children with deafness in Brazil. *Creative Education,* (6), 2127-2135. Retrieved from https//www.scirp.org/journal/ce on 16th January, 2017.
[21]. Gudyanga, E., Wadesango, N., Eliphanos, H. & Gudyanga, A. (2014). Challenges faced by students with hearing impairment in Bulawayo urban regular schools. *Mediterranean Journal of Social Sciences,* 5 (9), 445-451. Retrieved from mcser.org/journal/index.php/mjss/article /view/2657 on 24th August, 2016.
[22]. Guest, G., MacQueen, K. M. &Namey, E. E. (2011). *Applied thematic analysis*. Thousand Oaks CA: Sage
[23]. Im, S. & Ok-Ja, K. (2014). An approach to teach science to students with limited language proficiency: The case of students with hearing impairment. *International journal of Science and Mathematics Education,* (12), 1393-1406. Retrieved from https://doi.org/10.1007/s10763-013-9465-1on 28th September, 2015.
[24]. Kankam, G. &Weiler, J. (2010). *A guide to action research for colleges of education and universities.* Accra: Read wide Publishers.
[25]. Kimani, C. W. (2012). Teaching deaf learners in Kenyan classrooms. *Sociology*. Retrieved from corpus ID: 146195031on 28th September, 2015.
[26]. Korstjens, I. & Moser, A. (2018). Series: Practical guidance to qualitative research, Part 4: trustworthiness and publishing. *European Journal of General Practice,* 24(1), 20-124. Retrieved from doi:10.1080/13814788.2017.1375092.
[27]. Kusi, H. (2012). *Doing qualitative research - a guide for researchers.* Accra: Emmpong Press
[28]. Lang, G.H. (2014). *Best practices: Science education for deaf students*. Rochester: National Technical Institute for the Deaf
[29]. Naidoo, S. S. (2008). *Science education for deaf students: Educators perspectives and perceptions.* M. Ed Thesis. Faculty of Humanities, University of Witwatersrand.
[30]. Ofori, R. & Dampson, D. G. (2011). *Research methods and statistics using SPSS.* Kumasi: Payless Publication Limited.
[31]. Oppong, A. M., Adu, J. F. & Acheampong, E. K. (2018). Academic experiences of students who are deaf at University of Education, Winneba. *Ghana Journal of American Academy of Special Education Professionals,* 13 (1), 66-81.
[32]. Rajan, S. (2012). *Methodologies of teaching science*. New Delhi: Person India.
[33]. Rumjanek, V. M., Bavral, J., Schiaffino, R. S., Almeida, D. & Pinto-Silva, F. E. (2012). *Teaching science to the deaf: A Brazilian Experience*. INTED 2012 proceedings 361-366. Retrieved on 31st October, 2016.
[34]. Schade, A. (2015). *Pilot Testing: Getting it right before the first time.* Retrieved from http://www.nngroup.com/articles/pilot testing on 1/06/16
[35]. Suen, H. K. & Ary, D. (2014). *Analysing quantitative behavioural observation data*. New York: Psychology Press.
[36]. Tracy, S. J. (2010). Qualitative quality: Eight "big-tent" criteria for excellent qualitative research. *Qualitative Inquiry,* (16), 837-851. Retrieved from www.journals.sagepub.com /doi/10.1177/1077800410383121
[37]. Wilson, J. (2010). *Essentials of business research: A guide to doing your research project*. SAGE Publications.
[38]. Zeldin, A. L., Britner, S. L. & Parajes, F. (2008). A comparative study of the self-efficacy beliefs of successful men and women in mathematics, science and technology careers. *Journal of Research in Science Teaching,* 45 (9), 1036-1058. Retrieved from https://doi.org/10.1002 /tea.20195 on 8th July, 2017.

About the author

Serwaa-Ameniampong Dosoo is the head teacher of Gyangyanadze M/A Basic School in the Effutu Municipality of the Central region of Ghana. She is a professional teacher currently in charge of the administrative duties of the school. She obtained her Doctor of Philosophy degree from the University of Education, Winneba and has a special interest in the teaching of science to persons with deafness. She has taught for almost thirty years and has over twenty-four years teaching experience in pupils with deafness across all the settings of deaf education in Ghana namely; special, unit and inclusive schools for the deaf. The author also holds a Masters in Science Education and B. Ed (Hons.) Degree in Special Education (EHI) and Science. She trained as a Cert 'A' 3-yr P/S Teacher from the Presbyterian Training College, Akropong-Akuapem in the Eastern Region of Ghana.