

Examining the use of 21st-Century Teaching Skills in Basic School Science Classrooms

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ABSTRACT

The purpose of the study was to examine the use of 21st-century teaching skills in basic school science classrooms. The study adopted a qualitative research design. An observation checklist was employed to gather relevant data for the study. The study was carried out in Enchi, the Aowin Municipal Capital in the Western North Region, and Assin Foso, the Assin Central Municipal Capital in the Central Region of Ghana. The population used for the study was made up of eighteen science teachers selected from six public Junior High Schools in Enchi and eighteen science teachers selected from six public Junior High Schools in Assin Foso. The purposive sampling technique was used to select the six public Junior High Schools from Enchi and six public Junior High Schools from Assin Foso because the teachers from the public schools have acquired professional training. The thirty-six science teachers were conveniently selected. Concerning the data collected from the observations conducted, percentages and average values were computed for teachers who used 21st-century teaching skills in their science classroom and for those who did not use 21st-century teaching skills in their science classroom. It came out that an average of 30.20 % of the teachers used for the study did apply the 21st-century teaching skills in their science classroom while 69.80 % of the teachers did not use all the 21st-century teaching skills in their science classroom. Therefore, teachers who did not use all the 21st-century teaching skills should be encouraged to apply them to produce 21st-century learners.

Keywords: 21st-Century Teaching Skills, Higher-Order Thinking Skills, Instructional Quality, Pedagogical Change.

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I. INTRODUCTION

Classroom instruction's effectiveness and its link to learning outcomes can be a significant lever for educational transformation. There is a growing interest in how teaching strategies and classroom activities impact students' academic performance and psychological development around the globe, and for good cause. In both developed and developing countries (Pianta & Hamre, 2009), instructional quality is more strongly linked to student learning than school structure (Chavan & Yoshikawa, 2013; Patrinos *et al.*, 2013; Yoshikawa & Kabay, 2015). The variety of talents required for high-quality student learning and teaching, on the other hand, needs core competencies and skills beyond literacy and numeracy, known as 21st-century skills.

The classroom of 21st-century is meant to equip students with the abilities they'll need to excel in the workplace and live in a global society. As a result, the 21st-century skills classroom differs in several ways from the 20th-century skills classroom.

Learning has traditionally been a classroom activity in which students listen to lectures from lecturers while seated in rows at desks. Thus, a learning environment is typically

conceived of as a location or setting where teaching and learning take place, such as in schools, classrooms, or libraries. Students must develop skills that enable them to participate in their learning in the twenty-first century (Prensky, 2008). As a result, a 21st-century learning environment can be defined as a system that organizes the environments in which humans learn best. This approach must meet each learner's individual learning needs while also fostering the positive human relationships that are essential for optimal learning.

Classroom requirements for 21st-century skills differ dramatically from those of the previous century. In the classroom of the twenty-first century, teachers support student learning and foster productive learning environments so that students can develop the skills they will need in the future. The effectiveness of classroom instruction and its relationship to learning outcomes can be a powerful lever for educational change. However, there is still a lot to learn about what takes place in classrooms. Giving students the knowledge, skills, and the need is one of education's main objectives in preparing them for life.

Collaboration is now the common thread that connects all aspects of student learning. The collaborative project-based

approach, for example, guarantees that the curriculum in this classroom encourages effective communication skills, higher-order thinking abilities, and technical competence that students will require for 21st-century jobs and the increasingly globalized environment.

As a result, teachers must adopt new teaching tactics that are vastly different from those used earlier. The goal of this research was to look into the use of 21st-century teaching skills in Ghanaian elementary school science classes.

II. LITERATURE REVIEW

A pedagogical shift can be challenging because it requires the teacher to move from one set of skills to another. A teacher who has been successfully using these past pedagogical skills will typically resist pedagogical change. Fullan (2001), a change theorist, pointed out that reform entails not only implementing new policies but also changing classroom cultures.

New educational programs based on the works of Friedrich Froebel, Jean Jacques Rousseau, and Johann Pestalozzi developed around the turn of the century (Progressive Education, 2008).

Progressive education proponents such as John Dewey believed that schools should reflect society's existence and that education should be a constant reconstruction of the living experience, with the child at the center (Progressive Education, 2008). Dewey believed that to produce 21st-century learners, Schools should instruct children on how to get along with others and collaborate. Topic knowledge, expertise, and literacies are all required for 21st-century learning, in addition to specific skills.

A growing number of educational researches emphasize 21st-century competencies. Kang *et al.* (2012) developed a scale to evaluate primary school students' 21st-century skills, dividing them into three categories: cognitive (information use, information management, information construction, and problem-solving), affective (self-identity, self-management, and self-responsibility, self-value), and sociocultural (self-identity, self-value, self-management, and self-responsibility) (social membership, social sensitiveness, socialization skills, and social accomplishments). Günüş *et al.* (2013) studied how student teachers identify 21st-century student characteristics and divided them into personal skills (thinking freely and creatively, acting in a solution-oriented manner, being able to perform multiple tasks at once, determining goals based on their desires and skills, and being role models), investigative and knowledge acquisition skills (acquiring knowledge, problem-solving, love of learning, and curiosity), and investigative and knowledge acquisition skills (investigative and knowledge acquisition skills (both grasping the principles required to master the technology and effectively applying it).

21st-century skills, according to Kennedy, Latham, and Jacinto (2016), encompass methods of thinking, working, using tools, and living in the world.

The knowledge society, according to Ananiadou and Claro (2009), requires 21st-century abilities. Finegold and Notabartolo (2008) classify 21st-century skills into four groups: analytical skills, interpersonal skills, execution ability, information processing, and change capacity.

According to Thrilling and Fadel, 21st-century skills include knowledge and invention, digital literacy, and job and life skills (2009). Whatever name these abilities are given, they all revolve around the ability to think, learn, and communicate in a complex manner (Saavedra & Opfer, 2012).

21st-century skills include metacognition, critical thinking, creativity, communication, problem-solving, digital and technological literacy, civic duty, and global awareness, to name a few (Dede, 2010). Building such skills should be a top priority in underdeveloped countries where learning outcomes aren't improving. A barrier to achieving the desired outcomes is the lack of context-specific knowledge of teaching practices, as well as providing appropriate methods for aiding teachers in their professional growth (Seidman *et al.*, 2018; UNESCO, 2016; Wolf *et al.*, 2018). To put it another way, how can we assist teachers in acquiring 21st-century skills so that they can raise children who are also 21st-century-ready?

Students in the twenty-first century have drastically different experiences and expectations than students in the twentieth century, thus teachers must change their teaching approaches. Teachers may be astonished to discover that their pupils have already gained the abilities necessary for 21st-century learning outside of the classroom as they acclimatize to these new teaching approaches. Outside of school, these students use technology such as the Internet, text messaging, social networking, and multimedia daily, and they want their learning experience to be interactive and engaging through the use of technology. When teachers continue to teach in a 20th-century manner, there will be a disconnect between how they live and how they are taught, leading to demotivation and boredom in the classroom. Teaching 21st-century students is similar to teaching previous generations. Educators continue to want students to be creative problem solvers with the skills they need to succeed in society and on the job. The distinctions exist between the way skills are taught in the classroom and the way technology is utilized. Being able to do so will influence the way a teacher instructs (Beers, 2013).

The 21st-century learning environment does not need trapping students in a classroom from start to finish but rather converts it into a setting where students are free to walk around, seek answers to the teacher's concerns, and openly converse with their classmates. In the twenty-first century, lessons should never be restricted to a single area or time.

Incorporating 21st-century skills into the classroom requires a methodical approach. The desire for schools to prepare students for 21st-century skills raises pedagogical and assessment concerns (Soland *et al.*, 2013). As a result, this procedure necessitates a great deal of forethought.

According to Rotherham and Willingham (2009), teaching these skills cannot be considered independent of human capital. Teachers, in particular, should receive training in these areas.

By definition, an interactive teacher is completely aware of the group dynamics in the classroom. According to Dörnyei and Murphey (2003), the success of classroom learning is highly dependent on how students interact with one another and with their teacher, the classroom

environment, and how well students cooperate and communicate with one another, and the roles that both the teacher and the students play.

Teachers can perform several roles in the classroom, according to Brown (2010), which can assist students to learn more successfully. Their capacity to do so effectively will be influenced by the relationship they build with their pupils, as well as their knowledge and abilities.

Many authors, according to Harmer (2007), use the term 'facilitator' to describe a specific type of teacher: one who is democratic, in which the teacher shares some leadership with the students, and one who fosters learner autonomy, in which students not only learn on their own but also take responsibility for their learning through the use of group and pair work, as well as acting as a resource rather than a transmitter of knowledge.

Incorporating 21st-century teaching practices such as team games, role play, reading aloud, and whole-class listing can be used in a science classroom to allow teachers to be dynamic, clear, fair, encouraging, supporting, commanding, and efficient.

The twenty-first-century teacher must be a controller by taking advantage of everything that happens in the classroom, including what the students say and how they say it. The main center of attention in the classroom is the teacher; the teacher may have the gift of instruction and may inspire students through his or her knowledge and competence; a prompter who encourages pupils to engage and gives ideas about how they should continue in an activity. The prompter can gently encourage kids who are mute by poking them. Students may lose sight of the thread or be unsure about how to proceed; in this instance, the prompter can provide guidance, but always in a helpful manner; a resource by functioning as a walking resource center, ready to assist if required. The teacher's role as a resource is to demonstrate to pupils how to use existing resources, such as the internet, for their benefit themselves; as an assessor, the teacher must assess how well students are performing; as an organizer, the teacher must give instructions, set up and close activities, and provide content feedback; as a participant, the teacher must interact with students without being overbearing; and as a tutor, the teacher must act as a coach, providing advice and guidance and helping students.

Even though there are studies on 21st-century skills, such as "Improving 21st-century teaching skills: The key to effective 21st-century learners", "Introduction to 21st-century skills and education", and "Transforming Science Teaching Environment for the 21st-Century Primary School Pupils", the majority of this research has failed to address the 21st -century teaching skills or strategies needed by teachers in a science classroom. The study's goal was to observe science teachers' teaching styles to see if they possess and employ 21st-century teaching skills to meet the demands of 21st-century students in a science classroom. The purpose of this study is to determine the social character of teaching processes and to identify 21st-century teaching techniques used by science teachers in Enchi and Assin Foso Junior High Schools.

III. METHODOLOGY

The study adopted a qualitative research design. A self-developed observational checklist was employed to gather relevant data for the study. The study was carried out in Enchi in the Western North Region and Assin Foso in the Central Region of Ghana. The population used for the study was made up of eighteen (18) science teachers selected from six (6) public Junior High Schools in Enchi, the Municipal Capital of Aowin Municipality, and eighteen (18) science teachers selected from six (6) public Junior High Schools in Assin Foso, the Municipal Capital of Assin Central Municipality. A purposive sampling technique was used to select the six (6) public Junior High schools from Enchi and six (6) public Junior High schools from Assin Foso and the thirty-six (36) science teachers were conveniently selected.

The observational checklist was constructed based on some of the 21st-century teaching skills that ought to be demonstrated in classrooms to develop 21st-century skills in learners. Specifically, the instruments sought to examine whether these science teachers play their roles in the science classroom as, controllers, prompters, resource persons, assessors, organizers, participants, tutors, and facilitators during lesson delivery. The observational checklist was used by the researchers as an indicator to observe the participants' lessons to find out whether they apply 21st-century teaching skills in science classrooms. The purpose of the study was explained to participants, and they were guaranteed that any data collected would be kept confidential.

Percentages and average values were used to show the frequency of the various responses from the sampled teachers from which a conclusion was drawn from the data collected from the observational checklist.

IV. RESULTS AND DISCUSSION

Table I presents the dynamics of the participants and the type of 21st-century teaching skills they used in their classrooms. It is worth noting that, the participants used multiple parameters in the science classrooms during the study.

It can be observed in Table I that 8 (22.2%) respondents controlled their class whiles 28 (77.8%) respondents did not in the eighteen lessons observed. Again, 6 (16.7%) respondents were prompting their students' whiles 30 (83.3%) respondent were not prompting their students in the eighteen lessons observed.

TABLE I: OBSERVATIONAL CHECKLIST PARAMETERS

Parameters	Number of participants who applied the parameter (%)	Number of participants who did not apply the parameter (%)	Total (%)
Controller	8 (22.2)	28 (77.8)	36 (100)
Prompter	6 (16.7)	30 (83.3)	36 (100)
Resource	4 (11.1)	32 (88.9)	36 (100)
Assessor	14 (38.9)	22 (61.1)	36 (100)
Organizer	20 (55.6)	16 (44.4)	36 (100)
Participant	12 (33.3)	24 (66.7)	36 (100)
Tutor	10 (27.8)	26 (72.2)	36 (100)
Facilitator	13 (36.1)	23 (63.9)	36 (100)
Average Parameters Value	11 (30.6)	25 (69.4)	36 (100)

Also, 4 (11.1%) out of 36 participants observed acted as a walking resource while 32 (88.9%) did not act as a walking resource during the lesson delivery. Again, 14 (38.9%) respondents assessed their students while 22 (61.1%) respondent did not assess their students during lesson delivery in the eighteen lessons observed.

On Table I, it can be observed that 20 (55.6%) respondents were able to organize the class properly during their lesson delivery while 16 (44.4%) respondents were able to organize the class properly during their lesson delivery.

Out of the 36 respondents, 12 (33.3%) respondents acted as a participant during the teaching and learning process while 24 (66.7%) respondents did not act as a participant during the teaching and learning process.

It can be observed from Table I again that out of 36 respondents, 10 (27.8%) acted as a tutor while 26 (72.2%) did not act as a tutor, and 13 (36.1%) respondents facilitated their lessons while 23 (63.9%) did not.

From Table I an average of 11 (30.6%) participants used the 21st-century teaching skills in their classroom while 25 (69.4 %) participants did not use the 21st-century teaching skills in their classrooms.

CONCLUSION

The findings of the observational checklist support Finegold and Notabartolo's (2008) classification of 21st-century skills as analytic, interpersonal, and execution skills.

The ability of instructors to employ 21st-century skills is dependent on their competencies. As a result, teachers who did not apply 21st-century teaching skills in this study should master 21st-century teaching skills to develop 21st-century learners.

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