

## Transformational Leadership Practice Among Secondary School Science Teachers: Is There Gender And Learning Outcome Disparity?

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### Abstract

*The study investigated the impact of science teachers' use of transformational leadership style on secondary school students' achievement and attitude towards science. It also investigated whether the implementation of science teaching using transformational leadership style is gender specific. Three hypotheses guided the study. Forty five SS11 science students in two intact classes formed the sample for the study. Four biology teachers (two males and two females) adjudged as transformative and non transformative (Two each) after responding to a multifactor 12- item 4-point leadership questionnaire designed by Bass and Avolio (1992) and used by Balasubramanian and Krishnan (2012) were selected for the study. Each class was taught by either transformational or non transformational teachers for six weeks. Prior to the classroom episodes, students responded to a 22-item 4-point liker: scale test of attitude towards science (TAS) and a 20-item test of achievement in science (TATS) designed by the researchers and which was also re-administered as posttest. One-way Analysis of variance was used to find the significance of the difference in means of the two groups. Result showed no significant difference in male and female teachers' use leadership style the two groups of students differed significantly in their learning outcome. The study recommended that pre-service and service teacher training should begin to focus on non cognitive aspects of teachers' development in addition to their science knowledge as important aspects of their qualification for teaching science. Also regular leadership training for teachers is advocated.*

### Introduction.

The teacher performs diverse roles in the classroom, ranging from academic support, knowledge enhancement, personal- social guidance and leadership. Studies (Bolkan and Goodboy, 2010; 2009 and Ponder, 2008) are of the opinion that teachers' leadership practices influence all other aspects of teacher' roles and culminate in determining the extent to which students achieve academically.

Several leadership theories have directed attention to two basic leadership patterns- namely transactional and transformational leadership practices. Bolkan and Goodboy (2010)



and Balasubramanian and Krishnan (2014) explained transactional leadership as one in which the leader takes decisions about what should be done and directs the subordinates on what and how it should be done to achieve results. This pattern of leadership negates the intelligence and potentials of the subordinates by placing more value on the leaders' personal rather than group achievement. On the contrary, transformational leadership according to Burns (1978) is a pattern of leadership in which there is mutual motivation for success by both the leader and the followers towards achievement of group goals thus transforming work pattern and achievement indices. Balasubramanian and Krishnan (2014) conceptualized leadership as "ability to influence, motivate and enable others to contribute towards the effectiveness and success of the organizations to work they are members" (p. 45). In other words, leadership provides the leverage for organizations to work and function coherently to achieve success because organizations are made up of different individuals that are with diverse potentials, energies, and skills. It is the leader's duty to arouse the utility of these skills and potentials for the achievement of organizational goals. According to Bass (1985), this is only possible when the leader transforms the values, attitudes and motives of subordinates to a plane where performance becomes routine and natural.

Leadership in the transactional sense is not only simplified but also reduced transfer of work allocation and their remuneration but devoid of the essential communication ingredients necessary in interpersonal and team coherence and unity of purpose. In this light, transactional style of leadership asserts the leaders qualities and authorities while the subordinates are obedient followers. In an effort to succinctly draw contrast between transactional and transformational leadership practices, Burns (1978) in Balasubramanian and Krishnan (2014) conceptualized transformational leadership as a style in which "one or more persons engage with others in such a way that leaders and followers raise one another to higher levels of motivation and morality, and results in a transforming effect on both leaders and followers". This according to them if achieved inspires, generates awareness and acceptance of organizational mission and purpose, as well as values, beliefs and needs of both followers and leader without necessarily relying on rewards.

In a study of transformational leadership in the classroom, Bolkan and Goodboy (2009) found a positive relationship between transformational leadership practice with students' cognitive learning, affective learning, motivation, students' communication, satisfaction, students' participation and perceived instructor credibility. These variables are found to relate strongly with the overall students' performances in school. On the question of characterizing transformational leadership, Bolkan and Goodboy (2009) also consolidated students' responses and identified teacher charisma (confirming students, being enthusiastic in class, using humour and showing caring for students); individualized consideration (being available to students and providing idiosyncratic feedback) and intellectual stimulation (Using interactive teaching style, challenging students and encouraging independent thought). Bass (1998) had earlier identified these four factors as descriptive of transformational leadership. In Bass (1998), teacher charisma means providing vision and sense of mission



and instilling pride, gaining respect and trust. Bass also sees inspirational motivation as communication high expectations, using symbols to focus efforts and expressing important purposes in simple ways while intellectual stimulation is seen as promoting intelligence, rationality and problem-solving. Teachers exhibit personal consideration when they give personal attention to students by giving advice and personal corrective feedback to students.

Studies on transformational leadership in organizational and classroom setting have made some interesting revelations that are instructive. Some of these are :

1. That transformational leadership inspires high task achievement, high task satisfaction, lower role conflict and ambiguity (Howell and Frost, 1989)
2. That in organizations with transformational leaders, mission and vision statements have positive effect on level of performance (Baum, Locke & Kirkpatrick, 1998); Kirkpatrick & Locke, 1996).
3. Transformational leadership relate positively with collective performances (Stewart, 2006)
4. Transformative leadership impact is contextual (Garg & Krishnan, 2003).
5. Transformational leadership has high affinity for emotion recognition and agreeableness (Rubin, Munz & Bommer, 2005)

The science classroom is one that is peculiar and unique because of the very nature of science as investigative and dynamic field of study. The twenty first Century science classrooms are constantly influenced by technology, scientific discoveries, high increase in available knowledge and new and modern methods of teaching and learning that support participation and interaction. In the light of this, Bal-Tastan, Davoudi, Masalimova, Bersanov, Kurbanov, Bolarchuk and Pavlushin (2018) in a study of impact of teachers' efficiency and motivation on students' academic achievement in science in secondary schools found significant impact of teacher's self-efficiency and motivation on academic achievement. Other studies whose findings links students' achievement in science to teachers' characteristics include Anderson, Greene and Loewen (1998), Alvares Nunez (2012) and Abbasi, Moeini, Shahmar, Ebrahimi and khoozani (2018). The teacher has remained the main single factor implicated in investigations about students' science learning (Erdal, Tuysuz, Tosun and Ihan, 2016). It means that teachers' characteristic leadership qualities have remarkable effect on the quality and the amount of science to be learnt.

Gender, on the other hand, is a construct that refers to masculinity or femininity in a person in contrast to visible biological differences depicted by sex. Balasubramanian and Krishnan (2014), after a review of literature on gender and transformational leadership, espoused certain differences between males and females in organizational settings. While women are



found to be democratic, people oriented, exhibit more transformational leadership style, men are more autocratic, task oriented and forceful in their desire for task performance.

Examining the impact of leadership style on teaching and learning process in Imo state, Nigeria, Okoroji, Anyanwu and Ukpere (2014) identified leadership as a determinant of performance of both teachers and learners in achievement of goals. As classroom managers, administrators and organizers, the teachers enjoys high level of discretion, autonomy and freedom in deciding and implementing certain patterns of leadership to drive educational process and fast track goal achievement. Studies have also revealed that classroom climate, ethos and ambience positively correlate with students' motivation and participation in learning generally and science in particular. It means that a teacher's leadership style; be it transactional or transformational, democratic or autocratic have ample influence on behaviours and attitude of students to study. It is also important to note that the teacher's duty transcends knowledge enhancement but also includes subtle and tacit aspects as mentors and role models, the influence of which are immeasurable in determining the development of attitude towards science learning and consequently amount of learning achievable.

It is therefore necessary to understand its adoption of transformational leadership in science classrooms are gender specific or otherwise and if that leadership style has positive effect on student attitude towards science and the extent to which they can achieve in science.

#### **Statement of the Problem/Rationale for the Study.**

This study is necessitated by the ever increasing attrition found in many Nigerian science classrooms and the poor performance of students in science. This disheartening and continued under development of Nigeria as a consequence of poor science and technological development are results of poor attitude towards science learning by students and eventual poor science knowledge and achievement. Studies (Okoroji, Anyanwu and Ukpere, 2014) has noted that the teachers' training, knowledge, skills, abilities and attitudes affect and determine what goes on in the classroom and how learners respond to learning tasks. Considered from Bass (1985) perspective, an effective science teacher is one who is able to utilize his or her knowledge, training and charisma to inspirationally motivate high sense of academic vision and mission as well as stimulate intellectual activities that develop, sustain and increase rationality, problem-solving, investigative activities and participation in the world of science through interpersonal and group classroom dynamics that play during learning. Most science classrooms in Nigeria are traditional. It becomes necessary to determine empirically if teachers' transformational leadership with its in-built democratic tenets and motivational and interpersonal communicative characteristics have influence on the attitude and learning of science as well as improve the extent to which students learn science and if the teacher's gender impinges on the extent to which transformational leadership practices are implemented in the science classrooms in Nigeria. The study therefore asks: Does the teacher's gender influence the implementation of transformational leadership in science classrooms and will the implementation of transformational leadership

have effect on students' attitude towards science and the outcome of science learning in Nigerian secondary schools?

### **Research Questions**

The following research questions are therefore raised for the study.

1. Does the teacher's gender significantly affect the utilization / implementation of transformative leadership?
2. Does the use of transformative leadership significantly affect the attitude of students towards science?
3. Does the use of transformative leadership significantly affect students' achievement in science?

### **Research hypotheses**

This study raised the following null hypotheses to guide the study

1. There is no significant difference in the utilization/ implementation of transformative leadership due to gender
2. There is no significant difference in students' attitude towards science due to the teachers' use of transformative leadership style.
3. There is no significant difference in students' achievement in science due to the utilization/ implementation of transformative leadership.

### **Method of the study**

A quazi experimental design adopting the non equivalent groups was used for the study. Two intact SS11classes (N=18, N = 27) from a Delta state government owned semi- urban secondary school were purposively selected for the study. Class A (N = 18) were taught six concepts in Biology for two hours a week for a period of six weeks (12 hours) by two teachers (One male and one female) who were classified as non transformational after responding to a multifactor leadership questionnaire (MLQ), a 12 – item 4 – point self-rating scale designed by Bass and Avolio (1992) and used by Balasubramanian and Krishnan (2012) to determine their leadership status across the four transformational leadership factors (charisma, inspirational motivation, intellectual stimulation and individualized consideration). Class B (N= 27) was also taught the same biology concepts for the same duration but by two teachers (one male and one female) adjudged to be transformational using the same MLQ responses.

Prior to the six weeks of teaching, a 22 – item Test of Attitude towards Science (TATS) designed by the researchers and a 20 – item Test of Achievement in Science (TAS) were administered as pretest to both groups in the first week after a 2-hour orientation for



both the students and the teachers. The reliability coefficient of TATS was found by KR 21 to be 0.66 while that of TAS was found by Crombach Alpha to be 0.70. The tests were repeated in the seventh week to generate posttest data for the study. Data generated was analyzed using the one-way Analysis of variance (one way ANOVA) to determine the significance of the differences in means of the groups. ANOVA (parametric test) is adjudged suitable since there is homogeneity of variance as indicated by the Levene test of equality of variance.

### Results

The results are presented in tables below.

**Table 1: ANOVA summary of the difference in teachers' leadership style by gender**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.288	1	.288	1.179	.284
Within Groups	10.512	43	.244		
Total	10.800	44			

Table 1 above shows an  $f$ -value of 1.179 ( $df = 43$ ,  $P < 0.284$ ) which is not significant at 0.05 alpha level set for the study. This implies that leadership style utilized by the teachers is not gender specific. Hypothesis 1 is therefore not accepted as there is not enough evidence statistically to do so even though ( $\pi = 1.52$ ,  $N = 23$  0.511 for males and  $\pi = 1.68$ ,  $N = 22$ ,  $SD = 0.477$  for females). It means that no one gender has greater tendency or predisposition to utilize a particular leadership style.

**Table 2: One way ANOVA summary of the significance of the means of students post test scores on attitude towards science and achievement in science by leadership style**

	Sum of Squares	df	Mean Square	F	Sig.	
students attitude towards science	Between Groups	967.115	1	967.115	6.967	.012

students achievement in science concepts	Within Groups	5968.796	43	138.809		
	Total	6935.911	44			
	Between Groups	355.926	1	355.926	39.393	.000
	Within Groups	388.519	43	9.035		
	Total	744.444	44			

Table 2 above shows that students attitude towards science learning ( $F=6.967$ ,  $df= 43$ ) is significant at  $P< 0.012$  by leadership style and as such significant at the 0.05 alpha level chosen for the study. This means that there is a significant difference in the attitude towards science learning of the students taught by teachers due to their leadership styles. This means that leadership style utilized by the teacher influences students' attitude towards science significantly. Null hypothesis 2 which stated the contrary is therefore rejected since statistical evidence shows ( $\bar{x} = 50.28$ ,  $N = 18$ ,  $SD = 8.166$  for Non transformational leaders) vary significantly in favour of transformational leaders ( $\bar{x} = 59.74$ ,  $N = 27$ ,  $SD = 13.63$ ) in terms of students attitude towards learning of science.

Also shown in table 2 is an F-value of 39.393 ( $df =43$ ;  $p< 0.00$  for students' achievement in science concepts. This is significant at the 0.05 alpha level for the study. This implies that there is a significant difference in the achievement of the learners in science concepts in the groups taught by non transformational and transformational teachers. Null hypothesis 3 which hypothesizes a no difference in this variable is thus rejected based on statistical evidence ( $\bar{x} = 8.44$ ;  $SD = 2.526$ ,  $N = 18$  for Non transformational group as against  $\bar{x} = 14.19$ ;  $SD = 3.282$ ,  $N = 27$  for transformational group) available from the study.

### Discussion of findings

The findings of this study in respect to gender utilization of leadership style is in disagreement with Balasubramanian and Krishnan (2014) who found that females are more transformative in approach than males who are more task oriented, forceful and transactional in approach. What the result suggests is that the utilization of transformative practice or otherwise is not gender related but could depend on the individual's personality traits. Thus it is possible for both gender to be transformative of transactional in their approaches in the classroom. Also to be noted is the fact that knowledge of the impact of a leadership style on the students' learning could influence the teachers' choice of leadership style.

In the area of the impact of the teachers' utilization of transformative leadership on students' attitude towards learning, the study corroborates the report by Howell and Frost (1989) who

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found that transformative leadership inspires positive attitude towards work and task performance.

In the area of the impact of transformational leadership on students' achievement in science, the findings of this study is in line with Stewart (2006), Baum, Locke & Kirkpatrick, (1998), and Kirkpatrick & Locke (1996) who reported positive effect of transformative leadership style on performance generally. Okoroji, Anyanwu and Ukpere (2014) has noted that the teachers' training, knowledge, skills, abilities and attitudes affect and determine what goes on in the classroom and how learners respond to learning tasks. Bal-Tastan, Davoudi, Masalimova, Bersanov, Kurbanov, Bolarchuk and Pavlushin (2018) found positive impact of teachers' efficiency and motivation on students' academic achievement in science in secondary schools. Other results that are in line with the result of this study are Alvares Nunez (2012), and Abbasi, Moeini, Shahmar, Ebrahimi and khoozani (2018) and Erdal, Tuysuz, Tosun and Ihan (2016). The utilization of transformative leadership has effect on students' learning and attitude.

### Conclusion

This study investigated whether there exist disparity in learning of science due to the utilization of transformational leadership and if this teachers' utilization of transformational leadership style in the classroom is gender related. Result showed no gender attachment to a particular leadership style but revealed positive impact of transformational leadership on students' attitude towards science and their achievement in science concepts it is thus concluded that teacher leadership characteristics have serious consequences for learning of science.

### Recommendations

It is therefore recommended that teachers see the science classroom as an attitude workshop where their personal characteristics and leadership style can influence their output and themselves, not just as knowledge givers but influencer. To achieve this mindset, it is recommended that teacher preparation institution focus attention on developing science teachers' non cognitive characteristics as important aspects of teacher qualifications for teaching science. Employers of science teachers should also look into the personality traits of teachers before employing them by giving them psycho- social tests and also administering it from time to time to serving science teachers. This will help to ensure the stable social and psychological state of the teachers in schools. It is also important that teachers attend leadership trainings from time to time to update their knowledge of leadership styles applicable in the science classrooms of the 21<sup>st</sup> Century as applicable globally.



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