

BOOSTING ACADEMIC SELF-EFFICACY THROUGH SCHOOL CULTURE

BY

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ABSTRACT

Several studies have revealed the low level of mathematics self- efficacy displayed by students in schools. Studies from some other climes showed that school culture is one of the predictors of self-efficacy in mathematics. Available studies used self-efficacy to predict achievement in mathematics. There seems to be dearth of study on how school culture predicts self-efficacy in mathematics. This study, therefore, examined the extent to which school culture determined students' self-efficacy in public secondary schools. Survey design was used while simple random sampling technique was adopted. Five local government areas (LGA) were randomly selected from Oyo state public secondary. 4 schools were randomly selected from each LGA. Also, 30 students and 4 teachers of mathematics were randomly and purposively selected respectively from each school. In all, 20 schools, 600 students and 80 teachers participated. The instruments were validated using 30 students and 20 teachers. They were the School Culture Scale ($\alpha = 0.81$) and the Mathematics Self-Efficacy Scale ($\alpha = 0.78$). Mean, standard deviation and multiple regression were used to analyse the data at $p < 0.05$. There was .578 degree of relationship between Mathematics self-efficacy and the six elements of school culture and the relationship was positive. The study also revealed that Collegial support ($\beta = .271$, $t = 2.761$, $P < 0.05$), and learning partnership ($\beta = .338$, $t = 3.334$, $P < 0.05$) are the most influential predictors of Mathematics self-efficacy in public secondary schools. School culture ($\beta = .330$) significantly predicted self-efficacy in public secondary schools. Students in public secondary schools are efficacious and have school culture. It was recommended that good school culture should be encouraged in schools. Enlightenment programmes should be organised on what should constitute the school culture to improve mathematics self-efficacy.

Keywords: Self-efficacy in mathematics, School management, Low and high performing schools.

Introduction

Belief in one's efficacy is a key personal resource to self-development and successful adaptation to change. Self-efficacy operates through its impact on the domains of learning. Efficacy shows whether individuals think optimistically or pessimistically, in

self-enhancing or self-debilitating ways. It affects people's goals and aspirations, self-motivation and perseverance. According to Bandura (2001), people ought to believe they can produce desired effects by their actions so that they can persevere in the face of difficulties. He further states that whatever other factors serve as guides and motivators to performance, they are rooted in the core belief that one has the ability to effect changes by one's actions.

Ormrod (2006) refers to self-efficacy as the belief that one is capable of performing tasks in certain ways to attain certain goals. Furthermore, Bandura (2001) affirms that self-efficacy is one's belief in one's ability to succeed in specific situations. Self-efficacy is a construct that deals with one's perception that one is capable of doing what is necessary to reach set goals in terms of knowing what to do and being emotionally capable of doing it (Pajares & Schunk, 2001). Self-efficacy shapes people's expectations, whether or not they expect their efforts to produce favourable outcomes or adverse ones. It also determines how environmental opportunities and impediments are viewed.

People of low self- efficacy are easily convinced of the futility of their effort in the face of difficulties and quickly give up trying while those of high self-efficacy view impediments as surmountable by self-development and perseverance, and they stay on course in the face of difficulties and remain resilient to adversity. Self-efficacy affects the quality of emotional life and the level of vulnerability to stress and depression. Lastly, it determines the choices people make at important decisional points (Pajares, 2002). Marshall (2005) believes that self-efficacy will be enhanced if learning experiences ascend in difficulty and sequence. They further state that if students collaborate and they are given opportunities to participate in small group activities, it will also boost their self-efficacy. Also, if teachers are provided with professional development, their self-efficacy increases. According to Bandura (2001), self-efficacy in human behaviour can be made by exploring these four sources: mastery experience, vicarious experience, social persuasions, and physiological states.

Mastery Experience is the interpreted result of purposive performance. As students perceive their progress in acquiring skills and gaining knowledge, their academic efficacy for further learning is enhanced. Simply put, individuals gauge the effects of their actions, and their interpretations of these effects help create self-efficacy. Success raises self-efficacy while failure lowers it. For instance, students who perform well in Mathematics tests and earn high grades in Mathematics classes are likely to develop a strong sense of confidence in their Mathematics capabilities. This strong sense of self-efficacy helps ensure that such students enroll in subsequent Mathematics related classes, approach Mathematics tasks with serenity, and increase their efforts when a difficulty arises. On the other hand, low test results and poor grades generally weaken students' confidence in their capabilities. As a result, students with low Mathematics test result will more likely avoid future Mathematics classes and tasks, and they may

approach the area of Mathematics with apprehension thus lowering their self-efficacy.

Another source of self-efficacy is the vicarious experience of the effects produced by the actions of others. Most achievements (school grades) are judged relatively, and one's own capability is inferred by comparing one's attainment to those of one's peers. Again, individuals may infer their self-efficacy by observing the successes and failures of others. Thus, the successes of others raise one's own efficacy, whereas their failures lower it. Schunk and Pajares, (2004) assert that the effects of role models are particularly relevant in this context. A significant role model in one's life can help instill self-beliefs that will influence the course and direction that life will take. Students are likely to develop the belief: "I can do that" when a highly regarded teacher models excellence in an academic activity.

Individuals also create and develop self-efficacy as a result of the social messages they receive from others. Schunk and Pajares, (2004) corroborate that teachers' social interaction increases self-efficacy. They also, ascertain that social persuasions can involve exposure and this can play an important part in the development of an individual's self-beliefs. Most adults can recall something that was said to or done for them during their childhood that has had a profound effect on their confidence in their lifetime.

Physiological states such as anxiety, stress, arousal, fatigue and mood swings provide information about self-efficacy, while self-efficacy in turn, also powerfully influences the physiological states. Schunk and Pajares, (2004) assert that people live within psychic environments that are primarily of their own making. Individuals have the capability to alter their own thinking. It is often said that people can "read" themselves, and so this reading comes to be a realisation of the thoughts and emotional states that individuals have themselves created. Often, they can gauge their confidence by the emotions they experience as they contemplate an action. People with high self-efficacy set higher goals, invests more efforts, show more resilience and persist longer than those with low self-efficacy

In view of the foregoing, it can be deduced that academic self-efficacy involves judgments of one's capabilities to perform tasks in specific academic domains. Therefore, academic efficacy refers to personal judgments of one's capabilities to organise and execute courses of action to attain designated types of educational performance (Pajares, 2002). Accordingly, within a classroom learning environment, measures of academic self-efficacy must be adopted to assess students' perception of their competence to do specific activities. However, most academic self-efficacy researches focus on specific areas of the school curriculum and factors that could enhance students' academic achievement. For instance, Adeoye and Emeke (2010) carried out a study which investigated emotional intelligence and self-efficacy as determinants of academic achievement in English while Pajares, (2002) investigated academic efficacy at Mathematics-related tasks. Furthermore, other research studies

have provided consistent and convincing evidence that academic efficacy is positively related to academic performance (Odedele, 2000), academic motivation (Margolis & MacCabe, 2006), persistence (Matsushima & Shiomi, 2003), but other variables such as school culture, structure and school practices that could likely boost students' self-efficacy and aid achievement were rarely researched.

School culture can affect how problems are solved, the ways new ideas are implemented and how people will work together. Mitchell (2008) identifies three types of school cultures which are located on a continuum, ranging from bureaucratic, toxic to collegial culture. According to him, in bureaucratic culture, the school administrator is at the helm of affairs while teachers are followers of the dictating regime. There are laid down rules and regulations that must be strictly followed, as strong emphasis is laid on following official rules which may seem unnecessary.

Toxic culture is culture that value tradition and it is evident in a negative setting where dissatisfaction is highly palpable. It engenders feelings of hostility and hopelessness, the focus is on failure of programmes and new ideas. Energy is spent on maintaining the negative values causing high levels of stress for those unfortunate enough to be part of that culture. Toxic cultures value traditionalism, teachers fear being different and those who suggest new ideas are often criticized (Sookradge, 2010).

Collegial school culture is referred to as positive school culture and is characterised by: Collegiality, Experimentation, High expectations, Trust and confidence, Tangible support, Reaching out to the knowledge bases (i.e. "going to the source of information"), developing information networks rather than trying to solve problems in isolation, appreciation and recognition, care, celebration and humor, involvement in decision making, protection of what is important, traditions (i.e. the rituals, ceremonies and symbols that strengthen the school), honest and open communication (Peterson, 2002). Collegial cultures engender a sense of cohesiveness and collaboration. Teachers are encouraged to grow. Community is treasured and sharing of resources and ideas is a common thing. Teachers simply cannot work in isolation to improve student achievement and meet the demands of high stakes accountability. Student achievement increases when teachers work together in teams (DuFour, Eaker & DuFour, 2005).

Collegial culture also value involvement of parents, teachers, administrators, and even students in problem solving, which is considered, not as an individual challenge but a social challenge. Literature reveals six elements of positive school culture which include Collaborative leadership, Teacher collaboration, Professional development, collegial support, Unity of purpose, and learning partnership (Georgia Department of Education, 2006a). "In a collegial school culture, a team of highly skilled individuals comprises the teaching staff, working continuously with their colleagues to improve their teaching strategies and better manage their classrooms" Collaboration is the thread woven through all six school culture elements.

DuFour et al. (2005) define collaboration as 'a process in which teams worked together interdependently in order to impact their classroom practice in ways that would lead to better results for their students, for their team and for their school. This study focused on the six elements of a positive school culture (collegial culture) which are: Collaborative Leadership, Teacher Collaboration, Professional Development, Collegial Support, Unity of Purpose and Learning Partnership.

Collaborative leadership stresses the importance of the shared decision making process. Teacher collaboration is a process by which teachers work together interdependently in order to impact their classroom practice in ways that would lead to better results for their students. Constructive dialogue, hard work, and determination that no child will slip through the cracks are elements of teacher collaboration (Reeves, 2004).

Professional development provides opportunities for teachers and communities to learn and discuss best practices (DuFour et al., 2005), Unity of purpose requires the efforts of the stakeholders coming together to work towards achieving the common vision and mission of the school (Brown, 2005). Collegial support encourages colleagues to share their personal professional development experiences (Brosnan, 2003), while learning partnership is the bond the school has with the community and the sharing of the same high expectations for students' achievement (Lamb, 2007 & Glickman, 2002).

Marcoulides, Heck, and Papanastasiou's (2005) studied how students' perceptions of the school culture affects students' achievement. The results indicated that achievement scores can be explained by students' perceptions of the school culture. Mitchell (2008) in his study used the School Culture Survey and students' achievement on Criterion Referenced Competency test. The analysis of the survey results revealed that a moderately strong correlation exists between the six elements and students' achievement, but this correlation was found not to be statistically significant.

Other studies in their review of the literature on effective schools found a close correlation between positive school culture and academic quality: The literature indicates that a student's chance of success in learning cognitive skills is heavily influenced by the culture of the school (Marcoulides, Heck, and Papanastasiou, 2005). Apart from the school culture, other factors within the school that may affect achievement and influence academic self-efficacy are the school structure and practices.

Statement of the problem

Many prospective students of higher institutions instead of being admitted studying their preferred courses, they are compelled to opt for courses which they were not originally interested in because of their below average performance in mathematics which is one of the compulsory subjects. Observation shown that quite a lot of parents prefer sending their wards to some public schools because their students appear to have proven to be self-efficacious in mathematics.

However, there appears to be a dearth of literature on factors that can influence self-efficacy and on how school culture affects self-efficacy in Mathematics. Therefore, this study investigated the extent to which the culture of schools determines students' Mathematics self-efficacy in public secondary schools.

Purpose of the Study

The purpose of the study is to find out how school culture influences student academic self-efficacy in secondary schools

Research questions

Three research questions were answered during the study.

1. Does the obtained regression equation resulting from a set of the predictor variables allow reliable prediction of students' Mathematics self-efficacy in public secondary schools?
2. Which of the predictor variables is most influential in predicting students' Mathematics self- efficacy in public secondary schools?
3. Are there any of these predictor variables not contributing significantly to the prediction model?

Research Design

This study used a survey design. Survey design is a systematic empirical inquiry in which the researcher does not have direct control on the independent variables because their manifestations have already occurred.

Independent Variables;

School Culture (Collegial Culture) variables are: Collaborative Leadership, Teacher Collaboration, Professional Development, Collegial Support, Unity of Purpose , Learning Partnership. Dependent Variables are Mathematics Self- Efficacy

Population and Sampling

The target population for this study comprised all public Senior Secondary School II (SS2) students and their teachers in Oyo state, Nigeria. Multistage sampling technique was employed in selecting the sample for this study as follows: Simple random sampling technique was used to select 5 Local Government Areas in Oyo state. From each LGA, 4 schools were randomly selected. In all twenty (20) schools were selected. Simple random sampling was also adopted in selecting thirty (30) SSS II students from each of the twenty (20) schools. Altogether, six hundred (600) students were involved in the research. Purposive sampling method was used to select four (4) teachers of Mathematics from each school. This was done to select the teachers that had taught and are teaching the students in the senior secondary classes who are used to the school culture. Thus, a total of eighty (80) teachers of Mathematics were selected for the study.

Instrumentation

Two instruments were used in the study namely: School Culture Scale (SCS) and Mathematics Self- Efficacy Scale (MASES)

School Culture Scale (SCS):

The School Culture Scale was adapted from Mitchell (2008). The questionnaire has two sections, the bio-data section which contained questions about the participants' demographics and the question section which had 35- items. These items allowed teachers to record their perceptions of their school's culture. The instrument has five (5) sub-scales (See Appendix 11), with Likert description questionnaire. The Likert scale ranged from 1 (not at all) to 5 (always). The highest obtainable score on the scale is 175 while the lowest obtainable score is 35. It was pilot tested on thirty (15) randomly selected secondary school teachers so as to validate it and eliminate difficulties in understanding the questionnaire items. Cronbach alpha was used to determine the reliability coefficient and the value obtained was 0.81. Lawshe method was also used to establish the content validity and the value obtained was .74.

The content validity of the instrument was established using Lawshe formula:

$$CVR = \frac{N_g - N/2}{N/2}$$

The average value of these coefficients was found and used as the coefficient of the instrument. The content validity coefficient was 0.74.

CVR=Content Validity Ratio, Ne=No of panels rating the item good, N=Total number of panels

Mathematics Self- Efficacy Scale (MASES)

The Scale (MASES) was developed by the researcher. It has two sections: the biodata and item section which consisted of 40 items. The response format was 1= not true of me, 2=fairly true of me, 3= true of me, 4= always true of me. The highest obtainable score was 160 while the minimum score on the scale was 40 (see Appendix IV). The instrument was validated using 20 students from schools like that of the sample population. Factor analysis was used to determine the internal consistency of the instrument. The reliability and content validity of the instrument was established using Cronbach alpha and Lawshe method respectively. The coefficients obtained were .78 and .82 respectively.

Data collection procedure

The researcher engaged two (2) trained research assistants to assist in carrying out the study data. The researcher and the trained research assistants administered the instruments to the students and teachers. Collection of data lasted for three weeks. Names of schools used in this study are not included to ensure confidentiality

Data analysis

The data were analysed using Pearson Product Moment Correlation Coefficients and Multiple Regression Analysis.

Results and discussion

Research Question 1. Does the obtained regression equation resulting from a set of three predictor variables allow reliable prediction of students' Mathematics self-efficacy public secondary schools?

Table 1. Correlations of Mathematics self-efficacy and school culture of public secondary Schools

	Mathematics self-efficacy	Collaborative Leadership	Teacher Collaboration	Professional Development	Unity of Purpose	Collegial Support	Learning Partnership
Mathematics self-efficacy	1.000						
Collaborative Leadership	.306	1.000					
Teacher Collaboration	.158	.198	1.000				
Professional Development	.219	.222	.237	1.000			
Unity of Purpose	.255	.124	.131	.117	1.000		
Collegial Support	.328	.039	.085	.192	.142	1.000	
Learning Partnership	.416	.322	.044	.055	.130	.030	1.000
Mean	98.19	24.96	13.14	10.69	12.53	9.19	9.20
StdDev	11.65	2.79	1.77	1.63	1.26	.99	1.28

Table 2. Model Summary of School Culture and Self- Efficacy of Schools

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Public sec schools	.578 ^a	.335	.280	9.88731

Table 3. ANOVA^b of School Culture and Self- Efficacy of public secondary Schools

Type of School	Sources of variation	Sum of Squares	Df	Mean Square	F	Sig.
Public Sec Schools	Regression	3587.441	6	597.907	6.116	.000 ^a
	Residual	7136.396	73	97.759		
	Total	10723.837	79			

The models revealed the strength of the association or magnitude of the relationship between the elements of school culture and Mathematics self-efficacy in schools. (R), for culture is .578. This means that there was .578 degree of relationship between Mathematics self-efficacy and the six elements of school culture. The relationship was positive and considered moderate since it is greater than 0.

The coefficient of determination (R^2) of school culture was .335. This shows that 33.5% of the proportion of the total variance of Mathematics self-efficacy was shared with the linear combination of the six elements of school culture.

The adjusted coefficient of multiple determination (Adjusted R^2) was .280 for culture. This mean that 28.0% of school culture were the predicted amounts of shared variances between the variables but were adjusted mathematically to estimate this value for the population. It is a maximum likelihood estimate of what would have been obtained if the whole population had been involved instead of the sample population. This shows that 28.0% of the variance observed in public secondary schools' Mathematics self-efficacy is accounted for by all the predictors and these variances/observations are statistically significant not statistically significant in schools' culture. $F(6,73)=6.116 P<0.05$

This shows that 28.0% of culture of the variance observed in schools in Mathematics self-efficacy is accounted for by all the predictors and these variances/observations were statistically significant in public secondary school culture. $F(6,73)=6.116 P<0.05$

The observation of variance in public secondary school culture $F=6.116$ was statistically significant. It shows that in public secondary schools' culture there was a significant portion of explained variance. Therefore, the obtained regression equation allows reliable prediction of Mathematics self-efficacy.

Research question 2: Which of the predictors is the most influential in predicting students' Mathematics self-efficacy?

Table 4. Coefficients of School Culture and Self- Efficacy of Public Secondary Schools

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	S.E	Beta			Tolerance	VIF
(Constant)	-1.031	17.809		-.058	.954		
Collaborative Leadership	.580	.437	.139	1.327	.189	.832	1.201
Teacher Collaboration	.350	.655	.053	.533	.595	.912	1.096
Professional Development	.631	.725	.089	.871	.387	.881	1.136
Unity of Purpose	1.268	.907	.137	1.398	.166	.944	1.059
Collegial support	3.172	1.149	.271	2.761	.007*	.947	1.056
Learning Partnership	3.085	.925	.338	3.334	.001*	.887	1.128

* $P<.05$

partnership ($\beta=.338$, $t=3.334$, $P<0.05$) are the most influential predictors of Mathematics self-efficacy in public secondary schools.

Research Question 3; Are there any predictor variables not contributing significantly to the prediction model?

Contribution of the independent variables to Mathematics self-efficacy.

Table 4 shows that in public secondary schools, collaborative leaders, teacher collaboration, unity of purpose and professional development did not contribute significantly to the model.

Discussion

The result shows that school culture in public secondary schools statistically predicted self-efficacy in senior secondary schools in Oyo State agreed with the findings of James et al (2002) who indicated that teachers' social interactions or networking increases self-efficacy and also support Chinn et al (2000) who believed that if given the opportunity for collaboration, self-efficacy is enhanced. It negated that of Felsen (1984) who postulated that self-efficacy was not related to culture.

However, it is remarkable to note that if there is collegial support and learning partnership, the teacher would be pro-active in demonstrating acceptance, understanding, warmth, closeness, trust, respect, care and cooperation towards his or her students' works and at initiating positive teacher-student relationships as well as increasing the likelihood of building strong relationships that will endure over time. It is noteworthy that learning partnership does engender self-efficacy in the student. It is not a gainsay that teacher who established a personal, close, friendly, warm, and supportive relationship with their students create an enabling environment which enable them to learn in a relaxed and tension free atmosphere. It is evident that when students experience a sense of belonging at school and supportive relationships with teachers and classmates, they are motivated to participate actively and appropriately during the teaching/learning process and in other activities in the classroom as well as the school.

Furthermore, self-efficacy is enhanced if learning experiences ascend in difficulty and sequence. If students collaborate and they are given opportunities for small group activities, it will boost their self-efficacy. Students should be encouraged to see successful people as role models to boost their self-efficacy. In summary, the type of culture that a school operates can raise students' self-efficacy. and the study has generated baseline data about school culture of schools.

Recommendations

1. Enlightenment programmes should be organised on what should constitute the school culture to improve mathematics self-efficacy.
2. There should be regular training and re-training programmes for teachers in schools so as to provide a basis for their own personal improvement with regards to knowledge in their areas of study and, by extension, improvement on the performances of their pupils.
3. Investigation of teachers' level of professionalism from time to time is encouraged as it will help to determine where they need to be strengthened (Needs Assessment) and thus identify ways of improving teachers' training and capacity building programmes.
4. It is recommended that funds should be made available in schools for easy execution of school plans.
5. Orientation programmes should be organised for school managers on the types of school culture that exist.
6. Teachers should be encouraged to be innovative.
7. Conducive environment should be made available to sustain any educational programmes in the country.
8. Consequent upon this result, efforts should be made by school administrators/managers to be operating a positive culture. This will help their students attain greater heights and boost their self-efficacy.

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