

Pre-Service and In-Service Teachers Perceptions and Practices of the 21st Century Teaching Skills in Basic Schools

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Abstract: This study investigated the perceptions and practices of pre-service and in-service teachers regarding 21st-century teaching skills using a mixed-method approach involving surveys and classroom observations. A sample of 80 teachers was randomly selected from pre-service teachers in Al-Faruq College of Education and in-service teachers from local schools in Wenchi Municipality. Results indicated significant differences in perceptions ($t(78) = 2.72, p = .008$) but no significant differences in teaching practices ($t(78) = -1.03, p = .308$) or challenges faced ($t(73.94) = 1.73, p = .087$). Recommendations included targeted professional development for in-service teachers, support and mentorship for all teachers, and modifications to teacher education programs to enhance practical experiences. Additionally, workshops and seminars for pre-service teachers and their mentors were suggested to better prepare them for classroom challenges.

Keywords: 21st century teaching skills, pre-service teachers, in-service teachers, perceptions, practices, challenges

Introduction

The educational landscape is rapidly evolving in the 21st century emphasizing the need to equip teachers with necessary skills to prepare learners for success in an increasingly complex and interconnected world. Consequently, the educational system in Ghana has gone through several reforms and modifications leading to several changes not only in the structure and the but also in the curriculum development and its implementations.

Ghana's transition from an Objective-Based Curriculum to Standard-Based curriculum marks a shift from teacher-centered, content-heavy rote learning to a learner-centered competency -based approach and the focus of this new standard based curriculum is on what learners should know and do at specific level of the educational phase fostering 21st -century teaching skills holistic development of the learner rather than just passing exams. [1]. Therefore, the focus has now shifted from what the teacher is able to achieve at the end of the lesson to what the learner is able to do and also meeting the 21st century core competencies. The implementation began after nearly two years of preparing

teachers through professional learning community sessions. The question that comes to mind is how teachers integrate these 21st century teaching skills into the teaching and learning. [2] were of view that the persistent absence of a detailed and systematic curriculum addressing the pedagogy of these skills remain a challenge for the teacher education. Also, the new standard based curriculum seems to have in-built focus on digital literacy and ICT integration however, most schools in Ghana do not have the necessary facilities and resources to aid ICT integration in their lesson [3].

The concept 21st century teaching skills covers a range of competencies that are considered as essential for students' success in the modern workforce. Emphasizing on its importance, the [4], highlighted that these skills are crucial in enabling students to navigate the challenges of the digital age and thrive in a rapidly changing economy. [5] stresses the importance of creating a supportive and collaborative school culture that values the innovation and continuous improvement in school activities and its programs. These skills are necessary for students to strive in the modern economy where creativity and problem-solving are highly valued.

Even though, several studies have emphasized the importance of integrating 21st century teaching skills in shaping both pre-service and in-service proficiency teacher education program, research indicate that many programs still struggle to integrate these skills into their curriculum. Also, Research has shown that there is a growing concern on integrating 21st-century skills into pre-service educational teaching practice, and many in-service teachers still lack the necessary proficiency in these areas of practice. [6] emphasize the need to support both pre-service and in service teachers acquiring these skills.

[7] emphasize the need for teacher education programs to align with the demand of the 21st century classroom and provide teachers with the necessary tools and strategies to effectively support student learning.

Despite extensive research on 21st-century skills in education, a comprehensive understanding of how both pre-service and in-service teachers perceive and integrate these skills into their pedagogical practices remains largely unexplored, particularly within diverse educational contexts.

Pre-service teachers may encounter several challenges in developing proficiency in 21st -century teaching skills, they may lack opportunities for first- hand experience and practical application of these skills in real classroom settings while In-service teachers may struggle with resistance to change, limited access to professional development and inadequate resources. To address these challenges, [8] opined that targeted support and ongoing professional development are very necessary.

Again, schools and policymakers play a key role in supporting both pre-service and in-service teachers in developing proficiency in 21st century teaching skills. Therefore, Collaboration between educational institutions, government entities and other stakeholders is necessary to create a supportive environment that values innovation, continuous learning and professional growth. In order to understand how both pre-service and in-service teachers perceive and integrate these skills into their pedagogical practices, the researcher selected some schools and colleges within the Wenchi Municipality for this study.

Wenchi Municipality serves as a valuable case study for examine and comparing the proficiency of both pre-service and in-service teachers in 21st century teaching skills. The municipality has several basic schools and colleges such as Al-Faruq college of education and Wenchi Agricultural college. It has senior high schools such as Wenchi Senior High School, Koase Senior high school and Islamic Senior high school and primary and junior high schools such as Wenchi Methodist school and Al-haji Beni Basic Islamic school.

This study will examine pre-service and in-service teachers' perception and practices of 21st century teaching, identifying existing challenges and exploring strategies for improvement.

Objectives of the study

1. To determine the significant difference in Perception between the pre-service and in-service Teachers 21st century Teaching skills
2. To ascertain the significant difference in Practices between the pre-service and in-service Teachers 21st century Teaching skills
3. To find out the significant difference in the Challenges faced by both the pre-service and in-service Teachers in terms of 21st century Teaching skills integration.

Research Hypotheses

H₁. There is no significant difference in Perception between the pre-service and in-service Teachers 21st century Teaching skills

H₂. There is no significant difference in Practices between the pre-service and in-service Teachers 21st century Teaching skills

H₃. There is no significant difference in the Challenges between the pre-service and in-service Teachers 21st century Teaching skills

Significance of the Study

This study will provide valuable insights into the current state of pre-service and in-service teachers' proficiency in 21st-century teaching skills in the Wenchi Municipality. The findings from this study can also inform policymakers, school leaders, and teacher

training programs on the specific needs and areas for improvement in teachers' professional development. Ultimately, enhancing teachers' proficiency in 21st-century teaching skills can lead to improved student outcomes and better preparedness for the demands of the modern workforce.

Delimitations of the Study

Even though there are several schools and colleges in the Wenchi Municipality, this study will be limited to Al-Faruq college of education and the basic schools where student teachers do their teaching practice.

Literature Review

This study reviewed literature on the following topics:

1. Meaning and theory underpinning the 21st Century Skills in the classroom instructions.
2. Level of perception and practices of pre-service and in-service teachers in integrating 21st-century teaching skills in classroom instruction
3. The level of challenges and prospects pose to the pre-service and in-service teachers in integrating the 21st century skills in the classroom instructions.
4. Perception and practices of male and female pre-service and in-service teachers in integrating 21st-century teaching skills in classroom instruction.
5. How Pre-Service and In-Service Teachers can integrate 21st century skills into teaching and learning

2.1 Introduction

There has been a significant change to the way education should be delivered in this 21st century era. With the rapid advancement of technology and ever-changing demands of the global economy, educators are expected to equip students with the necessary skills to thrive in the 21st century workforce. These teaching skills are primarily underpinned by the constructivist and social constructivist learning theories which emphasize that learners actively construct knowledge through experience and social interaction. These theories support the development of 21st century teaching skills like critical thinking, communication, creativity, collaboration through methods like real-world problem - solving and project- based learning.

The 21st century teaching skills refers to a broad a set of knowledge, skills, work habits, and character traits that are believed to be critically important to success in today's world and contemporary careers and workplaces.

There are several definitions given by scholars on the term 21st century teaching skills emphasizing the need for new form of learning to tackle the global challenges. However,

despite this consensus, there is no unique and single approach to the definition of '21st Century Skills' [9]

Many researchers have tried to explain this concept through the identification of multiple competencies and skills and have synthesized them according to analytical framework. The literature reveals some Key examples such as the '4Cs' which was promoted by the Partnership for 21st Century Learning (P21) initiative, which was formulated by Battelle for Kids in 2019. This framework was designed to help educators integrate 21st-century skills in teaching [10].

It also highlights the four core 21st-century skills that learners must develop: the '4Cs' (Critical thinking, Communication, Collaboration and Creativity), these are range of attributes which should be developed within the context of teaching core subject areas. This is based on the assertion that 21st century challenges will demand a broad set of skills emphasising the individual's capabilities in core subject skills, social and cross-cultural skills, proficiency in languages, and an understanding of the economic and political forces that affect societies.

The '3Rs' was defined by [11] and Wagner [12], the '3Ps' was also promoted by [13], and ATC21S conceived by [14].

In defining this concept [15] opined that '21st Century Skills' are 'the knowledge, skills and attitudes necessary to be competitive in the twenty-first century workforce, participate appropriately in an increasingly diverse society, use new technologies and cope with rapidly changing workplaces. As the society keep on changing with new discoveries and findings coming into play from different parts of the world, the 21st century teacher must be well equipped with necessary skills knowledge and competences to provide what the society demands.

Despite the diversity in terminologies by various studies the key concept can be consolidated into five key areas such as:

- Communication skills, including language and presentation of ideas.
- Collaborative skills, including management of group activities and social interaction.
- Individual learning approaches, including critical thinking, metacognition and new skills acquisition.
- Individual autonomy, including flexibility, adaptability and entrepreneurship.
- ICT and digital literacy, including use of technology as tools for learning, communication and collaboration. [16].

The need for 21st century teaching skills at all levels of education stem from the fact that there is a change in societies resulting from the rapid spread of technology; increasing globalisation and internationalisation; and the shift from industrial social economies to information and knowledge-based social economies [17].

2.2 Level of Perceptions and Practices of pre-service and in-service teachers on 21st Century Teaching Skills

Pre-service and in-service teachers play a crucial role in the development and implementation of 21st century teaching skills in the classroom. This review of literature aims to explore how pre-service and in-service teachers perceive and practice 21st century teaching skills, including the level of awareness, knowledge, and application of these skills in their teaching practices in our various schools and colleges of education.

Several studies have indicated that pre-service and in-service teachers have varying levels of awareness and perception of 21st century teaching skills. In a study by [18], it was found that pre-service teachers had a basic understanding of 21st century teaching skills, but lacked the depth of knowledge and practical application necessary to effectively integrate these skills into their teaching practices. On the other hand, in-service teachers demonstrated a better understanding of 21st century teaching skills, but still faced challenges in implementing them in the classroom.

Furthermore, research by [19] found that pre-service teachers often perceived 21st century teaching skills as being secondary to traditional teaching methods, such as lecture-based instruction. This perception may stem from a lack of exposure to innovative teaching practices during their teacher education programs. In contrast, in-service teachers who had participated in professional development programs focused on 21st century teaching skills were more likely to view these skills as essential for student success and actively incorporate them into their teaching practices. It is worth noting that the level of practice of 21st- century teaching skills among pre-service and in-service teachers varies depending on their training, experience, and support systems. Research by [20] found that pre-service teachers often struggle to translate their theoretical knowledge of 21st century teaching skills into practical classroom strategies. This is often due to a lack of hands-on experience and mentorship during their teacher education programs.

In contrast, in-service teachers who have access to ongoing professional development and support are more likely to actively practice 21st century teaching skills in the classroom. Research by [21] found that in-service teachers who participated in technology integration training programs were able to successfully implement 21st century teaching skills, such as digital literacy, collaboration, and critical thinking, in their teaching practices.

Both pre-service and in-service teachers face a number of challenges in integrating 21st century teaching skills into their teaching practices. These challenges include a lack of time, resources, and support, as well as resistance to change from school administrators and parents. Additionally, pre-service teachers may lack the necessary training and exposure to innovative teaching practices during their teacher education programs, while in-service teachers may struggle to keep up with rapidly evolving technologies and pedagogical approaches.

However, there are also opportunities for pre-service and in-service teachers to enhance their practice of 21st century teaching skills. This includes investing in ongoing professional development, mentorship, and collaboration with colleagues to share best practices and innovative teaching strategies. Schools and educational institutions can also provide support and resources to help teachers effectively integrate 21st century teaching skills into their teaching practices.

In conclusion, the perception and practice of 21st century teaching skills among pre-service and in-service teachers is a complex and multifaceted issue. While both groups demonstrate varying levels of awareness and application of these skills, it is essential for teachers to continue to invest in professional development and support to enhance their teaching practices. By fostering a culture of continuous learning and innovation, pre-service and in-service teachers can effectively integrate 21st century teaching skills into their classrooms to support student success in the 21st century.

2.3 The Current Demand for the 21st Century Skills

The literature review suggests that the need for 21st Century Skills at the global level is dictated by a combination of factors, including the change in societies resulting from the rapid spread of technology, increasing globalisation and internationalisation, and the shift from industrial social economies to information and knowledge-based social economies [22]. This has become necessary for nations to re-orient their educational goals towards attainment of metacognition skills which essential for the job market.

[23], were of the view that problem-solving, teamwork and communication are the top three skills that companies require and will increasingly need in the next years. As the requirement of labour markets changes rapidly, many countries already recognise the importance of 21st Century Skills by including them in their education goals [24].

At the regional level however, a significant diversity in demand based on developmental context. [25]

The study identified that the need for 21st Century Skills seems to be clear in contexts of rapid development, such as East Asian countries [26], where labour markets are increasingly demanding a workforce with non-routine cognitive skills and interpersonal skills [27]. They however opined that many developing countries are deeply affected by

weak results in cognitive skills (particularly reading and mathematics), which are often recognised as a prerequisite for developing soft competencies such as critical thinking and problem-solving [28]

2.4 How Pre-Service and In-Service Teachers can integrate 21st century skills into teaching and learning

It is essential for teachers to incorporate 21st -century teaching skills into their lesson delivery in order to prepare students for the rapidly changing world. These skills encompass critical thinking, collaboration, communication, creativity, and digital literacy. This review explores various ways in which teachers can effectively integrate these skills into their teaching practices.

One of the ways teachers can integrate 21st- century teaching skills into lessons is by promoting critical thinking. According to P21 (Partnership for 21st- Century Learning), critical thinking involves analyzing and evaluating information in order to solve problems and make decisions. Teachers can encourage critical thinking by posing open-ended questions, promoting discussions, and engaging students in hands-on activities that require them to think critically about the material. By fostering critical thinking skills, teachers can help students become independent learners who are able to adapt and thrive in the rapidly changing world.

Collaboration is another key 21st -century teaching skill that teachers should incorporate into their lessons. According to the National Education Association, collaboration involves working effectively with others in order to achieve a common goal. Teachers can promote collaboration by assigning group projects, fostering a supportive classroom environment, and incorporating peer review activities. By encouraging collaboration, teachers can help students develop important interpersonal skills such as teamwork, communication, and conflict resolution, which are essential for success in the 21st= century workplace.

Communication is also a critical 21st- century teaching skill that teachers should focus on in their lessons. Effective communication involves clearly conveying ideas and information through a variety of mediums, including writing, speaking, and digital media. Teachers can promote communication skills by assigning presentations, incorporating technology into lessons, and providing feedback on student work. By emphasizing communication skills, teachers can help students learn how to effectively express themselves and engage with others in a meaningful way.

Creativity is another important 21st century teaching skill that teachers should integrate into their lessons. According to the World Economic Forum, creativity is one of the top skills employers are looking for in the 21st century. Teachers can foster creativity by encouraging students to think outside the box, explore different perspectives, and take risks in their learning. By promoting creativity, teachers can help students develop innovative solutions to complex problems and become confident, self-directed learners.

Finally, digital literacy is a crucial 21st century teaching skill that teachers should incorporate into their lessons. According to the National Education Association, digital literacy involves using technology to effectively access, evaluate, and create information. Teachers can promote digital literacy by integrating technology into lessons, teaching students how to conduct research online, and guiding them in the use of digital tools for communication and collaboration. By emphasizing digital literacy, teachers can help students develop the skills they need to navigate the digital world and succeed in the 21st century workforce.

Overall, integrating 21st century teaching skills into lessons is essential for preparing students for success in the rapidly changing world. By promoting critical thinking, collaboration, communication, creativity, and digital literacy, teachers can help students develop the skills they need to thrive in the 21st -century. By incorporating these skills into their teaching practices, teachers can create a dynamic and engaging learning environment that prepares students for success in school and beyond.

Materials and Methods

This study utilized a mixed-methods approach, including surveys and classroom observations. The sample consisted of pre-service teachers from Al-Faruq College of Education and in-service teachers from near -by local schools where the pre-service teachers do their field teaching practice in the Wenchi Municipality. A total of 80 pre-service and in-service teachers were randomly selected for the study. The pre-service teachers were level 400 students who were in the field for their teaching practice, and the in-service teachers were those mentoring the pre-service teachers in their various schools of practice.

A questionnaire was distributed to gather quantitative data on teachers' perceptions and practices in 21st-century teaching skills. An observation guide was prepared to further explore teachers' classroom practices, and this provided insights into how teachers incorporate 21st-century teaching skills into their instructional strategies. The questionnaire consists of two parts. The first part is the profile of the respondents, and the second part is intended for the variables associated with 21st -Century skill acquisition. Among the twelve (12) identified 21st-century skills, only seven (7) skills were used in the survey: collaboration, critical thinking, creativity, communication, digital literacy, social skills, and leadership.

Results

The data collected for the study was analyzed and interpreted based on the research hypotheses formulated. Table 3-7 presents the results on the research hypotheses.

Table 1. : Analysis of the Teachers who responded to the questionnaire

Teacher Status	N	Frequency	Percentage
Pre-Service	40	40	50
In-Service	40	40	50
Total	80	80	100

Table 1 above shows the status of teachers who responded to the questionnaire. 40 pre-service teachers which corresponded to 50% and 40 in-service teachers which correspond to 50% responded to the questionnaire for the study.

Table 3: shows mean and standard deviation scores for pre-service and in-service teachers' perception, practices and challenges on the 21st century teaching skills

Variable	Teacher Status	Frequency	Mean	Standard Deviation
Perceptio	Pre-Service	40	4.05	0.96
	In-Service	40	3.48	0.93
Practices	Pre-Service	40	3.63	0.95
	In-Service	40	3.83	0.78
Challenges	Pre-Service	40	3.73	0.85
	In-Service	40	3.35	1.08

The table above shows the mean perception score of 4.05 for pre-service teachers and 3.48 for in-service teachers. Also, the mean practices scores for the pre-service teachers is 3.63 and the in-service teachers was 3.83. Again, the mean challenging score for the pre-service teachers was 3.73 and the 3.35 for the in-service teachers.

Table 3: H₁. There is no significant difference in Perception between the pre-service and in-service Teachers 21st century Teaching skill

Test	F	df1	Df2	P
Levene's Test (Mean)	0.33	1	78	.569
Levene's Test (Median)	0.34	1	78	.569
F-Test	1.06	39	39	.864

This table shows the results of two different tests for equality of variances: Levene's Test and the Brown-Forsythe Test. Both tests are used to assess whether two or more groups have equal variances, which is an important assumption in many statistical tests like the t-test or ANOVA.

Interpretation. Levene's Test (Mean) Levene's Test using the mean checks if the variances are equal across your groups. A test statistic (F) of 0.33 is obtained, with degrees of freedom 1 and 78. The p-value is .569. Typically, a p-value threshold of 0.05 is used to determine statistical significance. Since .569 is greater than 0.05, this suggests that the test did not find statistically significant evidence to reject the null hypothesis of equal variances. Therefore, the variances are equal for the purposes of further analysis like a t-test or an ANOVA.

The Brown -Forsythe Test is a variation of Levenes Test that is less sensitive to non - normal data distribution since it uses the median. It has a test statistic of 0.34 and a p-value of 0.564. Typically, a p-value of threshold of 0.05 is used to determine statistical significance. This high p-value indicate that there is no significant evidence to suggest a violation of assumption of equal variances. Thus, according to the Brown- Forsythe Test, the variance across the groups can also be considered equal. So, in summary both tests suggest that the assumption of equal variances holds for the data. The table also contains two rows, one row for the case where equal variance is assumed and one row for the case where unequal variance is assumed. The p-value of .569 calculated with the Levene test (previous table) is above the standard significance level of 0.05. This means that there is not enough evidence to reject the null hypothesis of equal variance. In other words, we can assume that the variances of the two groups (PRE-SERVICE and IN-SERVICE) are approximately equal. We can therefore proceed with the row for equal variances.

Table 5: The results of a t-test for independent samples for the two group PRE-SERVICE and IN-SERVICE in relation to the dependent variable PERCEPTION.

		T	Df	P	Cohen's d
Perception	Equal variances	2.72	78.00	0.008	0.61
	Unequal variances	2.72	77.94	0.008	0.61

This table shows the results of a t-test for independent samples, which is used to test whether there is a difference between the two groups (or samples) PRE-SERVICE and IN-SERVICE in relation to the dependent variable PERCEPTION. More specifically, the t-test is used to determine whether there is a statistically significant difference between the means of the two groups PRE-SERVICE and IN-SERVICE Teachers 21st century teaching skill. The two tailed t-test for independent samples (equal variances assumed) showed that the difference between PRE-SERVICE and IN-SERVICE with respect to the dependent variable PERCEPTION was statistically significant, $t(78) = 2.72$, $p = .008$, 95.00% confidence interval [0.15, 1.00]. Thus, the null hypothesis that there was no difference in the mean value between the two groups was rejected. The Cohen's d value of 0.61 represents a medium effect size.

Table 4: H₂. There is no significant difference in Practices between the pre-service and In-service Teachers 21st century Teaching skills

Test	F	df1	Df2	P
Levene's Test (Mean)	3.14	1	78	.08
Levene's Test (Median)	2.17	1	78	.145
F-Test	1.49	39	39	.219

This table shows the results of two different tests for equality of variances: Levene's Test and the Brown-Forsythe Test. Both tests are used to assess whether two or more groups have equal variances, which is an important assumption in many statistical tests like the t-test or ANOVA. Levene's Test using the mean checks if the variances are equal across your groups. A test statistic (F) of 3.14 is obtained, with degrees of freedom 1 and 78. The p-value is .08. Typically, a p-value threshold of 0.05 is used to determine statistical

significance. Since .08 is greater than 0.05, this suggests that the test did not find statistically significant evidence to reject the null hypothesis of equal variances. Therefore, you may assume that the variances are equal for the purposes of further analysis like a *t*-test or an ANOVA. The Brown-Forsythe Test is a variation of Levene's Test that is less sensitive to non-normal data distributions since it uses the median. It has a test statistic of 2.17 and a *p*-value of .145. Typically, a *p*-value threshold of 0.05 is used to determine statistical significance. This high *p*-value indicates there is no significant evidence to suggest a violation of the assumption of equal variances. Thus, according to the Brown-Forsythe Test, the variances across the groups can also be considered equal. In summary, both tests suggest that the assumption of equal variances holds for the data. The table also contains two rows, one row for the case where equal variance is assumed and one row for the case where unequal variance is assumed. The *p*-value of .08 calculated with the Levene test (previous table) is above the standard significance level of 0.05. This means that there is not enough evidence to reject the null hypothesis of equal variance. In other words, we can assume that the variances of the two groups (PRE-SERVICE and IN-SERVICE) are approximately equal. We can therefore proceed with the row for equal variances

Table 5: The results of a *t*-test for independent samples for the two group PRE-SERVICE and IN-SERVICE in relation to dependent variable PRACTICES

		<i>T</i>	<i>Df</i>	<i>P</i>	Cohen's <i>d</i>
Practices	Equal variances	-1.03	78	.308	0.23
	Unequal variances	-1.03	75.11	.308	0.23

This table shows the results of a *t*-test for independent samples, which is used to test whether there is a difference between the two groups (or samples) PRE-SERVICE and IN-SERVICE in relation to the dependent variable PRACTICES. More specifically, the *t*-test is used to determine whether there is a statistically significant difference between the means of the two groups PRE-SERVICE and IN-SERVICE.

The two tailed *t*-test for independent samples (equal variances assumed) showed that the difference between PRE-SERVICE and IN-SERVICE with respect to the dependent variable PRACTICES was not statistically significant, $t(78) = -1.03$, $p = .308$, 95.00% confidence interval [-0.59, 0.19]. Thus, even though there was a difference in their mean practices score but it was not statistically enough to reject the null hypothesis. Therefore, the null hypothesis that there was no difference in the mean value between the two groups was not rejected. The Cohen's *d* value of 0.23 represents a small effect size.

Table 6: H₃. There is no significant difference in the Challenges between the pre-service and in-service Teachers 21st century Teaching skills

Test	F	df ₁	Df ₂	P
Levene's Test (Mean)	4.42	1	78	.039
Levene's Test (Median)	4.66	1	78	.034
F-Test	1.61	39	39	.14

This table shows the results of two different tests for equality of variances: Levene's Test and the Brown-Forsythe Test. Both tests are used to assess whether two or more groups have equal variances, which is an important assumption in many statistical tests like the *t*-test or ANOVA. Levene's Test using the mean checks if the variances are equal across your groups. A test statistic (*F*) of 4.42 is obtained, with degrees of freedom 1 and 78. The *p*-value is .039. Typically, a *p*-value threshold of 0.05 is used to determine statistical significance. The *p*-value of .039, which is less than the conventional alpha level of 0.05, suggests that there is statistically significant evidence to reject the null hypothesis of equal variances. This means that the variances of the groups are likely different. The Brown-Forsythe Test is a variation of Levene's Test that is less sensitive to non-normal data distributions since it uses the median. It has a test statistic of 4.66 and a *p*-value of .034. Typically, a *p*-value threshold of 0.05 is used to determine statistical significance. The *p*-value of 4.66 is also less than 0.05, indicating statistically significant evidence to reject the null hypothesis of equal variances.

In summary, both Levene's Test and the Brown-Forsythe Test indicate that the variances in your groups are not equal. Again, the table contains two rows, one row for the case where equal variance is assumed and one row for the case where unequal variance is assumed. The *p*-value of .039 calculated with the Levene test (previous table) is below the standard significance level of 0.05. This means that there is enough evidence to reject the null hypothesis of equal variance. In other words, we can assume that the variances of the two groups (PRE-SERVICE and IN-SERVICE) are not equal. We can therefore proceed with the row for unequal variances.

Table 7: The results of a t-test for independent samples for the two group *PRE-SERVICE* and *IN-SERVICE* in relation the dependent samples *CHALLENGE*

		<i>T</i>	<i>Df</i>	<i>P</i>	<i>Cohen's d</i>
<i>CHALLENGES</i>	<i>Equal variances</i>	1.73	78	.087	0.39
	<i>Unequal variances</i>	1.73	73.94	.087	0.39

This table shows the results of a t-test for independent samples, which is used to test whether there is a difference between the two groups (or samples) *PRE-SERVICE* and *IN-SERVICE* in relation to the dependent variable *CHALLENGE*. More specifically, the t-test is used to determine whether there is a statistically significant difference between the means of the two groups *PRE-SERVICE* and *IN-SERVICE*. A two tailed t-test for independent samples (equal variances not assumed) showed that the difference between *PRE-SERVICE* and *IN-SERVICE* Teachers with respect to the dependent variable *CHALLENGE* was not statistically significant, $t(73.93931824531124) = 1.7326432655330384$, $p = .087$, 95% confidence interval $[-0.06, 0.81]$. Thus, the null hypothesis that there was no difference in the mean value between the two groups was not rejected. The Cohen's *d* value of 0.39 represents a small effect size.

Discussion of Findings

This chapter presents the summary of the study including the purpose of the study, the objectives, the methodology employed as well as the results obtained from the analyses of data will also be discussed under this section.

This study investigated whether there is a significant difference between the pre-service and in-service teachers' perception, their classroom practices and the challenges they faced in integrating 21st century teaching skills in some selected basic schools within Wenchi Municipality.

The result from the study indicates that there is a significant difference between the pre-service teachers and in-service teachers on how they perceived the 21st century teaching skills in terms of its value, it's awareness and importance to the educational development of the learner.

From the results, Pre-service teachers have a significantly higher perception score compared to in-service teachers, indicating that they may have a more positive attitude towards teaching practices and professional development. This finding aligns with

research by [29] who also found that pre-service teachers tend to be more optimistic and open-minded towards new teaching methods.

Also, the higher perception score of pre-service teachers suggests that they may be more receptive to innovative teaching approaches and more willing to engage in ongoing professional development opportunities. This finding is consistent with the literature that suggests pre-service teachers are more flexible in adopting new educational practices compared to in-service teachers. [30]

Again, the lower perception score of in-service teachers may indicate a need for targeted professional development programs or interventions to enhance their attitudes and beliefs towards effective teaching practices. This is supported by research conducted by [31] which emphasized the importance of continuous professional development for in-service teachers to improve teaching quality.

Besides, the difference in perception scores between pre-service and in-service teachers highlights the importance of ongoing support and mentorship for teachers at all stages of their career to promote continuous growth and improvement. Studies by [32] have shown that mentorship programs can positively impact teacher perception and efficacy in the classroom.

Furthermore, the discrepancy in perception scores between pre-service and in-service teachers may also be influenced by the level of experience and exposure to different teaching methodologies. While pre-service teachers are more likely to be exposed to current trends in education through their coursework, in-service teachers may benefit from opportunities for professional learning communities or collaborative learning experiences to stay current with best practices [33].

Moreover, the second hypothesis test indicates there is a significant difference between pre-service and in-service teachers 21st century teaching skills in terms of their classroom practices and integration into their teaching and learning. The results from the t-test indicates that even though there is a difference between their classroom mean score practices on the 21st century teaching skills, the difference is not statistically significant to reject the null hypothesis.

The higher practices score of in-service teachers compared to pre-service teachers suggests that years of experience and on-the-job training contribute to a more refined and effective teaching approach. This finding is in line with research by [34] which indicates that in-service teachers tend to develop more sophisticated instructional practices over time.

Again, the lower practices score of pre-service teachers may indicate a need for additional practical training and hands-on experiences during their teacher education

programs to better prepare them for the demands of the classroom. Studies by [35] emphasize the importance of incorporating real-world experiences and teaching opportunities into pre-service teacher training to bridge the gap between theory and practice.

Also, the higher practices score of in-service teachers suggests that they have had more opportunities to refine their teaching techniques and adapt their practices based on student needs and feedback. This finding is supported by research by [36] which highlights the role of reflective practice and ongoing professional development in improving teaching effectiveness.

Furthermore, the difference in practices scores between pre-service and in-service teachers underscores the importance of mentorship and peer collaboration in supporting teachers at all career stages. Research by [37] demonstrates that collaborative learning communities and mentorship programs can enhance teaching practices and promote a culture of continuous improvement among educators.

Moreover, the discrepancy in practices scores between pre-service and in-service teachers may also be influenced by access to resources, support, and professional learning opportunities. In-service teachers may have more opportunities for professional development and access to instructional coaching, which can contribute to their higher practices score. This is supported by research by [38] which emphasizes the impact of ongoing professional learning and support on teacher effectiveness and classroom practices.

The third hypothesis test shows that there was a difference in the mean challenge score but the difference was not so significant. The difference in mean challenge scores between pre-service and in-service teachers suggests that pre-service teachers may face more difficulties and hurdles as they transition into the teaching profession compared to their in-service counterparts. This could be due to the lack of practical experience and exposure to real classroom scenarios that pre-service teachers have prior to starting their teaching careers [39].

Again, it is possible that in-service teachers have developed coping mechanisms and strategies over time to deal with the challenges of teaching, leading to a lower mean challenge score. In contrast, pre-service teachers may still be in the process of developing these skills and may feel less equipped to handle the demands of the profession [40].

In addition, the higher mean challenge score for pre-service teachers could also be attributed to the rigorous demands of teacher education programs, which may place additional stress and pressure on individuals who are still in training [41]. This can lead

to feelings of overwhelm and inadequacy among pre-service teachers, reflected in their higher challenge scores.

Again, In-service teachers may have had more opportunities to seek professional development and support throughout their careers, which could contribute to their lower challenge score. These teachers may have access to mentorship programs, workshops, and resources that help them navigate the challenges of teaching more effectively [42].

lastly, the discrepancy in mean challenge scores could also reflect differences in job satisfaction between pre-service and in-service teachers. Pre-service teachers, who are newer to the profession, may be more prone to feelings of disillusionment and dissatisfaction when faced with challenges, whereas in-service teachers may have developed a sense of resilience and fulfillment that buffers them from these challenges [43].

Recommendations

The following recommendations were made based on the findings of the study: There is a need for targeted professional development programs or interventions for in-service teachers within the municipality to enhance their attitudes and beliefs towards effective teaching practices. Also, there is a need to provide support and mentorship for teachers at all stages of their career to promote continuous growth and improvement. Again, teacher education program should be modified to include more practical experience and exposure to real classroom scenarios for pre-service teachers prior to starting their teaching careers. Besides, both pre-service and in-service teachers should have access to mentorship programs, workshops, and resources that will help them navigate the challenges of teaching more effectively. Last, there is the need for teacher training institutions to organize workshops, seminar and briefing for both the pre-service and their mentors before they embark on their field teaching practices.

Suggestions for Further Research

In further studies, the scope of the study population can be widened to increases its generalizability of findings.

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