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Distributive leadership as predictor of 21st century teaching practices

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ABSTRACT

The concept of distributive leadership is a vital component of 21st century teaching practices. This study aimed to identify the dimensions that influence the development and implementation of science and mathematics teaching in dual language program schools. It was conducted with the help of over 336 teachers from 93 dual language program (DLP) schools in Malaysia. The distributive leadership readiness scale and 21st century skill (4C) questionnaire was used to collect data and analyze the effects of various dimensions on the development and implementation of science and mathematics teaching in dual language program schools. The results of the study revealed that the P3 model was associated with 14.9% (ΔR^2=.149) increase in the variance of 21st century teaching practices. The results of the analysis revealed that the changes in the three leadership style components included in the regenerating model were significant. The shared responsibility, leadership style and the combination of these dimensions contributed to the 12.9% (ΔR^2=.129) increase in variance. The research also found a positive relationship between 21st century teaching practices and the distributive leadership concept. The findings support the notion that distributive leadership can be a weak factor influencing the development and implementation of 21st century teaching practices.

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1. INTRODUCTION

The headmaster ensures that the staff members are dedicated to achieving the school's goals. According to Mestry [1], in the 21st century, a headmaster is expected to perform various roles to improve their school's performance. These include overseeing the development of the school's organizational structure and improving its overall quality. The ideal candidate for the job should have strong relationships with the school's teachers and be able to transform the organization into a successful one that focuses on improving learning outcomes [2]. Aside from being able to lead an academic institution, the candidate also needs to be impartial and fair in his or her judgment. According to Aliyyah *et al.* [3], the ideal candidate should be capable of delivering credible and reliable assessments. They must also be a good listener, regardless of the situation.

According to Gordon [4], the concept of distributed leadership gained increasing attention from scholars and practitioners. This type of leadership is different from traditional leadership because it allows individuals to have different roles and responsibilities. It is also beneficial for organizations as it allows them to develop a more balanced approach to managing their senior leaders. The concept of this type of leadership stems from the increasing number of senior leaders who are getting overworked. Unfortunately, the search for a school leader has not been successful due to the lack of qualified individuals with the necessary skills to lead

schools [5]. In addition, many schools have started developing conceptualizations aimed to address the needs of the organization. According to Shaturaev and Bekimbetova [6], school leaders are most likely to fail due to their excessive workload. This can prevent them from focusing on the important activities of the school. In addition, it can prevent them from producing effective methods and strategies. A more sustainable and desirable school leadership concept emerged. Instead of having a single leader who can achieve a certain goal, school leaders should consider the various activities and interactions happening in the community [7].

The concept of distributed leadership involves getting to know the various roles and networks of the school community and developing effective strategies and methods that can help schools sustain their success. This concept was first introduced during the 1980s to 1990s due to the increasing realization that the various materials and social artifacts in schools can influence the development of individuals. The concept of distributed management emerged during the 1980s as organizations started to realize that their success depended on the contributions of different individuals [8]. During the 1990s, this concept became more prevalent. In 2021, Shava *et al.* [9] defined the concept of distributed management as a set of characteristics and functions that individuals within the community share. This concept was introduced to help schools develop effective strategies and methods to improve their performance [10]. Despite the absence of a comprehensive history of the concept and its various aspects, this paper aims to summarize its current state.

According to a study by Moshou and Drinia [11], people living in the modern age are expected to be involved in a global shift due to various technological advancements and scientific developments. Some of these dimensions include the rapid emergence of new technologies, the increasing complexity of human life, and the need for new thinking styles. Individuals are expected to improve their knowledge and skills to keep up with the rapid evolution and emergence of new scientific and technological developments. The education system is also expected to provide people with the necessary tools and resources they need to adapt to these changes.

Individuals are expected to develop various skills like problem-solving, reading, and writing to become more productive members of society. In line with today's technological advancements, the education system will also provide people with various resources and tools to improve their knowledge [12]. The goal of this concept is to help people develop the necessary skills to effectively use information in today's world. Due to the complexity of the world, people rely on various information formats and methods. Those who can effectively synthesize, evaluate, and distribute information are considered highly competent.

To be successful, individuals need to develop the skills they can use to improve their lives and adapt to the changes brought about by technological advancements. They also need to enhance their knowledge transfer and thinking abilities. According to the literature about 21st century teaching styles, these styles need to be created to keep up with the changing needs of society [13]. These skills are not only for people who need to improve their lives but also for people who want to excel in their careers. A study by Afandi *et al.* [14] revealed that the development of 21st century teaching skills refers to various abilities that people can use in the future. These skills can help individuals improve their social and academic performance. The increasing number of abilities and learning styles can have a significant effect on the development of children's abilities and knowledge. It is therefore important that the various learning environments are designed to accommodate the appropriate development of these skills.

Schools must be involved in the development of these 21st century teaching skills. They should also be able to plan and implement the various activities and programs related to this subject. The authors of this study claim that the development of these teaching skills is related to distributive management. The goal of this study is to identify the distributive leadership dimension as a predictor of 21st century teaching practices in dual language program (DLP) school in Malaysia.

2. LITERATURE REVIEW

2.1. Distributive leadership and 21st century teaching

During the new leadership era starting in 1980, several leadership theories specific to the field of education were developed. According to Gumus *et al*. [15], the three most popular theories in education include distributive, instructional, and teacher leadership. A study conducted by Gumus *et al.* analyzed over 157,190 articles published in various educational journals from 1980 to 2014. It noted that the number of studies on distributive leadership has increased significantly over the past couple of years. The four countries that are considered to have the most research regarding this subject are the United States, Australia, Canada, and the United Kingdom. According to studies conducted by Gumus *et al*. [15], distributive leadership is regarded as a popular theory in the education field.

Several studies have been conducted on the subject of distributive leadership, and the popularity of this practice can also be seen in the number of schools that practice it. According to Organization for Economic Co-operation and Development (OECD), 35 of the organization’s member countries have adopted this type of leadership. In Malaysia, the practice of distributive leadership is also widely practiced. According to the

Ministry of Education Malaysia (MOE) [16], this type of leadership can help improve the quality of school leaders. The country's government has urged schools to adopt this type of leadership. This practice has been shown to improve the performance of school leaders at every level.

A distributive leadership concept involves a group of people interacting together. This type of leadership can be described as a cooperative style of leadership that focuses on group goals. According to DeMatthews [17], this type of approach differs from traditional leadership in that it focuses on the goals of the group instead of individual goals. The increasing responsibilities and duties of school leaders have prompted the need for more distributive leadership. In addition to that, the concept of community awareness about the role of teachers has also been shown to increase. According to Zakaria and Mokhtar [18], the notion of head teachers being superheroes has been removed from the curriculum.

The concept of distributive leadership refers to a style of leadership that involves the interaction between various elements of a school's culture and leadership practices [19]. These include the setting of goals and vision, the sharing of responsibility, and the development of leadership. In 2019, Goh *et al*. [20] defined four characteristics of this type of leadership. According to a study conducted by Thien and Adams [21], distributive leadership positively affects several groups, including the school, teachers, students, and leaders. It shows that effective leadership can help improve the school climate and teaching programs.

According to studies conducted by various researchers [22]–[25], distributive leadership can increase a student's achievement. They found that it can indirectly improve their reading and mathematics performance. In addition, it can boost their attitudes.

In addition, teachers are expected to support and guide their students' 21st century skills, which include critical thinking, creativity, and problem-solving. There are three main themes that comprise 21st century learning: knowledge, innovation, and technology. Having the necessary human resources can help a country develop. According to Gonzalez-Salamanca *et al*. [26], the education system should be revamped in order to accommodate the needs of the new generation. Awacorach *et al*. [27] claimed that the teacher-centered system has already been replaced by a student-centered one.

In order to be more successful and democratic, countries need to teach their young people the necessary skills to be successful in the 21st century. This is done through the establishment of a learning environment that is conducive to the development of these skills. The roles of teachers also change as the system changes due to the changing conditions. According to Bozkurt [28], everyone must have the necessary 21st century skills to succeed in the future. This can only be achieved through a learning environment that is conducive to the development of these skills. The skills that are developed in the 21st century can help students excel in their studies.

Various strategies and methods that are geared toward addressing the 21st century should be implemented. Students should also be provided with various skills such as collaboration, critical thinking, and communication [29]. In the past, rote learning was considered the main focus of education. Instead, it is now emphasized that learning should be focused on productivity and creativity. Apart from being able to support and guide their students, teachers also need to have the necessary skills to teach critical thinking. Some of these include being able to establish relationships with others, being able to question and doubt facts, and being open to new ideas. In 2022, Cosanay and Karali [30] noted that individuals who are expected to adapt to the rapid evolution of knowledge should have the necessary skills to come up with effective solutions. This includes being able to think critically. Critical thinking skills are also required for teachers to deliver effective educational services.

According to previous studies [31], [32], teachers play an important role in the development of 21st century skills. They noted that a teacher should be able to think critically and independently, be patient and unbiased, and be receptive to new innovations. In addition, teachers should organize all the materials and tools in their classrooms in accordance with these skills. In order to develop 21st century skills, teachers should encourage their students to ask questions and discuss the information they have gathered. They should also make sure that the classroom environment is simple and clear.

They should also help students develop 21st century skills by creating environments that are conducive to their participation, developing a higher level of critical thinking skills, and helping them think critically. Teachers have a lot of responsibilities at every stage of an education's lifecycle, from elementary school all the way to higher education. These skills play an important role not only in the student's future careers but also in their academic success. According to Nooruddin and Bhamani [33], a teacher should be a leader who can ensure the continuous development of 21st century skills. He or she should also work with other individuals who have an impact on education. Moreover, the students' and teachers' 21st century skills can have an impact on each other. In 2022, Kuloglu and Karabekmez [34] stated that the various skills that are considered to be 21st century include critical thinking, productivity, and problem-solving. According to the research, primary schools are vital places where the development of these skills can take place.

Various studies have been conducted on the development of 21st century skills in literature. Some of these include those by Zaragoza *et al.* [35], as well as van Geel *et al.* [36]. According to the researchers, the increasing number of studies that have been conducted on the subject matter suggests that the teaching profession is in need of the continuous development of these skills. According to Bozkurt [28], teachers must have these two skills to ensure that their students' development is monitored. Classroom teachers' use of these 21st century abilities should be analyzed. Figure 1 shows the characteristics of distributive leadership.

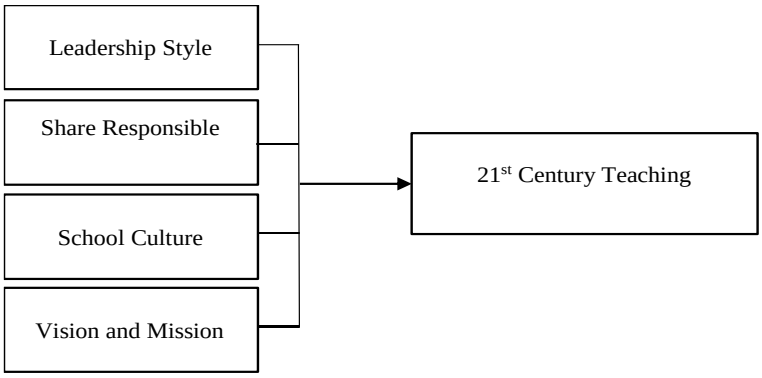


Figure 1. Characteristics of distributive leadership

Past studies show that there is a relationship between distributive leadership and 21st century teaching. Although distributive leadership has been proven to provide opportunities for teachers to improve the level of delivering 21st century teaching, distributive leadership is also not without challenges in implementation. Therefore, leadership development can realize positive changes in the 21st century teaching practice approach in DLP schools.

2.2. Dual language program in Malaysia education system

In Malaysia, the dual language program (DLP) is an initiative under the education system that aims to improve students' proficiency in both Bahasa Malaysia and English by teaching various subjects in both languages. Under the DLP, selected schools teach certain subjects such as science and mathematics in English, while the rest of the subjects are still taught in Bahasa Malaysia. This program is offered at the primary and secondary levels, with the goal of producing students who are proficient in both languages and capable of communicating effectively in both academic and real-world settings.

The DLP is part of the Malaysian government's efforts to enhance the country's international competitiveness and to prepare students for the global job market. The program has been implemented since 2016, and it has since been expanded to include more schools across the country. Overall, the DLP is seen as a positive development in Malaysia's education system, as it helps to equip students with the skills and knowledge needed to succeed in an increasingly interconnected world. The implementation of the DLP in Malaysia's education system has been ongoing since 2016. The program was initially introduced in 300 schools and has since expanded to include more schools across the country.

As of 2021, the DLP is available in 1,580 primary schools in Malaysia. The subjects offered under the program include mathematics, science, and English language subjects, with the remaining subjects still taught in Bahasa Malaysia. The Malaysian government has expressed its commitment to continuing the implementation of the DLP and expanding it to more schools across the country. The program has received positive feedback from students, parents, and educators, who believe that it is a step towards improving the quality of education in Malaysia and preparing students for the global job market.

According to the Malaysian Ministry of Education, as of January 2022, the DLP is being implemented in a total of 1,613 primary schools across Malaysia. A research study by Suliman *et al.* [37] assessed the effectiveness of the DLP in improving the English language proficiency of students in Malaysia. The study found that the DLP had a significant impact on the English language proficiency of students, particularly in listening and speaking skills. The study also highlighted the importance of teachers' proficiency in both languages in the effective implementation of the DLP. Another study by Moses and Malani [38] assessed the perceptions of teachers and students towards the implementation of the DLP in Malaysia. The study found that the majority of the participants had positive perceptions of the program, and they believed that it could enhance students' language proficiency and prepare them for the global job market.

However, some challenges have been identified in the implementation of the program, such as a shortage of qualified teachers who are proficient in both languages and the need for adequate resources and materials to support the program's implementation. Nonetheless, the Malaysian government continues to address these challenges to ensure the effective implementation of the DLP in the country's education system. Thus, the research questions are as: i) Do distributive leadership dimensions predict 21st century teaching in science and mathematics teaching in DLP schools?; ii) Is there any relationship between distributive leadership dimensions and 21st century teaching in science and mathematics teaching in DLP schools?

3. RESEARCH METHOD

This is a survey study, involving a total of 336 teachers from DLP schools, in Malaysia. Proportionate stratified random sampling was used for this study. The calculation for determining the sample size of this study refers to Cochran's formula. Data for this study were collected using the distributive leadership readiness scale and 21st century skill (4C) questionnaire. The instrument for distributive leadership has four dimensions vision, mission and goals, school culture, leadership practice, and shared responsibilities. The 21st century skill instrument has four dimensions based on knowledge, usage, confidence, and skills. The data obtained from the questionnaire were analyzed using SPSS Version 24. Regression and stepwise regression analysis are widely used methods to describe predictable dimensions.

4. RESULTS

4.1. Demography

In sum, 336 teachers from DLP schools, in Malaysia were involved in the survey. Table 1 shows the demographic respondent. In terms of gender, there were 33.0% male teachers and 67.0% female teachers. In terms of experience, a total of 10.7% of experienced teachers taught between 1 to 9 years, 50.6% had 10–19 years of experience, 34.5% had 20–29 years of experience, and 4.2% had 30–39 years of experience. In terms of academic qualifications, 9.5% of teachers qualified with certificates/diplomas, 64.6% of teachers qualified with bachelor's degrees, and 25.9% of teachers qualified with masters/doctorate.

Table 1. Respondent profile

Item	Category	Respondent	Percentage (%)
Gender	Male	111	33.0
	Female	225	67.0
Location	Urban	235	69.9
	Rural	101	30.1
School category	National School	69	20.5
	Chinese School	98	29.2
	Tamil School	169	50.3
Teaching experience	1–9 years	36	10.7
	10–19 years	170	50.6
	20–29 years	116	34.5
	30–39 years	14	4.2
Academic qualification	Certificate/diploma	32	9.5
	Degree	217	64.6
	Masters/doctorate	87	25.9
Total		336	100

4.2. Distributive leadership dimensions as a predictable factor for 21st century teaching

The characteristics of leadership style, share responsible, and school culture showed significant beta β values as shown in Table 2. This indicates that the dimensions explained the significant difference in 21st century learning. However, the vision and mission dimensions are not significant because their small values prevented the analysis from taking into account their influence.

Table 2. The beta values of the distributive leadership dimensions

Dimension	Beta	Sig.
Leadership style	β=.256*	.000
Share responsible	β=.157*	.003
School culture	β=.149*	.005
Vision and mission	β=.086	.089

Note: Significant at level *p<0.05

The results of the multiple regression analysis in Tables 3 and 4, show that the change in the three distributive leadership included in the regeneration model follows a significant β value. Leadership style (β=.315, p<0.5) significantly contributed as much as 0.10% ($^{R^2}$=.099) changes in variance [F(1,334)=36.742, p<0.5]. The combination of leadership style (β=.280, p<0.5) and share responsible (β=.190, p<0.5) contributed 13.4% ($^{R^2}$=.134) changes in variance [F(2,333)=13.475, p<0.5]. The combination of leadership style (β=.252, p<0.5), share responsible (β=.166, p<0.5) and school culture (β=.155, p<0.5) contributed 15.7% ($^{R^2}$=.157) changes in variance [F(3,332)=8.833, p<0.5]. The regression equation is given as in (1).

$$Y = 2.427 + 0.180_1 + 0.132_2 + 0.108_3 \quad (1)$$

Table 3. Linear regression predictor of 21st century teaching

Model	R	R^2	df	F	Sig.
Leadership style	.315[a]	.099	1	36.742	.000
			334		
			335		
Share responsible	.366[b]	.134	2	13.475	.000
			333		
			335		
School culture	.396[c]	.157	3	8.833	.003
			332		
			335		

Note: Significant level at p<0.05

Table 4. Coefficient values distributive leadership factor as predictors

Model	Variable	B	Std. Error	Beta	t
P1	Constant	3.256	.162		20.097
	Leadership style	.225	.037	.315	6.062
P2	Constant	2.709	.218		12.428
	Leadership style	.200	.037	.280	5.407
	Share responsible	.152	.041	.190	3.671
P3	Constant	2.427	.235		10.311
	Leadership style	.180	.037	.252	4.844
	Share responsible	.132	.041	.166	3.190
	School culture	.108	.036	.155	2.972

Dependent variable: school effectiveness, P=predicable variable

The results of the stepwise multiple regression analysis show that the P3 regression model (leadership style, share responsible, and school culture) contributed for 15.7% ($^{R^2}$=.157) changes in variance in 21st century teaching. The influence dimension of leadership style (β=.252, p<0.5) was highest followed by, share responsible (β=.166, p<0.5) and school culture (β=.155, p<0.5). This indicates distributive leadership dimensions contribute to predicting the 21st century teaching in science and mathematics teaching in DLP schools.

4.3. Correlation between distributive leadership dimensions and predictable factors for 21st century teaching

This study has also given priority to determining the relationship between distributive leadership and 21st century teaching in science and mathematics in DLP schools. Therefore, Pearson correlation analysis was implemented to determine the hypothesis for this study. Table 5 shows the analysis of the relationship between distributive leadership and 21st century teaching in science and mathematics teaching in DLP schools. Pearson correlation analysis also shows that there is a weak significant positive relationship between distributive leadership and 21st century teaching (r=.378, p<0.01) in science and mathematics teaching in DLP schools. The finding shows there is a significant positive relationship between distributive leadership and 21st century teaching in science and mathematics teaching in DLP schools.

Table 5. Correlation between distributive leadership and 21st century teaching

	Relationship	
N=336	r	Sig. (2-tailed)
Distributive leadership and 21st century teaching	.378	.000

**Correlation is significant at the 0.01 level (2-tailed)

5. DISCUSSION

This study has focused on the dimension of distributive leadership as a factor predicting the practice of 21st century teaching science and mathematics in DLP schools. This study has determined that there is a weak level relationship [39], [40] between distributive leadership and 21st century teaching practices. This relationship shows that the implementation of distributive leadership helps and affects all dimensions of 21st century teaching practice. This will give a holistic change in the teacher's teaching to help improve the students' academic achievement. The findings of this study also highlight that the dimension of distributive leadership predicts the practice of 21st century teaching at a weak level [39], [40]. There are three predictors of four dimensions where leadership style, share responsible, and school culture. These three dimensions have a direct impact, but vision and mission do not contribute to 21st century teaching. As is known, the leadership style dimension is one of the dominant approaches in the distributive leadership variable followed by others.

Leadership style is able to provide positive changes in the approach to 21st century teaching practice by striving for leadership, increasing knowledge, collaborating with external departments, and through professional training. In addition, expectations for student achievement, sharing responsibility, creating a learning community, success based on experience, discussing issues, and providing communication channels through the implementation of the share responsible dimension can enhance 21st century teaching [41]. Furthermore, the dimension of school culture ensures that school teachers respect each other, use the latest ideas and innovations, make joint decisions, and implement joint plans that also have an impact on the teaching approach. Vision and mission are not predictors in improving 21st century teaching in this study. This is because most aspects in the relevant dimension are not implemented continuously. The statement is a regular part of the school community's dialogue. Unfortunately, many parents and students do not understand the school's mission and vision [42]. This causes it to be less helpful in the practice of 21st century teaching. Since the vision mission is a permanent statement, it does not have a lasting effect in practicing 21st century teaching.

The practice of the dimensions of leadership style, share responsible, and school culture has not yet fully emerged in predicting 21st century teaching in the DLP program in primary schools. Overall, implementing science and mathematics in English as a second or third language in primary schools requires appropriate attention. Teachers are still not able to master and control the teaching of science and mathematics in English [43]. In addition, students are still not able to fully master the English language [44]. So, this situation makes it difficult for the approach practiced in distributive leadership to be able to have a high impact on changes in the practice of 21st century teaching. Therefore, the Ministry of Education Malaysia (MOE) needs to pay attention to the mastery of English among teachers and also students so that the skills of science and mathematics subjects can be well mastered. Based on previous studies [43], [45], variables such as teacher commitment, technology literacy, school environment, and professional development also play a role as predictive dimensions in influencing 21st century teaching. However, future studies should also look into other variables to determine the best predictors of this subject that can influence the teaching of science and mathematics in DLP schools.

6. CONCLUSION

The goal of this study was to examine the effects of distributive leadership on 21st century teaching practice in dual language program schools. It revealed that the implementation of this type of leadership has a weak impact on various dimensions of the 21st century teaching environment. The lack of a comprehensive approach to addressing the challenges of 21st century learning has raised concerns about the effectiveness of the distributive leadership approach. This is why the Ministry of Education Malaysia should pay attention to the development of programs and courses that will help school leaders improve their skills in this area.

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