



Empowering Filipino teachers in Bahrain: The role of cognitive flexibility and teaching leadership in shaping students' 21st-century skills

Mary Jean Dureza¹, Rodalin Asenas², Jose Dennis Dureza³

¹*Arabian Pearl Gulf School*

²*University of Technology Bahrain*

³*Nasser Centre for Science and Technology*

Corresponding email: mjaetalks@proton.me

ABSTRACT

Educational institutions demand teachers to be cognitively flexible and highly skilled in leading their students to success. As 21st-century skills become increasingly essential, educators must assess how their approaches influence student development. This study explores the relationship between cognitive flexibility (CF), teaching leadership (TL), and the improvement of 21st-century skills among Filipino teachers in Bahrain. Specifically, it examines how these factors interact to shape student outcomes. Using a quantitative approach, data were collected from 65 Filipino teachers across various institutions through surveys assessing CF, TL, and students' 21st-century skills attainment. The analysis revealed a significant impact of teaching experience on students' skill acquisition ($F=2.463$, $p=.055$), indicating that seasoned educators are better equipped to promote these critical skills. Furthermore, teaching leadership demonstrated a significant positive effect on students' development of 21st-century skills ($t=2.475$, $p=.016$) at the 5% significance level, underscoring the pivotal role of effective leadership in education. Interestingly, no significant correlation was found between cognitive flexibility and students' 21st-century skills, suggesting that while adaptability remains essential for teachers, leadership qualities may play a more direct role in student success. These results highlight the need for competency improvement programs that prioritize cultivating teaching leadership skills, particularly in contexts where 21st-century competencies are a key focus. Overall, this study emphasizes the significance of teaching leadership and experience in equipping students with the essential skills for success in a rapidly evolving world.

ARTICLE INFO

Received : Oct. 12, 2024

Revised : Dec. 2, 2024

Accepted : Dec. 30, 2024

KEYWORDS

*Cognitive flexibility,
Teaching leadership, 21st
century skills*

Suggested Citation (APA Style 7th Edition):

Dureza, M. J., Asenas, R., & Dureza, J. D. (2024). Empowering Filipino teachers in Bahrain: The role of cognitive flexibility and teaching leadership in shaping students' 21st-century skills. *International Research Journal of Science, Technology, Education, and Management*, 4(4), 114-127. <https://doi.org/10.5281/zenodo.14745223>

INTRODUCTION

The rapid advancement of technology and economic shifts globally has reinforced the relevance of 21st-century skills, such as critical thinking, problem-solving, collaboration, and technological proficiency. These competencies are crucial for thriving across academic and workplace settings.

Responding to these demands, the Bahrain Quality Assurance Authority (BQA) restructured its educational framework to emphasize 21st-century skills, focusing on their integration into teaching and learning processes. Central to this initiative is the role of educators in promoting these skills among students. This study focuses on Filipino teachers in Bahrain, who comprise a significant portion of the local educational workforce, to explore how cognitive flexibility (CF) and teaching leadership (TL) influence students' acquisition of these skills.

The research investigates three key objectives: (1) assessing CF and TL levels among Filipino teachers, (2) examining the relationship between CF, TL, and students' 21st-century skills, and (3) analyzing the impact of teaching experience on these variables. These objectives address the pressing need to evaluate teachers' readiness to cultivate competencies that align with the global and community-driven challenges of the 21st century.

Studies highlight the critical nature of 21st-century skills in shaping students for a fast-evolving global landscape. (Van Laar et al., 2017) categorized these skills into analytical reasoning, innovation, collaboration, and technology integration. Bahrain's reforms, driven by the BQA, aim to align educational outcomes with these skills, ensuring that students can adapt, compete, and excel in the face of rapid changes. By enforcing Key Performance Indicators (KPIs), the BQA seeks sustainable quality enhancement in the education and training sectors.

Educators are pivotal in achieving this vision, but defining the attributes of effective teachers remains challenging. Cognitive flexibility and teaching leadership are critical teacher qualities that enable them to adapt and lead effectively in strengthening 21st-century skills within the context of Bahrain's educational system. In Bahrain, the emphasis on CF and TL reflects a growing alignment with global trends that prioritize these competencies as essential for modern pedagogy. While many countries incorporate these qualities into their educational frameworks, Bahrain's unique socio-cultural context necessitates a tailored approach that addresses local challenges and opportunities (Harris & Spillane, 2008; Dyer, 2018). Filipino teachers, given their significant representation in Bahrain's educational sector, offer a valuable perspective on these dynamics. Evaluating their cognitive flexibility and leadership capabilities is essential to determining their readiness to meet the expectations of modern education.

This study seeks to bridge the gap by exploring the interplay of CF, TL, and teaching experience in shaping students' 21st-century skills, ultimately contributing to the broader goal of enhancing educational outcomes in Bahrain.

OBJECTIVES OF THE STUDY

The central goal of this study is to analyze the students' attainment of 21st-century skills through the cognitive flexibility and teaching leadership of Filipino teachers in Bahrain. To achieve this, the following specific objectives are set:

1. To examine the differences in the attainment of cognitive flexibility, teaching leadership, and 21st-century skills based on years of service. This objective aims to explore how years of teaching experience (categorized into five groups: 21 years and above, 16-20 years, 11-15 years, 6-10 years, and 0-5 years) influence the attainment of these variables.
2. To investigate how cognitive flexibility is perceived in various professional contexts. This includes understanding how cognitive flexibility is applied to enhancing personal and professional development, resolving conflict, meeting deadlines, and adapting to complex duties.

3. To assess the frequency and impact of teaching leadership in an educational setting. This objective focuses on exploring the application of teaching leadership in areas such as its impact on school or university environments, the level of trust among teachers, its effect on student achievements, and its role in improving instructional practice.
4. To analyze the relationship between cognitive flexibility, teaching leadership, and the attainment of 21st-century skills. This objective seeks to determine if there is a significant relationship between cognitive flexibility and teaching leadership in fostering the development of 21st-century skills among students

Related Literature

Cognitive flexibility is a vital trait for effective educators, enabling them to adapt swiftly to dynamic classroom situations and leverage teachable moments for better instructional practices. Teachers who possess this skill can adjust their approaches to align with classroom dynamics, using adaptability as an asset in navigating the complexities of education. Typically, cognitive flexibility in teachers is assessed by presenting real-life classroom scenarios. Educators who excel in this area are often seen as impartial, open to innovative ideas, and capable of revising outdated beliefs when presented with new insights (Diamond, 2013; Miyake & Friedman, 2012).

The importance of cognitive flexibility lies in its ability to help teachers thrive in unpredictable and diverse classroom environments. While many educators display adaptability as they engage students actively, even experienced teachers benefit from enhancing this skill to manage challenging contexts more effectively. Today's classrooms are increasingly diverse, comprising students from various cultural, ethnic, socioeconomic, and religious backgrounds. Such diversity can sometimes create conflict when opposing ideologies clash. In these moments, cognitive flexibility can help educators detach from emotionally charged situations, redirect students' focus from disruptive behaviors, and foster more constructive interactions (Bilgin, 2009).

Often described as "shifting" or "attentional flexibility," cognitive flexibility reflects an individual's capacity to transition between cognitive frameworks, activities, or approaches. It operates at the intersection of awareness, adaptability, and confidence, allowing educators to process new or evolving information and adjust their thoughts or actions accordingly. This essential skill enables teachers to navigate the complexities of modern education effectively while fostering an inclusive and responsive learning environment (Diamond, 2013; Miyake & Friedman, 2012).

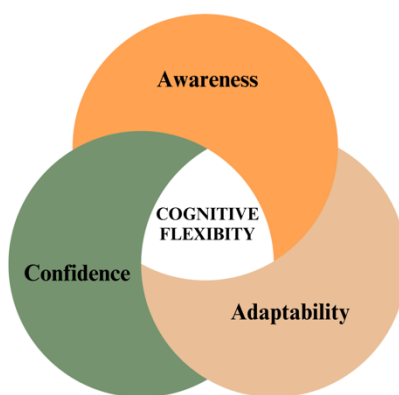


Figure 1: Venn diagram showing cognitive flexibility at the intersection of awareness, adaptability, and confidence.

Awareness

A person's ability to recognize enhanced or diminished alternatives is vital in every assumed condition (Bilgin, 2009; Gündüz, 2013). The concept of cognitive flexibility involves the ability to think about more than one thing at a time (Cartwright, 2002). An individual who is aware can simultaneously consider multiple variables,

including views, encounters, and entities. Obtaining the skill to divide one's attention across two or more routes of knowledge is significant (Anderson, 2002) and demonstrates a degree of cognitive flexibility.

Adaptability

Adaptability highlights the person capability to adjust to new or changing circumstances (Bilgin, 2009; Gündüz, 2013). This involves shifting thinking and attention in response to changing conditions or rules (Hund & Foster, 2008). Additionally, it encompasses the capability to simultaneously visualize an idea or state of action from two or more perspectives (Chi, 1997) while managing multiple tasks at once (Cartwright, 2002). Cognitive flexibility further enables individuals to reflect on past shortcomings and devise unconventional approaches (Anderson, 2002).

Confidence

The ability to exercise control over specific conditions and respond accordingly is a component of cognitive flexibility, awareness, and adaptability. Anderson (2002) referred to this concept as self-efficacy (Bilgin, 2009). Adaptability, awareness, and confidence contribute significantly to cognitive flexibility, which forms part of executive function. These components are crucial for "mental abilities that support creative thinking" (Ritter, Kolb, & Karp, 2014). Cognitive flexibility theory (Spiro, Coulson, Feltovich, & Anderson, 1988) defines this phenomenon as mental shifting, describing the brain's capacity to adjust to new, evolving, or unplanned events. It encompasses task switching, referring to the capacity to transition between different thought processes (Miller, 2021).

Integrating teachers' experiences with cognitive flexibility theory provides a framework for enhancing personal and professional development, resolving conflict, meeting deadlines, and adapting to complex duties. This integration can support the development of productive practices and a deeper understanding of the teaching profession.

Additionally, "Teacher leadership is the method by which educators influence and inspire their peers, principals, and other members of the school community to enhance instructional strategies and learning methodologies, ultimately aiming to boost student achievement" (York-Barr & Duke, 2004). Teacher leaders strive to improve schools by not only instructing students but also inspiring and impacting those around them within their institutions and beyond (Danielson, 2006; Wenner & Campbell, 2017).

Teachers with advanced cognitive flexibility are better equipped to handle challenges such as curriculum changes, examination policy adjustments, and other workplace complexities. Presenting and analyzing teachers' engagement with students through cognitive flexibility theory can effectively illustrate the complexity of students' adaptability in attaining 21st-century skills. This approach can gauge teachers' effectiveness and competence while fostering an environment conducive to innovative teaching practices (Spiro et al., 1988).

Teaching Leadership

To reform schools, teacher leadership is essential (Fullan, 2005). It is crucial for academic staff to support teachers in developing strong professional identities, as suggested by College (2006). However, programs must also empower teachers to become more confident and capable of creating a significant impact on the school systems they serve, thereby enabling college instructors to act as allies in fostering teacher leadership.

Defining teacher leadership, however, remains a complex task, as highlighted by Murphy (2005). When teachers assume leadership roles, they have the potential to strengthen teaching methods, learning outcomes, and the school community, and the broader discipline (Khan & Malik, 2013; Nappi, 2014; Uribe-Alvarez, 2014).

Teacher leadership practices

Harrison and Killion (2007) outline two (2) primary approaches to teacher leadership across formal and informal settings. The formal approach includes structured roles and responsibilities, such as department heads, instructional coaches, and team leaders. Informal leadership, on the other hand, involves influencing peers without holding a formal position, such as being a mentor or advisor. Formal leaders might serve on decision-making committees, while informal leaders provide guidance and inspiration to colleagues (Harrison & Killion, 2007).

Through these avenues, teachers can excel as knowledge providers, instructional designers and curriculum experts, classroom advocates, learning facilitators, mentors, school-leaders, data-driven coaches, and agents of change, and lifelong learners (Harrison & Killion, 2007). Catalysts, for example, often conduct evaluations, manage assessments, analyze results, and adjust instructional priorities to address school needs (Spillane & Sherer, 2004). To achieve the school’s collective vision, teacher leaders build collaborative relationships with colleagues (Tashi, 2015).

Whether formal or informal, teacher leadership involves guiding across and beyond the classroom, motivating others to adopt and enhance teaching methodology (Katzenmeyer & Moller, 2001). Teacher leaders are influential, motivating peers to approach tasks differently and perform in ways they might not otherwise have considered. Danielson (2006) emphasizes that teacher leaders lead by example, cultivating a culture of continuous learning and improvement. They take initiative, inspire colleagues to enhance their practices, and recognize that leadership is deeply intertwined with professional growth. Teacher leadership, whether formal or informal, aims to improve school operations and educational outcomes by fostering collaboration and innovation.

To analyze and evaluate the roles of teacher leaders in the context of this study, the Kentucky Teacher Leadership Framework (2015) acted as a guiding resource framework in figure 2.



Figure 2: Kentucky teacher leadership framework by Kentucky Teacher Leadership Work Team (2015).

This structure is used primarily for two purposes. First, nearly five of the components cited in the outline are carefully arranged in line through teacher leadership procedures, as identified from the narrative mentioned above.

Second, this outline also highlights an aspect of teacher leadership that was previously overlooked in the existing narrative.

A streamlined overview of the teacher leadership procedures stemming from the aforementioned narrative, which has been validated, facilitates readers in understanding the alignment of these procedures with the components recorded in the Kentucky Teacher Leadership Framework, as illustrated in Figure 2.

In attaining 21st-century skills, it is essential for teachers to possess two attributes: cognitive flexibility and teaching leadership skills. This approach aligns with the goals of the Assessment and Teaching of 21st Century Skills (ATC21S) initiative.

According to Binkley et al. (2012), ten skills were identified as part of the ATC21S project and clustered into four categories: means of reasoning (e.g., creativity, innovation, critical thinking, problem-solving, and decision-making); developing the ability to understand one's own thought processes; conducts of implementation (e.g., communication, collaboration); tools for implementation (e.g., information literacy, ICT mastery); and adapting to the world (e.g., citizenship, life and career skills, and personal and social responsibility). Through practicing these skills, teachers can effectively navigate modern educational demands and foster 21st-century competencies in their students, ensuring that teaching aligns with global educational frameworks.

Materials and Methods

Population

The sample size of 65 Filipino teachers was purposely selected to ensure a representative distribution of participants across various educational sectors in Bahrain, including both public and private institutions. This number was deemed sufficient to capture diverse perspectives and experiences, particularly considering the respondents' substantial teaching experience (16-20 years). Additionally, the inclusion of teachers with different academic qualifications (bachelor's and master's degrees) provided a well-rounded view of the factors influencing teaching leadership and students' 21st-century skills.

Research Design and Ethical Procedures

This study employed a descriptive design, incorporating various stages of data processing, including preliminary protocols, data collection, and data analysis. The participants were deliberately chosen according to specific criteria, including their years of experience, and invited to participate through free and informed consent, ensuring ethical standards were met. To protect participants' personal information, unique identifiers and codes were used to ensure privacy and confidentiality.

For data collection, participants received questionnaires via email and chat. The first questionnaire assessed cognitive flexibility through four scenarios, for instance, "describe a situation where you had to change your teaching approach based on student feedback." The second focused on teaching leadership with four scenarios, such as "provide an example of how you have assisted a colleague in enhancing their teaching practice." The third evaluated participants' ability to foster 21st-century skills among students using eight questions, including questions like, "on a scale of 1 to 5, to what extent do you promote collaborative learning among your students?"

To analyze the data, the statistical techniques of ANOVA and regression analysis were applied. ANOVA was utilized to examine the disparities in the acquisition of the 21st-century skills across groups based on years of teaching experience, ensuring the observed variations were statistically significant. Regression analysis was used to examine the predictive relationship between teaching leadership, cognitive flexibility, and students' development of 21st-century skills. These methods enabled a robust examination of both the independent and interacting variables, shedding light on the factors that impact skill acquisition.

Instruments Development and Validation

Cronbach's Alpha tests were conducted on two electronic survey questionnaires to assess their reliability and internal consistency in alignment with the aims of this study. The cognitive flexibility questionnaire yielded a value of .78, indicating a reliability level of 78%, which is classified as "average." In contrast, the teaching leadership questionnaire received a value of .77, or 77%, also categorized as "average."

Furthermore, the assessment of 21st-century skills scored .86, reflecting an 86% reliability rating, which is regarded as high. The questions in the instruments were divided into sections. Using the theoretical frameworks of cognitive flexibility proposed by Spiro et al. (1988) and Bilgin (2009), the questionnaire included four scenarios that assessed the application of cognitive flexibility in teaching and learning contexts. In measuring teaching leadership, four scenarios were constructed based on the Kentucky Teacher Leadership Framework. Lastly, the assessment of the eight questionnaires for 21st-century skills attainment was based on the current Bahrain Qualifications Authority (BQA) frameworks.

RESULTS AND DISCUSSION

1. What is the level of difference in the attainment of cognitive flexibility, teaching leadership, and 21st-century skills based on years of service, specifically:

- 1.1. 21 years and above;
- 1.2. 16-20 years;
- 1.3. 11-15 years;
- 1.4. 6-10 years; and
- 1.5. 0-5 years?

Table 1. The Attainment of Cognitive Flexibility, Teaching Leadership, and 21st-Century Skills Based on Years of Service

		N		Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
							Lower Bound	Upper Bound		
CF	1- 5 Years	6	3.8333	.40825	.16667	3.4049	4.2618	3.25	4.50	
	6- 10 years	18	4.0278	.46089	.10863	3.7986	4.2570	3.25	4.75	
	11 - 15 years	16	3.7969	.33190	.08297	3.6200	3.9737	3.25	4.50	
	16 - 20 years	20	3.9875	.35795	.08004	3.8200	4.1550	3.25	4.50	
	21 years and above	5	3.8000	.41079	.18371	3.2899	4.3101	3.50	4.50	
	Total	65	3.9231	.39262	.04870	3.8258	4.0204	3.25	4.75	
TL	1- 5 Years	6	4.3750	.41079	.16771	3.9439	4.8061	3.75	5.00	
	6- 10 years	18	4.5000	.28440	.06703	4.3586	4.6414	4.00	5.00	
	11 - 15 years	16	4.2813	.36372	.09093	4.0874	4.4751	3.50	5.00	
	16 - 20 years	20	4.5750	.41438	.09266	4.3811	4.7689	4.00	5.00	
	21 years and above	5	4.6000	.33541	.15000	4.1835	5.0165	4.25	5.00	
	Total	65	4.4654	.37206	.04615	4.3732	4.5576	3.50	5.00	
YS	1- 5 Years	6	3.6458	.406330	.165884	3.21942	4.07225	2.875	4.000	
	6- 10 years	18	4.1666	.361268	.085152	3.98701	4.34632	3.500	5.000	

11 - 15 years	16	4.0156 3	.378800	.094700	3.81378	4.21747	3.250	4.625
16 - 20 years	20	4.1562 5	.326653	.073042	4.00337	4.30913	3.375	4.750
21 years and above	5	4.0500 0	.628739	.281181	3.26932	4.83068	3.125	4.750
Total	65	4.0692 3	.400214	.049640	3.97006	4.16840	2.875	5.000

Table 1 illustrates respondents' ratings of cognitive flexibility, teaching leadership, and 21st-century skills. Using a 5-point Likert scale, the standard deviations were .39262 for cognitive flexibility, .37206 for teaching leadership, and .400214 for 21st-century skills. Teaching leadership exhibited values closest to the mean, indicating less variability, while 21st-century skills showed greater dispersion. The calculated means revealed that teaching leadership achieved the highest mean score of 4.4654, followed by 21st-century skills (4.06923), with cognitive flexibility having the lowest mean (3.9231). Confidence intervals further underscored teaching leadership as the strongest contributor, with upper and lower bounds of 4.5576 and 4.3732, respectively.

The findings also highlight the importance of fostering a positive experience for Filipino teachers, enabling them to effectively share their educational expertise. Feedback at key milestones in the employee lifecycle enhances both organizational culture and individual performance. When done effectively, it accelerates teachers' professional growth, boosts retention, and contributes meaningfully to the educational system (Jyothi, 2012).

The findings support the hypothesis that teaching leadership is a significant predictor of students' attainment of 21st-century skills. This aligns with Fullan's (2005) research, which highlights the pivotal role of teacher leadership in fostering school improvement. The implications of this finding are substantial for local educational policies in Bahrain, emphasizing the need for greater investment in teacher leadership growth programs to enhance teaching effectiveness and student outcomes. Moreover, these results resonate with broader global educational practices that increasingly recognize the necessity of empowering teachers as leaders within classrooms and schools. On top of that, cognitive flexibility did not emerge as a significant predictor, a result that diverges from some prior studies emphasizing its importance in cultivating adaptability and innovation among students. This discrepancy may stem from contextual differences or the varied operationalization of cognitive flexibility in other research. Further investigation is needed to clarify the role of cognitive flexibility in educational settings.

Furthermore, teaching experience significantly impacted students' attainment of the 21st-century skills, attributes to the accumulation of pedagogical expertise and classroom management proficiency over time. This finding reinforces the idea that local educational policies should prioritize mentoring and support systems for novice teachers, as well as ongoing professional learning opportunities that leverage experienced educators' insights to foster skill development in innovative ways. These findings emphasize the importance of targeted professional development programs to enhance teaching leadership skills, equipping educators with the tools to better facilitate student outcomes.

Overall, this study emphasizes teaching leadership as a pivotal factor in promoting 21st-century skills. It calls for continuous professional development initiatives focused on leadership, which can inform local educational reforms while contributing to the global discourse on effective teaching strategies. Additionally, further exploration of how cognitive flexibility interacts with teaching practices is vital for fostering innovative learning spaces that cater to the changing demands of students in a globalized contexts.

Table 2. Significant Differences in the Level of Cognitive Flexibility, Teaching Leadership, and 21st-century skills grouped according to their Years of Service

ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
CF	Between Groups	.659	4	.165	1.074	.377
	Within Groups	9.206	60	.153		
	Total	9.865	64			
TL	Between Groups	.944	4	.236	1.789	.143
	Within Groups	7.916	60	.132		
	Total	8.860	64			
YS	Between Groups	1.446	4	.361	2.463	.055*
	Within Groups	8.805	60	.147		
	Total	10.251	64			

*Significant at 10% level

Based on the analysis of variance, there is enough evidence to support a notable shift in the level of 21st-century skills when the respondents are grouped in terms of years of experience ($F=2.463$, $p=.055^*$). However, we cannot perceive the same result regarding the respondents' level of cognitive flexibility and teaching leadership. It can be gleaned from the data that years of service significantly affect students' 21st-century skills attainment. To identify the underlying source of the observed variation, a post-test analysis has been conducted using the Least Significant Difference (LSD) method.

The post-hoc analysis revealed teachers with more than a decade of experience demonstrated significantly higher scores in the development of 21st-century skills compared to those with fewer years of experience. Additionally, no significant differences were found between teachers with five to ten years of experience and those with over ten years, suggesting that a certain threshold of experience is crucial for promoting these skills. In contrast, no significant variation was found in cognitive flexibility and teaching leadership levels across different years of experience, indicating that these factors may not be as influenced by the length of teaching service.

Table 3. 21st Century Skills

Multiple Comparisons

LSD

Dependent Variable	(I) YTE	(J) YTE	Mean Difference		Sig.	95% Confidence Interval	
			(I-J)	Std. Error		Lower Bound	Upper Bound
21 st Century Skills	0- 5 Years	6- 10 years	-.520833*	.180588	.005	-.88206	-.15960
		11 - 15 years	-.369792*	.183388	.048	-.73662	-.00296
		16 - 20 years	-.510417*	.178316	.006	-.86710	-.15373
		21 years and above	-.404167	.231969	.087	-.86817	.05984

*. The mean difference is significant at the 0.05 level.

As shown in the table above, the mean difference of 21st-century skills is perceived to be significantly higher when comparing groups with fewer years of experience than those with higher years of experience. Regarding the last group (21 years and above), people with more experience tend to have higher 21st-century skills. According to

observation, as we moved from groups with less experience to groups with more experience, the mean difference value increased. Hence, the development of 21st – century skills significantly grows with years of experience.

2. How is cognitive flexibility being perceived in terms of the following situations:

- 2.1 Enhancing personal and professional development;
- 2.2 Resolving conflict;
- 2.3 Meeting deadlines; and
- 3.4 Adapting to Complex Duties?

Table 4. Perception on Cognitive Flexibility in Various Situations

Scenario	Mean	Interpretation
1. Enhancing personal and professional development	2.35	Low
2. Resolving conflict	4.37	High
3. Meeting deadlines	4.72	Very High
4. Adapting to complex duties	4.25	High

Table 4 presents the respondents’ perception on cognitive flexibility in various situations. The level of each observation was rated based on the given 5-point scale such as: very high, high, moderately high, low, and very low.

The analysis of the data was known through the mean score obtained from the teachers’ responses on cognitive flexibility. The following were: meeting deadlines (4.72) interpreted as very high while low for enhancing personal and professional development (2.35). On the other hand, high was the interpretation for resolving conflict (4.37) and adapting to complex duties (4.25), respectively.

Meeting deadlines, resolving conflicts, and adapting to complex tasks garnered high scores based on the teachers’ experiences in classroom settings whereas enhancing personal and professional development received the lowest score. It simply means that respondents must always meet deadlines, and to do this, they must have cognitive flexibility. The skill of adapting mental sets, tasks, and strategies is called cognitive flexibility (Diamond, 2013; Miyake & Friedman, 2012).

3. How often can teaching leadership be applied in terms of:

- 3.1 Teaching leadership on its impact in school or university;
- 3.2 Teaching leadership on the level of trust among teachers;
- 3.3 Teaching Leadership on Students’ Achievements; and
- 3.4 Teaching Leadership on improving instructional practice?

Table 5. Teaching Leadership in Various Situations

Scenario	Mean	Interpretation
1. Teaching leadership on its impact at school or university	4.32	High
2. Teaching leadership on the level of trust among teachers	4.26	High
3. Teaching leadership on teachers and students’ achievements	4.80	Very High
4. Teaching leadership on improving instructional practice	4.48	High

Table 5 emphasizes the respondents' perception of teaching leadership in various situations. The garnered mean score determines the perceptibility of the situations based on the teachers' classroom experiences, namely: teaching leadership on teachers and students' achievements (4.80) interpreted as very high while high for teaching leadership on improving instructional practice (4.48), teaching leadership on its impact at school or university (4.32) and teaching leadership on the level of trust among teachers (4.26), respectively.

It is confirmed by (Harrison & Killion, 2007) teachers act as resource providers, instructional and curriculum specialists, classroom assistants, learning coordinators, mentors, school leaders, data coaches, catalysts of change, and lifelong learners, (Spillane & Sherer, 2004) Teacher leaders may also engage in developing assessments, administering them, scoring and analyzing outcomes, and refining instructional goals and priorities. Towards achieving the school's mutual purpose, they create a collaborative relationship with one another (Tashi, 2015).

4. Is there a relationship between cognitive flexibility and teaching leadership on the attainment of 21st-century skills?

Table 6. Significant Relationship Between Cognitive Flexibility and Teaching Leadership on the Attainment of 21st-Century Skills

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.314 ^a	.098	.069	.386091

a. Predictors: (Constant), TL, CF

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.009	2	.504	3.384	.040**
	Residual	9.242	62	.149		
	Total	10.251	64			

**Significant at 5% level

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.733	.618		4.422	.000
	CF	-.088	.144	-.087	-.612	.543
	TL	.377	.152	.350	2.475	.016**

**Significant at 5% level

The regression analysis showed that teaching leadership significantly predicted students' 21st-century skills (t = 2.475, p = .016), explaining 9.8% of the variance. This highlights the importance of effective teaching leadership in shaping students' development of these skills. The implications of this finding are profound for local educational policies, indicating that enhancing teaching leadership could be a key strategy in improving educational outcomes and fostering 21st-century skills among students. For instance, Bahrain's focus on educational reform, driven by the Bahrain Quality Assurance Authority, emphasizes the need for teacher training programs that cultivate leadership skills among educators (BQA, 2021). This aligns with broader global educational practices, such as the Teacher Leadership Model in the United States, which promotes collaborative environments where teachers take on leadership roles to improve instructional practices and student learning (Crow, 2015). By empowering teachers within their schools, both locally and globally, educational systems can more effectively meet the challenges of the 21st

century. However, cognitive flexibility did not significantly influence 21st-century skills ($p = .543$), suggesting that while it may have value in other areas, it does not directly impact students' acquisition in the context of this study, these skills are explored.

CONCLUSION AND RECOMMENDATION

In view of the findings presented, the following conclusions are drawn:

1. Level of Attainment based on Years of Service

The respondents' years of service were considered one of the important factors in determining the level of difference in the attainment of cognitive flexibility, teaching leadership, and 21st-century skills. The result pointed out that one of the goals of selection systems is to make sure that the candidate in teaching has a positive experience. Every phase in the teacher's development can be a vital force affecting both culture and performance. This was specifically discussed in the following:

Cognitive flexibility. The ability to think quickly and adaptively is one of the key traits that define effective teachers. A cognitive flexible individual is often seen as more open-minded, as they can assess the value of new information and adjust their existing beliefs based on new perspectives. In a classroom where the pace is fast, teachers who have been in their professions for a long period of time are adept at switching tasks and are particularly attuned to adapting to changing circumstances.

Teaching leadership. The teachers are conceived to be a leader in both inside and outside the classroom, inspiring others to enhance educational practice. Teacher leader possesses the ability to inspire their colleagues to adopt innovative practices they might not have considered without a leader's influence. Hence, teacher-leaders may delve into their own years of experience before they can persuade others.

21st century skills. In attaining 21st-century skills, it is practical that teachers must possess these two (2) attributes, cognitive flexibility and teaching leadership. It is expected that teachers' meaningful experiences are important in acquiring the earlier-mentioned qualities because if teachers are organizationally fit and organizationally connected, their involvement is essential. Teachers' length of experience can be a yardstick on how they can motivate students to be productive and to perform further. When acted properly, it eases the achievement of 21st-century skills and inspires students to remain focused on how they can impact their own lives.

2. Cognitive Flexibility in Different Situations

Since meeting deadlines, resolving conflicts, and adapting to complex tasks garnered high scores, it simply means that to attain the ability to change mental sets, tasks, and strategies teachers should possess cognitive flexibility. When teachers exercise cognitive flexibility, they can divert their students and their own attention away from an unhealthy situation to one that is more suitable for them. They have the ability to adapt by switching between different mental sets, tasks, or strategies.

3. Teaching leadership in Different Situations

Because teaching leadership is being applied to gain teachers' and students' achievements, to improve instructional practice, to create impact at school/university, and to obtain trust among teachers, it means that teachers have developed their powerful professional identities. They become more confident and capable of having a significant effect on the school/university they serve. They are empowered to enhance teaching, learning, the school environment, and the profession by stepping into a leadership role.

4. Attainment of 21st Century Skills

Looking at the individual loading factors in the tested model, only teaching leadership is statistically significant ($t=2.475$, $p=.016$) at a 5% significance level. Thus, *ceteris paribus* “all other things being equal”, teaching leadership significantly influences the level of 21st-century skill, whereas cognitive flexibility does not. Teachers, in this journey wear many hats, acting as a resource provider, instructional and curriculum experts, classroom supporters, learning coordinators, mentors, school leaders, data coaches, change catalysts and, above all, learners. The teacher leader may also be involved in designing assessments, administering them, scoring and analyzing the results, and identifying and adjusting instructional needs and priorities toward achieving the school/university’s mutual purpose through collaborative relationships.

5. Teacher Professional Development

As teaching leadership is utilized to achieve both teachers' and students' success, improve instructional practices, create a positive impact within schools or universities, and build trust among educators, it demonstrates that teachers have cultivated strong professional identities. This development boosts their confidence and ability to make a meaningful difference in the institutions they serve. By taking on leadership roles, they are empowered to enhance teaching, learning, the school environment, and the overall profession.

6. Policy Recommendations

Educational policies should support and encourage teacher leadership development initiatives.

7. Further Research

Future studies could explore other factors influencing 21st-century skills attainment and investigate the interaction between cognitive flexibility and teaching leadership.

REFERENCES

- Anderson, J. R. (2002). Obtaining the skill to split one's interest involving two or more routes of knowledge. *Learning and Instruction*, 12(5), 455–464. [https://doi.org/10.1016/S0959-4752\(01\)00014-9](https://doi.org/10.1016/S0959-4752(01)00014-9)
- Bahrain Qualification Authority. (2019). *Schools' reviews handbook* (p. 7). Retrieved from <https://www.bqa.gov.bh/En/Publications/DocLib/EN%20V6.pdf>
- Bahrain Quality Assurance Authority (BQA). (2021). *Educational Reform in Bahrain: Key Performance Indicators and Strategic Goals*. Manama, Bahrain: BQA.
- Bilgin, M. (2009). Biliisel esnekliđi yordayan bazı deđişkenler. *Çukurova Üniversitesi Eğitim Fakültesi Dergisi*, 3(36), 142–157.
- Binkley, M., Erstad, O., Herman, J., & Raizen, S. (2012). Defining 21st-century skills. In P. Griffin, B. McGaw, & E. Care (Eds.), *Assessment and teaching of 21st-century skills* (pp. 17–66). Dordrecht, Netherlands: Springer.
- Cartwright, N. (2002). Cognitive flexibility: Thinking about more than one thing at a time. *Cognition and Emotion*, 16(6), 883–895. <https://doi.org/10.1080/02699930143000565>
- Chi, M. T. H. (1997). It's the capability to concurrently picture an idea or state of action from two or more viewpoints. *Cognitive Science*, 21(4), 601–610. https://doi.org/10.1207/s15516709cog2104_5
- College, N. (2006). Supporting teachers in developing dominant specialized personalities. *Journal of Educational Leadership*, 4(1), 45–60.
- Crow, G. M. (2015). *Teacher Leadership: A New Approach to School Improvement*. *Educational Administration Quarterly*, 51(1), 100–118.
- Danielson, C. (2006). *Teacher leadership that strengthens professional practice*. Alexandria, VA: ASCD.
- Diamond, A. (2013). Cognitive flexibility: The ability to switch between different mental sets, tasks, or strategies. *Nature Reviews Neuroscience*, 14(2), 92–104. <https://doi.org/10.1038/nrn3437>
- Dyer, C. (2018). Global Trends in Educational Leadership: Implications for Policy and Practice. *International Journal of Leadership in Education*, 21(1), 115–130.
- Fullan, M. (2005). *Leadership & sustainability: System thinkers in action*. Thousand Oaks, CA: Corwin Press.
- Harrison, C., & Killion, J. (2007). Ten roles for teacher leaders. *Teachers as Leaders*, 65(1), 74–77.

- Harris, A., & Spillane, J. P. (2008). Distributed Leadership Through the Looking Glass. *Leadership and Policy in Schools*, 7(1), 35-56.
- Hund, A. M., & Foster, C. A. (2008). In response to changing conditions or rules: Shifting thinking and attention. *Cognitive Development*, 23(2), 149–164. <https://doi.org/10.1016/j.cogdev.2007.06.002>
- Katzenmeyer, M., & Moller, G. (2001). *Awakening the sleeping giant: Helping teachers develop as leaders*. Corwin Press.
- Kentucky Department of Education. (2015). *Kentucky teacher leadership framework*. Retrieved from <https://education.ky.gov/Teachers/TeacherLeadership/Pages/default.aspx>
- Miller, A. (2021). Cognitive flexibility: The brain's ability to adapt to new, changing, or unplanned events, including task switching. *Cognitive Psychology Review*, 32(4), 245–262. <https://doi.org/10.1016/j.cogpsych.2021.05.001>
- Miyake, A., & Friedman, N. P. (2012). The roles of executive functions in academic achievement and the development of cognitive flexibility. *Psychological Bulletin*, 138(1), 121–134. <https://doi.org/10.1037/a0027274>
- Lieberman, A., & Miller, L. (1992). *Teachers, their world and their work: Implications for school improvement*. Teachers College Press.
- Ritter, S. M., Kolb, B., & Karp, S. (2014). These three components form a core part of executive function, essential to mental abilities that support creative thinking. *Psychological Bulletin*, 140(3), 889–912. <https://doi.org/10.1037/a0035775>
- Spillane, J. P., & Sherer, J. Z. (2004). A distributed perspective on school leadership: Leadership practice as stretched over people and place. In *Proceedings of the Annual Meeting of the American Educational Research Association* (San Diego, CA).
- Spiro, R. J., Coulson, R. L., Feltovich, P. J., & Anderson, D. K. (1988). Cognitive flexibility theory: Advanced knowledge acquisition in ill-structured domains. In *The tenth annual conference of the cognitive science society* (pp. 375–383). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Tashi, K. (2015). A quantitative analysis of distributed leadership in practice: Teachers' perception of their engagement in four dimensions of distributed leadership in Bhutanese schools. *Asia Pacific Education Review*, 16(3), 353–366. <https://doi.org/10.1007/s12564-015-9377-3>
- York-Barr, J., & Duke, K. (2004). What do we know about teacher leadership? Findings from two decades of scholarship. *Review of Educational Research*, 74(3), 255–316. <https://doi.org/10.3102/00346543074003255>
- Nappi, J. S. (2014). The teacher leader: Improving schools by building social capital through shared leadership. *The Delta Kappa Gamma Bulletin*, 80(4), 29–34.
- Van Laar, E., Van Deursen, A. J. A. M., Van Dijk, J. A. G. M., & De Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*, 72, 577–588. <https://doi.org/10.1016/j.chb.2017.03.010>
- Voogt, J., & Roblin, N. P. (2012). A comparative analysis of international frameworks for 21st-century competences: Implications for national curriculum policies. *Journal of Curriculum Studies*, 44(3), 299–321. <https://doi.org/10.1080/00220272.2012.668938>

DECLARATION OF CONFLICTING INTEREST:

I, With the consent of all authors, hereby agree that the article does not contain libelous or unlawful statements, and does not infringe on any privately owned rights including copyright, trademark, or patent;

FUNDING

This work is personally financed by the authors.

DECLARATION OF ORIGINAL WORK:

This report is our original work.