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EDUCATIONAL PLANNING

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THE IMPROVEMENT OF EDUCATION

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From the Editors

This issue of Educational Planning covers a wide planning area from theory to practice. It starts from goal-free planning to educational leadership planning, staff development planning, virtual classroom planning and the visual environment planning of educational facilities.

First, Lindahl explored the goal-free educational planning model of David Clark. The model focuses on building a shared understanding of the school's mission, vision, and key values, and calls for stakeholders to contribute to moving the school in the desired direction.

Then, Osagie and Momoh investigated the relationship of principals' leadership styles and student performance in Nigeria. The findings that transformational leadership was an important element of school improvement have had important implications for educational leaders with respect to planning for leadership development and preparation of teachers.

This is followed by Abolo and Oguntoye who examined the different conflicts and their impact on staff effectiveness in the Nigerian South-West federal universities. The findings of the study indicated that conflicts were significantly related to staff effectiveness and that the effectiveness of the academic staff was affected more than that of the non-academic staff during conflicts. The study recommended the need to plan for morale booster programs for the staff.

In planning for a virtual classroom, Riegel and Kozen explored the "Four Cs" requirements of the National Education Association: communication, collaboration, critical thinking and problem solving, and creativity. They addressed teaching and learning the four quality indicators within a virtual classroom. Digital resources that address each of the "Four Cs" and tie into content learning were identified and described.

Finally, the article By Pulay, Read, Tural and Lee examined student behaviors under two different CCT levels of fluorescent lighting in an elementary school classroom. The findings indicated that the higher CCT of the lighting the more student on-task behaviors were. This study has practical implications to school officials interested in bettering classroom physical environments to advance student academic success.

Authors of the articles of this issue have repeatedly called our attention to the importance of planning in every aspect of educational development. We recognize that any educational project, program and long or short term development has to be well planned to be successful. This is why this journal is established to serve as a platform to exchange our planning ideas and experiences through a global perspective.

Editor: Tak Cheung Chan

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September 2016

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GOAL-FREE PLANNING: A LARGELY UNRECOGNIZED, BUT FREQUENTLY USED, APPROACH TO SCHOOL IMPROVEMENT

RONALD A. LINDAHL

ABSTRACT

This article explores the relatively unknown educational planning model introduced by David Clark in 1981 – goal-free planning. Unlike more traditional rational planning models, goal-free planning focuses on building a shared understanding of the school’s mission, vision, and key values, rather than on more finite goals and objectives. It then calls for stakeholders to recognize how each can make his or her unique contribution to moving the school in the desired direction.

INTRODUCTION

Planning is an essential part of organizational improvement at all levels of formal education, from pre-school through higher education. As early as 1916, Fayol recognized it as a key management function, and it remains so today. In public preK-12 education, it is almost universally mandated by state policy; in higher education, virtually all accreditation agencies require it. However, although in some instances the *strategic planning* approach is prescribed, in most cases the specific planning model is not delineated in policy.

In 1981, David Clark added *goal-free* planning to the literature base repertoire. His contention was that both theory and experience mitigated against the efficacy of the traditional rational, goal-based models. Perhaps because very few authorities have given other than occasional references to this approach (e.g., Astuto, Clark, Read, McGree, & Fernandez, 1994; Hargreaves & Hopkins, 1994) other than to cite or briefly discuss Clark’s work, goal-free planning is not among the approaches familiar to educational leaders. Also, because it is an easy, yet erroneous, assumption that the model is not based upon organizational goals or directions, educational leaders may prematurely dismiss it as non-relevant to their organizational improvement process and needs. However, in reality, the model is merely based on a broader definition of goals, less explicit, less procedural, more idiopathic, less concrete, and more emergent than most goals associated with rational planning processes (Clark, 1981, p. 44). Reflective analysis of how organizational improvement is generally approached and effected suggests that, at least unconsciously, educational leaders often follow the basic tenets of goal-free planning, moreso than those of the so-termed rational models.

BASIC TENETS OF RATIONAL PLANNING MODELS

Rational planning models are built on a fairly fixed, and essential, set of assumptions (Clark, 1981; Etzioni, 1967; Lindblom, 1959; March & Simon, 1959; Simon, 1957, 1997):

1. Clear understanding of an organization’s goals or mission is an a priori condition for planning.
2. Planning must follow a sequential, rational process that allows the planner to build upon previous steps to address the organization’s goals.

3. There is ample and effective communication across and among hierarchical levels of the organization
4. Planners and implementers have valid, reliable, and comprehensive access to information.
5. Events, their causes, and their consequences are predictable.
6. It is feasible to evaluate A clear the effects of the plan and its implementation, and to use the results for feedback and medication purposes.
7. It is possible to identify suitable alternative means of attaining goals and to rationally prioritize and choose among them.

Rational planning typically takes one of several well-established forms: comprehensive rational planning (Simon, 1957, 1997); bounded rationalism (March & Simon, 1959; Simon, 1957, 1997); incrementalism (Lindblom, 1959); or mixed-scanning (Etzioni, 1967). The very commonly used strategic planning model (Bryson, 1988, 2004; Cook, 1990; Kaufman & Herman, 1991; Mintzberg, 1994) is a sub-set of the comprehensive or bounded rational approaches, depending on the specific decision-making parameters set for that specific application. However, Clark (1981) contended that in most educational organizations, these seven basic assumptions seldom can be met, so an alternative, less-constricted planning approach must be employed; to this end, he proposed the goal-free approach.

BASIC TENETS OF GOAL-FREE PLANNING

Clark's (1981) model is predicated on stakeholders understanding, and agreeing upon, the organization's mission, vision, and key values rather than on more finite goals and objectives. In short, stakeholders must be in concert with the paradigm through which the organization views its world (Kuhn, 1970). Kuhn presented the concept of paradigm shifts, or individuals' and organizations' abilities to form radically different visions than those currently prevailing, visions that would allow important improvements that do not currently seem possible. For example, current technology permits distance education to allow asynchronous learning, bring advanced courses to remote locations where it was previously not feasible to employ qualified teachers, and relieves students from extensive commutes, often in inclement weather or dangerous driving conditions. This represents a significant paradigm shift in education.

Fortunately, formulating a future-oriented shared vision in most school situations does not require such a paradigm shift. The mission, vision, and values can be reflected upon and discussed in relation to current and predicted future conditions, with the purpose of discerning some key areas for future direction or thrust. Rather than adopting finite, rational goals, e.g., improving reading scores by $x\%$ over the next y years, broader directions, such as promoting reading across the curriculum, providing students with formative evaluation feedback to improve their reading, and assisting students to acquire skills and positive dispositions toward reading, are derived. Then, rather than prescribing how this should be implemented, the goal-free approach calls for leaders to work with the organizational stakeholders to help them to identify what contributions each could make to move the organization in the desired direction. This could well vary greatly among stakeholders; for example, the contributions an English teacher might propose in moving toward this direction would likely be considerably different from those of a music

teacher; yet, each could make his or her unique contribution. The school leader's responsibility would be to provide the necessary professional development, resources, encouragement, supervision, and evaluation to assist each stakeholder to make his or her contribution.

WHY EDUCATIONAL LEADERS MIGHT NATURALLY GRAVITATE TOWARD GOAL-FREE PLANNING

Educational leaders may gravitate toward the goal-free planning model because of their perceptions of the inadequacy of the traditional rational models. On the other hand, they may do so because of their affinity for some of the tenets of the goal-free model.

Negative Reasons Why Educational Leaders May Gravitate toward Goal-Free Planning

Most educational leaders, and the stakeholders of the organizations they serve, have had experience with rational planning; all too often, this has not been a positive, successful experience (Galvez, Cruz, & Diaz, 2015). Strunk, Marsh, Bush-Mecenas, and Duque (2016) noted that although formal (rational) planning is required in most school improvement efforts, little is known about the quality of those plans or of plan implementation. Similarly, Mintzberg (1994) noted the low levels of effectiveness of strategic planning efforts. Educational leaders often express concern with the high time and resource intensity of rational planning methods; incremental planning does not suffer from these same concerns, but is ineffective in guiding large-scale or time-sensitive change. Mixed scanning attempts to mitigate the limitations of both models, yet the underlying assumptions and problems persist.

In large measure, it is the difficulty educational organizations face in meeting the rational planning assumptions that causes educational leaders to eschew these approaches. One assumption is that schools are tightly-coupled systems, culturally-driven and controlled, with rigidly shared values, and with extremely regular and effective communication and feedback; thus, "nothing gets very far out of line" (Peters & Waterman, 1982, p. 320) (see also Weick, 1976). Although some of these properties may exist in certain sub-systems of schools (e.g., financial, legal, and human resources), they are not typical of most site-based aspects, which more closely resemble loosely-coupled systems, which are flexible, provide maximum autonomy for individuals, and have strong social networks.

Another often unmet assumption of rational planning is that finite goals may readily be identified and agreed upon. Because the outcomes of the various alternatives deliberated cannot be accurately forecast in schools, it is often difficult even to set finite goals. Consequently, obtaining agreement on specific goals is also often not possible in schools. Educational organizations are not monolithic; they are comprised of competing or different sub-systems and value systems. As Evans (2001) explained, individuals within the organization are deeply concerned about how the proposed changes will positively or negatively affect them personally, often more so than how the proposed changes will affect the overall school.

Unlike private sector organizations, in both preK -12 and higher education, faculty tenure often mitigates against effective rationally-planned school improvement. Tenured faculty may typically only be dismissed by showing a narrowly defined cause, such as immoral conduct, noncompliance with school laws, conviction of a crime, insubordination, or fraud or

misrepresentation (FindLaw, n.d.). As a result, tenured faculty members know that they are unlikely to lose their jobs and dismissal often involves lengthy and costly legal processes (ProCon.org, n.d.). Consequently, it is difficult to coerce tenured faculty members to carry out rational plans if they perceive that it is not in their personal best interest. It is far easier for those faculty members to resist passively/aggressively without threatening their tenured status. Against this negative background, goal-free planning offers some enticing advantages when compared to the traditional approaches.

Positive Reasons Why Educational Leaders May Gravitate toward Goal-Free Planning

One principal reason why educational leaders would favor the goal-free planning approach is its heavy foundation in the organization's culture and climate. Although many attempts have been made in the professional knowledge base to differentiate between these two constructs, there remains no clear, agreed-upon distinction. For example, Martin (2002) compared and contrasted 12 definitions of culture, alone. Harrison and Shirom (1999) defined climate as being people's perceptions of the culture, and Tagiuri (1968) conceptualized culture as one element of climate. Consequently, for this discussion of goal-free planning, they are treated as one interrelated construction, one that is a key element in a school's performance (Cohen, McCabe, Michelle, & Pickeral, 2009; Elbot & Fulton, 2008; Engels, Hotton, Devos, Bouckennooghe, & Alterman, 2008; MacNeil, Prater, & Busch, 2009) and in efforts improve that performance (Bulach & Malone, 1994; Cohen, Pickeral, & McCloskey, 2009; French, Bell, & Zawacki, 2000; Fullan, 2005; Schein, 1992, 1999). Sarason (1996) provided one of the most powerful, and most widely accepted, testimonies to the importance of organizational climate and culture in school improvement when he declared that it is often the climate and culture of the organization that must be changed rather than the typical school improvement foci of curriculum, pedagogy, structures, etc.

Another positive attractor of goal-free planning is its emphasis on the individual in the school improvement process. As Evans (2001) explained, the success or failure of school change can generally be attributed to human aspects; resistance to change is natural, but can be overcome. Rogers (2005) is widely recognized for his work on the differential rates at which individual stakeholders accept innovations, categorizing them into such groups as *early adopters*, *early majority*, *late majority*, and *laggards*. This closely resembles the work of Hall and Hord (2014), who provided excellent insight into individuals' differential *levels of concern* and *levels of use* of the innovation. This focus on the individual corresponds well to school leaders' current understandings of professional development, which also must situate the individual's knowledge, skills, and dispositions toward a new professional practice in the direction the organization is hoping to move (Joyce & Calhoun, 2010; Joyce & Showers, 1980, 2002; Learningforward, 2011; National Staff Development Council, 2005; Sparks, 1983, 2005; Sparks & Hirsh, 1997; SouthWest Development Laboratory, 2011). It also aligns well with current leadership thought on the need to lead through empowerment of all organizational members (Allen, Grigsby, & Peters, 2015; Burns, 1978; Bass, 1997; Bass & Avolio, 1990, 1993; Tichy & Devanna, 1990). As Handy (1994) pointed out, people are not meant to be *empty raincoats*, mere pieces of organizations playing roles; *membership* (involvement) is more important than *ownership* (power). This

individualistic approach to change is also consistent with most major motivation theories (Herzberg, 1966; Maslow, 1943, 1970). Astuto et al. (1994, p. 74) contrasted such empowering leadership with traditional authoritative, top-down leadership as follows: “Decision processes require administrators to seek advice from professional staff and others, develop consensus, and select options consistent with the school’s goals, purposes, and processes” or “Decision processes require professional staff to identify and select a range of alternative options consistent with principles of teaching and learning and the value referents on which the school community is based.” By focusing on how each individual can best contribute to the organization’s chosen direction or thrust, goal-free planning helps to fulfill Slater’s (2008, p. 67) contention that “A leader’s success will be measured not by the number of followers they have, but rather by the number of individuals that they have inspired to become leaders themselves.”

CONCLUSIONS

Schools have a relatively poor history with formal planning, largely because their institutional characteristics do not coincide well with the basic assumptions of the traditional rational planning models. This negative history clouds future planning efforts, as educational leaders and stakeholders resist yet another planning and implementation attempt. However, one model, Clark’s goal-free planning approach, aligns well with the characteristics of many schools. Most educational leaders are not cognitively familiar with the goal-free planning model, although if its basic tenets were explained to them, they would likely identify it as an approach they have used and favor. It fits well with the leadership, motivation, professional development, culture and climate nourishment, and emphasis on vision concepts that are at the forefront of educational leadership today.

Is goal-free planning a panacea for school improvement at either the preK – 12 or higher education levels? Most certainly not! Other planning models, e.g., incremental planning, will continue to occupy a prime role in guiding schools. Is goal-free planning a legitimate educational planning model? Certainly! However, it functions best when organizations are not under extreme pressure or time-sensitivity for change, when distributed leadership is prevalent, when the organizational climate and culture is healthy, when the organization is able to coalesce around a shared vision and future priorities and direction (as opposed to highly specific goals), and where related professional development and supervision can be tailored to individual needs within the nomothetic thrusts. Certainly, not all educational organizations possess these admirable qualities and not all situations allow for moderately paced, self-directed changes. However, when these conditions align, educational leaders may be well served to consider employing goal-free planning. Obviously, this then calls for considerably more scholarly reflection, theoretical integration, and research on this approach to planning.

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PRINCIPALS' LEADERSHIP AND STUDENT PERFORMANCE IN SENIOR SECONDARY SCHOOLS IN EDO STATE, NIGERIA

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ABSTRACT

The study investigated the leadership styles of principals who were successful in achieving good results consistently in the Senior School Certificate Examination (SSCE) in Edo State, Nigeria. No previous studies have examined leadership styles and the link to student performance as measured by public examinations in Edo State. The transformational leadership model was used to conceptualize the leadership styles of principals in this study. It was hypothesized that there is a positive relationship between transformational leadership behaviors of principals and overall performance of students. Analysis of principals' leadership style was conducted using the transformational Multifactor Leadership Questionnaire 5X Short. The findings demonstrate support for the hypothesis relative to five dimensions of transformational leadership and student's performance in the SSCE. The study also shows that transformational leadership is an important element of school improvement. Hence, the findings have important implications for education professionals and administrators with respect to planning for leadership development and preparation of teachers in Edo State.

INTRODUCTION

The differential scholastic achievement of secondary school students in Nigeria has been a source of concern to educators, government and parents. This has been a concern because of the importance of education in the development of the country. Education is the key to human and capital development and it is also the key to national development. The mass failure of secondary school students in recent years in public examinations such as the Senior School Certificate Examination (SSCE) which is conducted by the West African Examination Council (WAEC) is indicative of the fact that secondary school education in Nigeria has fallen drastically (Adebule, 2004). For example, the poor performance of students in SSCE and NECO exams registered an average failure rate of 72 per cent, 74 per cent, 74 per cent, and 75 per cent in 2008, 2009, 2010 and 2011, respectively (Adesulu, 2014). Less than 30 per cent of over a million students who sat for the examination within the last six years obtained credits in five subjects including English Language and Mathematics (Adesulu, 2014). Parents and stakeholders in education are in total agreement that the government's lack of adequate investment in education is yielding the undesirable dividend (Ekundayo, 2010). Asikhia (2010) believe that the falling level of academic achievement is attributable to teachers' non-use of verbal reinforcement strategy. The attitude of some teachers to their job is reflected in their poor attendance to lessons, lateness to school, unsavory comments about students' ability that could damage their ego, poor method of teaching and the likes affected students' academic performance (Aremu & Sokan, 2003). The search for the causations of poor academic achievement is unending and some of the factors that have been put forward are: motivational orientation, self-esteem/self-efficacy, emotional problems, study habits, teacher consultation and poor interpersonal relationships (Adeyemi, 2008).

The foundation for the development of human capital is primary and secondary education. Much of the outcry for the poor performance has been blamed on the students. Thus the problem has been decontextualized from the school, its teachers and the principals. The reasons for the poor performance were projected onto poverty of the students, their parents, families, communities and environment (Adeyemo, 2005). It is evident that the schools continue to grapple with the issue of how to best serve an ever increasing student population.

Despite the disheartening results from the schools, there are some schools which have consistently produced very good results in Edo State. Parents try hard to get their children admitted into such schools. A review of the literature reveals that there has been little investigation into the leadership styles of principals and the link to students' performance in public examinations in Edo State. The importance of the role of principals and their impact on the school cannot be overlooked. Principals have a very unique role in schools' organization. Principals are managers and the job of managing involves among other things, the provision of leadership for men and women, coordinating both human and material resources to ensure the achievement of organizational goals (Hallinger & Heck, 1998). The fundamental goal of the school is to enhance teaching and learning process.

This study investigated the leadership styles of principals who were successful in enhancing students' academic achievement in public examinations such as the Senior School Certificate Examination (SSCE). Specifically, the study aimed to examine the relationship between transformational leadership and student performance in the Senior School Certificate Examination (SSCE) in secondary schools in Edo State.

Leadership plays an important role in any organization to achieve particular goals. It is the ability of leadership that harnesses human and material resources to create productivity. Leadership is therefore of paramount importance in any organization to the extent that without it goals may be difficult to attain (Lipham, 1964). Leadership is defined as a process of social influence where leaders induce followers to apply their energies and resources toward a collective objective (Bolman & Deal, 1977). Ogunsayin (2006) stated that leadership is a position of dominance and prestige accompanied by the ability to direct, motivate and to assist others in achieving a specific purpose. Cheng (1996) found two general elements in the concept of leadership. First, leadership is related to the process of influencing others behaviors. Secondly, it is related to the development of goals and achievements.

Leadership is of particular importance in educational administration because of its far reaching effects on the accomplishment of school programs, objectives and attainment of educational goals (Peretomode, 1991). Educational leadership refers to the leadership that provides direction and expert advice on developments of learning, teaching and curriculum, emphasizes relevance to education in management, diagnoses educational problems and encourages professional development and teaching improvement (Cheng, 1994). The significance of educational leadership is due to the belief that the quality of leadership makes a major difference to school and student outcomes. There is also increasing recognition that schools require effective leaders if they are to provide the best possible education for their learners (Ibukun, 1997). Educational leaders worldwide search for ways to grow schools as learning centers that can effectively nurture and sustain the development of students. Leadership that supports student learning is critically important in this process

The behavior of leaders has been identified as one of the major factors influencing the productivity of subordinates in any organization and the school system is not an exception (Babayomi, 2006). Without leadership, an organization can best be described as a scene of confusion and chaos. When leadership in an organization is effective, there is progress, however, when the leadership is defective, the organization declines and decays. In order to build strong teacher commitment towards the realization of school goals, principals must provide strong, directive leadership in setting and developing school goals, creating a unity of purpose, facilitating communication and managing instruction (Purkey & Smith, 1983). Strong leadership embodied in the principal is instrumental in setting the tone of the school (Scheerens & Creemers, 1989; Weber, 1971).

At the head of leadership in secondary schools in Nigeria is the principal, who administers the school with other teaching and non-teaching staff. The principal is regarded as the chief executive who is responsible for all that happens in the school. The principal manages both human and material resources to ensure the achievement of organizational goals. Thus, the

position of the principal in the school is unique because without it, the school cannot function properly (Obilade, 1998). The secondary school system in Nigeria is riddled with series of problems such as violence, insecurity of life and property, poverty, inadequate funding, poor academic performance of students, cheating in examinations and poor attitude of teachers to teaching (Ofoegbu, Osagie & Clark 2012). Unfortunately, these problems go on unabated in the schools. A significant challenge for principals is to identify the situations in their schools, such as school culture, how it affects the students and the type of leadership behaviors principals adopt in order to choose a path for the improvement of the schools. The principal is the critical person when it comes to efforts to improve the quality of the school. Since a school is known to be an instrument of change and reform in the society, the principal is pivotal in driving reforms and changes (Uyanga, 2008). This responsibility is very obligatory and principals are expected to be the catalysts for change and deploying managerial skills for implementing change within the school. Thus, the principal is the key supporting agent for change to achieve success in the school. Hence the principal's behavior has a very positive relationship to school effectiveness. It is against this backdrop that this study set out to examine critically the leadership styles of principals who have succeeded in producing good results in public examinations despite the plethora of problems besetting the secondary school system in Nigeria. The paper provides useful information on learning from success as leverage for a professional learning community.

CONCEPTUALIZING TRANSFORMATIONAL LEADERSHIP

The concept of transformational leadership was introduced by Burns (1978) to describe the process by which leaders affect radical change in the outlook and behavior of followers. Bass (1985) extended Burns work and applied it to various types of organizations. He defined a transformational leader as one who motivates followers to do more than they were originally expected to do. He postulated that transformational leaders influence others to transcend their own self-interest for the good of others, the organization, or country. Transformational leaders are responsible for performance beyond expectations as they transit a sense of mission, stimulate learning experiences and arouse new ways of thinking (Hater & Bass, 1988). Schein (1978) described behaviors associated with transformational leaders as integral to creating and influencing organizational culture. Those who displayed leadership that is transformational contributed positively to the achievement of business unit goals (Howell & Avolio, 1993). Yammarino (1994) defined transformational leadership as the one which motivates followers to do more than they are expected to do in a way that upgrades the individual's level of awareness of the importance and value of outputs and how they are produced. Yukl (1998) described transformational leadership as the process of greatly affecting and changing the individual's attitudes, behaviors, beliefs and commitment of the individual to the organization's tasks, aims and strategies. The following is a description of transformational behaviors provided by Avolio, Waldma and Yammarino (1991)

Charisma

Charisma depicts the impression of the employee of the leader in terms of the power of influence, self-confidence, trust in others, consistency and ideas which individuals make an effort to imitate. Thus, leaders become a target of admiration, respect, sense of responsibility, confidence, growing optimism and discussion by the followers.

Idealized Influence

Idealized influence includes the leaders' values, beliefs, moral considerations, moral behavior and selfless acts. It is also the extent to which the leader articulates goals and arouses followers' interests. Establishing a common vision is an integral part of idealism. A transformational leader plays a role in helping others consider the future. This happens when

inspiration is produced through conformity of personal values with the groups' interests. Transformational leadership implies being tolerant and risk-sharing with followers.

Inspirational Motivation

A leader sets an example for followers. He or she communicates vision, encourages hard work and expresses important goals. Transformational leaders motivate others through purposeful tasks that tend to be challenging. Team spirit is excited by arousing enthusiasm and optimism. Transformational leaders try to build relations with their followers via interactive contact which serves as a cultural link between them. This leads to a change in the values of both parties towards a common ground. The leader creates crystal clear vision of the future in his followers through realization of expectations and demonstrating commitment to goals and common vision. This dimension is measured by the leaders' ability, confidence in his or her values and vision.

Individualized Consideration

The leader provides constant interactions and combines individuals' needs with the organizational function. He or she shows personal interest in followers' requirements of growth and achievement. To do this, a leader acts as a referee and supervisor. The leader helps develop the follower's abilities towards high levels of potential. A leader must consider individual differences between followers in terms of their requirements and desires. The positive effect of individualized consideration and transformational behaviors lies in empowering followers. This can be measured by the leader's interest in the followers' needs for development and growth and the leader's care in training them and guiding them.

Intellectual Stimulation.

Transformational leadership stimulates individuals to be able to be creative and excellent by introducing ideals and early solutions to problems. However, it highlights rationality and new approaches for followers. It also re-evaluates old beliefs and values and looks at difficulties as problems that need to be solved and seeks logical solutions to these problems. Transformational leaders do not criticize followers in public for their mistakes. Rather, they provide them with challenging tasks and encourage them to solve problems.

PURPOSE OF THE STUDY

The study investigated the leadership styles of principals who were successful in producing good results for students in the Senior School Certificate Examination (SSCE), a public examination administered by the West African Examination Council (WAEC) over a period of six years (2006-2011). It was hypothesized that transformational principals employed techniques with creative and innovative approaches to curriculum and instruction that contributed to high student performance. Transformational leaders operate out of a sense of duty and commitment, that is, a critical understanding of the need to advocate for excellence in their students. This article reports on the findings of the study that examined the link between transformational school leadership and student achievement.

Studies of effective leadership in secondary schools are more important than ever, given the gaps that currently exist in the performance of students in secondary schools in Edo State and in Nigerian schools in general. Therefore, a study of transformational leadership and its relationship to students' performance was of significant importance given that many schools in Nigeria continue to demonstrate the confluence between achievement and mass failure. Findings could have important implications for practicing educational professionals, as well as colleges of education relative to leadership development and teacher preparation.

STATEMENT OF THE PROBLEM

The present and future implications of the academic performance of students in the Senior School Certificate Examination (SSCE) have been a source of worry to the public and stakeholders in the education sector. Secondary school education is important as a preparation for living successfully in the society and for higher education. However, it seems that the secondary schools are not living up to the expectations in meeting these objectives. Secondary school education in Nigeria is riddled with challenges of various dimensions and magnitude, all of which combine to suggest that it is in a state of despair (Ajayi, 2002; Omoregie, 2005). Observation in the secondary school system shows that the style of leadership of a principal could have a serious impact on the performance of students in public examinations such as the Senior School Certificate Examination (SSCE). Therefore, the problem investigated was how principals' leadership style impacted students' performance in the Senior School Certificate Examination (SSCE) in Edo State.

JUSTIFICATION FOR THE STUDY

Nigeria is endowed with enormous natural resources which if properly exploited will be beneficial to its citizens (Asiodu, 2012). As has been demonstrated by all nations which have achieved rapid economic growth and development, education is the key to unlocking the country's enormous potential. It is the driver of development. A successful transformation of the education sector depends on the roles and decisions taken by the leaders. Hence, studies of effective leadership in the secondary school setting are more important than ever, given the poor performance of secondary school students in externally administered examinations. Therefore, a study of the transformational leadership style and its relationship to students' achievement was of significant importance in view of the fact that many of the secondary schools in Edo State continue to record poor performances in the Senior School Certificate for students' achievement in the Senior School Certificate Examination (SSCE) Examinations (SSCE) not only in Edo State but also all secondary schools in other states in the country.

RESEARCH QUESTION

The central research question that guided the study is:
What is the relationship between transformational leadership and student achievement in secondary schools in Edo State, Nigeria?

METHODOLOGY

The study adopted the descriptive research design. The study population comprised all the 283 public and private secondary schools in Edo State, Nigeria. Out of this population, a sample of five schools was taken. The schools were selected on the basis of student achievement data in the Senior School Certificate Examination (SSCE) for the past six years (2006-2011) as illustrated in Table 1. The criterion for the selection was the percentage of the number of students who scored credits and above in five subjects including English and Mathematics. This is the minimum requirement for admission into the universities in Nigeria (Federal Government of Nigeria, 1981). In fact, one of the schools selected for the study, Lumen Christi International High School, Uromi, Edo State has won the National trophy for the best performance in the Senior School Certificate Examination (SSCE) in the entire country three times, in 2007, 2009 and 2011 (Olugbile, 2012)

A purposive sampling technique was used to select 20 teachers per school for the study. Selection was based on five years teaching experience and two years' work experience with the current principal. This will enable the teachers to effectively assess the leadership behavior of their principals vis-a-vis teaching and learning in the schools. In addition, all the principals of the schools were included in the sample. These principals and teachers were the respondents in the study. The identity of the respondents was safeguarded.

Five postgraduate students in the researcher's department were employed to administer and collect the questionnaires. The data gathered were collected and analyzed using inferential statistics and descriptive statistics to examine the variables of the study, transformational leadership and student achievement.

Research Instrument

The instrument used for this study was the Multifactor Leadership Questionnaire 5X Short developed by Bass (1985) and Avolio and Bass (1997). The Multifactor Leadership Questionnaire 5X Short is the most widely used instrument to measure transformational and transactional leadership in the organizational and behavioral Sciences (Tejeda et al, 2001) and is considered the best validated measure of transformational and transactional leadership (Kirkbride, 2006; Ozaralli, 2003). It is for these reasons that this instrument was chosen to measure transformational leadership in this study. The interaction of the dimension of transformational leadership and student achievement was of specific interest to this study. The analysis of principals' leadership style was conducted using the transformational subscales of The Multifactor Leadership Questionnaire 5X Short. Student achievement data were collected from the Ministry of Education, Benin City, Edo State. There were twenty-five questions that measured the five factors of transformational leadership using a five point Likert scale as a means for the participants to record their responses. The possible responses included: 0 = Not at all, 1 = Once in a while, 2 = Sometimes, 3 = Fairly often and 4 = Frequently, if not always.

With regards to the reliability and validity of the instrument, confirmatory factor analysis (CFA) as conducted by Tejeda, Scandura & Pillai (2001) found high internal reliability for the five subscales which measure transformational leadership. Coefficient alpha for the five samples were consistently above .70

Table 1. Students' Performance in the Senior School Certificate Examination (SSCE)

Year	Schools				
	Lumen Christi	UDSS	Edo College	Idia	Presentation
	%	%	%	%	%
2006	100	94	87	72	74
2007	100	92	84	75	78
2008	100	96	82	72	70
2009	100	93	85	70	75
2010	100	96	86	78	77
2011	100	97	88	73	76

Source: Statistics Office, WAEC, Benin City, Nigeria (2013)

RESULTS AND DISCUSSION

The results of the research question of the study are presented in Table 2 and Table 3. A discussion of the findings will follow. In order to determine the principals' leadership behavior, the data collected were analyzed using inferential statistics and descriptive statistics to examine the variables of the study, transformational leadership, and student achievement.

Table 2. Transformational Leadership Percentage Scores of Sampled Principals.

Transformational Leadership Dimension	%
Charisma	78.5
Intellectual stimulation	73.2
Individual consideration	68.9
Idealized influence	81.5
Inspirational motivation	65.2

Table 3. Means and standard deviations of five dimensions of transformation leadership (N = 105)

Variables	Mean	S.D.
Charisma	3.79	0.24
Intellectual stimulation	3.53	0.22
Individual consideration	3.36	0.34
Idealized influence	3.86	0.26
Inspirational motivation	3.27	0.51

Table 4. Test of relationship between principal's leadership behavior and student performance.

Variables	N	r-cal	r-table
Principal's leadership	105	0.352	0.250
Student performance	105		

$p < 0.05$

Research Question: What is the relationship between transformational leadership and student achievement, particularly in secondary schools in Edo State, Nigeria?

The results of this study indicate the presence of four dimensions of transformational leadership, charisma, intellectual stimulation, idealized influence and individual consideration as predictors of student achievement for the selected secondary schools in Edo State. Tables 2 and 3 show that 78.5 % 9 (Mean = 3.79, SD = 0.24) of the respondents agreed that charisma was demonstrated by the ability of the principals to act with sense of responsibility and discuss what was important and valued in the school. The relationship between charisma and student achievement was that the principals were able to create a shared vision that focused on high achievement and overall school improvement. The findings suggested that transformational principals in the study may have recognized the need to work hard in order to boost achievement among the students. Charisma among these principals occurred through the persistent expression of their most important values and beliefs (Jackson, 2000).

Tables 2 and 3 show that with regards to intellectual stimulation, 73.2 % (Mean = 3.53, SD = 0.22) of the respondents agreed that the principals in the sample were encouraging and supportive of teachers' creativity and innovations, creating a context of high expectations for the students.

With regards to individualized consideration, Tables 2 and 3 show that 68.9 % (Mean = 3.36, SD = 0.34) of the respondents agreed that the principals encouraged and supported teachers to develop their skills by approving in-service training, conferences and workshops. This behavior has helped the teachers to perform their duties better for the benefit of the students. The principals also demonstrated that they cared for the students. This attitude was instrumental in developing the teachers' and students' self-efficacy which in turn enhanced student performance in external public exams.

Tables 2 and 3 show that with regards to idealized influence, 81.5 % (Mean = 3.86, SD = 0.26) of the respondents agreed that the principals emphasized group and leader participation in the making of policies and setting goals. The principals in the sample were able to inspire others to set goals and helped teachers and students to accomplish these goals. Decisions about the school were arrived at after consultations and communication with both teachers and students. The principals tried to make the students feel important in the school. The respondents agreed that the principals' leadership enhanced a high degree of morale for the teachers and the students.

With regards to inspirational motivation, Tables 2 and 3 show that 65.2% (Mean = 3.27, SD = 0.51) of the respondents agreed that the leaders were able to inspire others to set goals, help teachers and students accomplish those goals by constantly prodding them. That is, by actively engaging the teachers to teach their subjects and actively engaging the students in the learning process. The findings showed that transformational leadership approach has the potential to engage all stakeholders in the achievement of educational objectives. The aims of the leader and followers coalesce to such an extent that there is a harmonious relationship and a genuine convergence leading to agreed decisions (Henderson, 2002). The findings suggest that the principals in this study directly influenced the behavior of their teachers and the teaching processes employed to promote student learning.

Pearson -r correlation was employed to determine the relationship between the principal's leadership behavior and student performance. The result obtained from the analysis (Table 4) shows that the value of r-calculated (0.352) is greater than the r-table value (0.250) at 0.05 level of significance. This implies that there is significant relationship between principal's leadership behavior and student performance. This result affirms the preceding findings. The reason for this may be that when principals provide good leadership, it will facilitate a conducive atmosphere for teaching and learning that will enhance student performance.

Teachers are the center piece of any educational system. No educational system can rise above the quality of its teachers. Teachers who have low morale are not likely to perform as expected in the school system. The numerous problems permeating the entire educational system in Nigeria such as persistent poor academic performance of students in public examinations, indiscipline and examination malpractice may suggest that teachers have not been performing their jobs as expected (Ajayi & Oguntoye, 2003). Fadipe (2003) posited that teachers, apart from students are the largest most crucial inputs of an educational system. They influence to a great extent the quality of the educational output. Teachers' irregular promotion, low remuneration, (when compared to other public workers) and societal perceptions of the job have dampened the morale of teachers. Corroborating this fact, Obineli (2013) stated that staff promotion helps to boost the morale of teachers and motivates them to work, thereby increasing productivity and efficiency and also enhancing job satisfaction. When teachers are not motivated, their level of job commitment may be low and the objectives of the school may not be accomplished. Along with the preceding facts, the study found that the morale of the teachers in these high performing schools was very high. This is supported by the fact that transformational leadership was instrumental and motivational in developing teachers' and students' self-efficacy as evidenced by

Leithwood and Juntzi (1999). It was observed that there was communication and interaction between the teachers and the students in these schools.

CONCLUSIONS AND RECOMMENDATIONS

The results of this study supported the hypothesis of a positive relationship between the principals' transformational leadership style and student achievement in the Senior School Certificate Examination (SSCE). The findings specifically demonstrated the dimensions of charisma, intellectual stimulation, individualized consideration and idealized influence as predictors of school achievement in the schools sampled. These principals have a thorough understanding of vision as a means to achieve school goals and objectives. They were able to get the teachers and students excited about school goals and cause them to be committed to the goals of the school. They employed creative and innovative approaches to curriculum and instruction that helped to bring about the high student achievement in these schools. The principals were inspirational in leadership. Thus, the principals in the sample through specific dimensions of transformational leadership had a positive effect on students' achievement in the secondary schools investigated. Hence the study has shown that goal focused leadership is ultimately an enabling attribute.

The results of the present study may have some implications for principals, teachers and students in other secondary schools. Identifying the leadership style of successful principals would provide data that could be generalizable across the secondary school system in Edo State. This will be a tremendous support to the challenging situations found in most of the secondary schools in Edo State and generally in Nigeria. Understanding one's leadership style is extremely valuable and a prerequisite to developing leadership in others. To this end, it is imperative for principals in non-performing schools to engage in self-reflection. That is, they should explore their own leadership style as a means to supporting the development of their schools and enhancing the performance of teachers and students. Students' academic performance is what members of the society use mainly to measure the effectiveness of schools.

The foregoing has implications for educational planning. Education is the main key to economic development of a country (Chen & Dahlman, 2004). A society which does not gear itself to learning will find it difficult to progress in economic and social development. It is the education received through the acquisition of specific skills that will enable the individual to function effectively and efficiently in the society (Fadipe, 2011). A major aim of educational planners is to determine the skills gap which needs to be filled to improve the efficiency of the national economy. The principals in the non-performing schools are producing shortages of manpower in many fields of human activity in Nigeria. The impact of educational planning to manpower planning cannot be overemphasized (Obasan & Yomi, 2011).

It is, therefore, incumbent upon the principals in the non-performing schools to change their leadership styles in order to improve the performance of their students in public examinations. To this end, it is recommended that educational planners in the Ministry of Education should sponsor and organize conferences, seminars, and workshops set on a framework for leadership development for principals in all the secondary schools (both public and private) in Edo State.

DIRECTIONS FOR FUTURE RESEARCH

During the study, it was observed that apart from the leadership style of the principals, these schools had some characteristics that contributed to the high performance of the students. For example, Lumen Christi which has won the National trophy for best performance in SSCE three times is a private Catholic secondary school for boys located in a rural community with a boarding house facility. In this school, there is evidence of school discipline. Presentation is a private Catholic secondary school for girls with boarding house facility. In a boarding facility, students live a regimented life. This helps in the upbringing of the students in their formative years.

Edo College is an old, very special public secondary school for boys located in the city. It is unlike the many other public secondary schools the government took over and control in recent times. It has walls around it so the students cannot wander off the campus. Teachers live on campus to enforce discipline. The University Demonstration Secondary School (UDSS) is a private school located inside the University of Benin campus. It is a mixed school for boys and girls with no boarding house facility. Parents drop their children in the morning and pick up their children at the end of the school day in the afternoon. There is less interaction between the boys and girls. The students are under the watchful eyes of their teachers during school time. There is no doubt that these students are influenced by the academic atmosphere. In fact, many of the students gain admission and attend the university. These schools have an atmosphere that is conducive for learning as the classes are generally small, about forty students in a class. The recommended ratio is one to fifty (Federal Government of Nigeria, 1981). These schools operate with strict disciplinary climates. All these private schools are more expensive than the public schools. Future research will investigate the influence of such environmental factors on the performance of students in all the secondary schools in Edo State.

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CONFLICT RESOLUTION STRATEGIES AND STAFF EFFECTIVENESS IN SELECTED FEDERAL UNIVERSITIES IN NIGERIA

EVUARHERHE VERONICA ABOLO
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ABSTRACT

Conflict is inevitable in all organizations, and the university being a center of learning, with diverse needs is not left out. The study examined the different conflicts occurring in the Nigerian South-West federal universities and their impact on staff effectiveness. The academic and the non-academic staff of the three South-West federal universities in Nigeria constituted the population for the study from which 1385 participants were selected as samples. The survey research design was adopted for the study. The stratified and simple random sampling techniques were used to select the sample from the three unions in the selected universities. Two sets of research instrument namely: Conflict and Staff Effectiveness Questionnaire (CSEQ) and an interview schedule were used for data collection. Three research questions and two research hypotheses were answered and tested in the study. The research questions were answered using descriptive statistics of percentages, frequencies, and means while the hypotheses were tested using inferential statistics of T-Test and Pearson Product Moment Correlation. The findings of the study are that conflicts were significantly related to staff effectiveness and that the effectiveness of the academic staff was affected more than that of the non-academic staff during conflicts. The study recommended the need for the Nigerian South-West federal universities and the federal government to embark on morale booster programs for the university staff.

INTRODUCTION

Conflict is a struggle over claims, values and scarce resources. It is inevitable among individuals and in organizations because of the nature of human beings who differ in value orientation, attitudes and levels of understanding. Conflicts have become part of human organizations the world over. There are two major types of conflicts, internal and external. Internal conflict occurs between employees and their employers while external conflict occurs between employees and other bodies outside the organization such as the government. Examples of internal conflicts abound between management and their employees in the universities while external conflicts occur between the university unions and the federal government. External conflicts seem to be the crux of the crises in the universities and they occur at alarming rates due to the diverse nature of the parties involved. The political nature of man, together with the fact that conflict is a global phenomenon in organizations, has made its occurrence in the universities an inevitable situation. But what seemed an aberration is the constant return to the resolution table with seemingly unending resolutions. The various unions in the federal universities are always in constant conflict with either the management or the federal government. These unions are the Academic Staff Union of Universities (ASUU), the Non-Academic Staff Union of Universities (NASU) and the Senior Staff Association of Nigerian Universities (SSANU).

Since the 1990s, it has become nearly impossible for universities to run an entire session without academic activities being disrupted by government–universities face off. In the South-West, the federal universities have had to be closed for several months due to the staff demands. From 2009 to 2011, there was hardly any semester that could boast of a conflict free calendar. The aftermath of these conflicts seemed to have a major impact on the university staff effectiveness. Staff effectiveness is the commitment of workers in their duties leading to high productivity. Also staff effectiveness is the ability of staff to put in maximum performance at work in order to realize the desired goals and objectives of the universities. The staffs of Nigerian federal universities are always battling with being engaged in their assigned duties and staying idle due to incessant conflicts (Albert, 2005).

As rampant as the conflicts in the South-West federal universities, so also are the various effects on the effectiveness of their jobs. This is evident on the quality of work put in by the university staff especially lecturers in trying to catch up with the loss time during conflicts. Conflicts in the universities result in low or no form of work. This tends to weaken staff satisfaction and morale as their needs are left unmet. Assessing the engagement level of staff during and after conflicts in the South-West federal universities is of paramount importance considering the huge number of students whose performance could be affected.

There have been a replay of one conflict or the other with attempts at resolving them, using strategies that seem to suggest inadequacy due to their reoccurrence since the 1990s. These conflicts are so rampant that students and lecturers have advocated for a third session named *strike session* in the universities calendars. The university staffs are demanding better university infrastructures, funding systems and working conditions of staff.

Conflict results in strained relationship. In resolving the conflicts, the South-West federal universities and government are yet to arrive at a compromise. Relationships have been strained and affected as conflicts are not effectively resolved. This also has affected staff morale, mostly evident in low productivities. The immediate effect of conflict is the distortion of academic calendar in most universities. Thus, the overall impact of conflict on staff effectiveness relates to value distortion and system dissonance. When the system and values are distorted, then the effect is enormous and frightening to staff morale and productivity.

The more employee's perceived organizational injustice and unfairness as arising from the poor management of conflict in the work place like the university, the more they reciprocate by exhibiting negative attitude to work. These negative attitudes are not without consequences on staff morale and productivity (effectiveness). Thus there is the need to examine the effects of the different conflicts on the effectiveness of the South-West federal university staffs because a worker who has experienced work frustration or suffered organizational injustice arising from poor management of conflicts, may become counterproductive. These can be expressed in form of character assassination, spreading negative rumors, sabotaging and low productivity.

STATEMENT OF THE PROBLEM

Conflict is inevitable given the wide range of goals existing in organizations. Educational institutions such as the South-West federal universities in Nigeria have experienced different types of conflicts (internal and external). These conflicts may have had effects on the work effectiveness of university staff resulting in low morale, inaction, frustration, lack of commitment and low productivity. The incessant conflicts resulting in strikes and closure of universities revolve round the non-implementation of agreements between the university staff and the federal government. Most conflicts have had immediate effects of distortion of academic calendar in the university leading to fatigue and lowering of professional standard. The constant resort to conflict resulting in the closure of the universities can now be referred to as a vicious cycle of strike, negotiation, arriving at agreement, postponing strike, waiting, non-implementation of agreement, warning strike, and full blown strike.

Unresolved conflicts in the universities seemed to have resulted in serious consequences on staff effectiveness such as employee low turnover, low morale, reduced productivity, quality problems, reduced collaboration, passive/aggressive behavior, inefficient management credibility, negative upward attention and distrust (Cram & MacWilliams, 2011). The purpose of this study is to examine the conflicts in the South-West federal universities and how they impact on the work effectiveness of staff.

RESEARCH QUESTIONS

1. What are some of the causes of unresolved conflicts in the South-West federal universities?
2. How do conflicts in Nigerian South-West federal universities impact staff effectiveness?
3. How do the activities of unions (ASUU, NASU, SSANU) during conflicts impact staff effectiveness in the Nigerian South-West federal universities?

HYPOTHESES

1. There is no significant relationship between conflicts in Nigerian South-West federal universities and staff effectiveness.
2. There is no significant difference in staff effectiveness among workers unions (ASUU, NASU, SSANU) in the Nigerian South-West federal universities.

LITERATURE REVIEW

Meaning of Conflict

Conflict is a natural condition existing in any multiparty heterogeneous system. The university and government conflict in Nigeria is seen as means of cushioning tension. This according to Anih (2008) is the struggle in the higher education institutions. It is an inherent social condition derived from the fact that persons, parties, social groups and collectivities differ from one another on a variety of values, goals and material resources. Conflict is often defined as a form of behavior – mutual interference escalated hostilities. A conflict situation is therefore one that is characterized by the inability of those concerned to iron out their differences. It is the perceived incompatibility of goals, actions and outcomes between two or more people. Conflict means different things to different people. Dubrin 1978 (cited in Ejiogu, 2002) saw conflict as “opposition of persons or forces that gives rise to some tension”. As long as we have more than an individual in interaction, there is bound to be conflict. Thus conflict is an inevitable element in any labor management relationship.

Conflict is not necessarily a bad thing. According to Anih (2008), conflict is a part of life, but it becomes unhealthy when it is between people rather than about idea. Conflict is bound to occur as long as there are people dealing with fellow people, making decision or having meeting. Conflict, therefore is a direct opposition, a clash or disagreement between people. Ekpu (2008) opined that conflict is neither positive nor negative as it is the result of diverse characteristics of our thoughts, beliefs, perceptions, attitudes at social systems and structure. Thus, Ekpu explained that it is the way one handles, manages conflict that will determine its effects. Conflict could be seen as an energizer of development if properly managed by people and the conflicting parties involved. Conflicts have negative outcomes when the affected individual exhibits a feeling of defeat and demoralization; they also have positive outcomes when better ideas are produced, they force people to clarify views.

Types of Conflict

Conflict is widespread in human societies. It occurs in profit and nonprofit organizations. In organizational life, different types of conflict can be identified. There are four categories of conflict according to Anderson (2006). These include: intrapersonal and interpersonal, intragroup and intergroup. The intrapersonal conflict has to do with incompatibilities within a person’s cognitive system. Interpersonal conflict is between people, intragroup is within a group while intergroup conflict is between groups. We have two sources of conflicts, the internal and the external source. The internal source according to Fajana (2000) deals with disagreement arising within the enterprise while the external are those cropping up outside the organization.

Differentiating conflict according to work types, Chukwumaeze (2008) classified it as substantive conflicts which are those rooted in the substance of the task. Affective conflict derived from the emotional affective aspect of the interpersonal relation; it deals with the individual’s emotions. Still on the types of conflict, Anih (2008) categorizes them into pre-existing ones which involve issues carried over from previous contents. The author also refers to spontaneous reaction which deals with reaction in a critical time in contest. Also included, are cumulative responses, which are series of calls or bad breaks that do not favor one team. Substantive conflict is associated with the job not individual while affective deals with emotion.

Asongo (2008) identified three types of conflicts:

Social conflict involves struggle over values or claims to status; power and scarce resources in which the main actors are out not only to gain the desired values but also to neutralize, injure or eliminate their rivals. The author further divided social conflict into realistic, non-realistic, ideological and anthropological conflicts.

Psychological conflict is a situation in which a person is motivated to engage in two or more mutually exclusive activities. It could occur at different levels – overt behavioral level, verbal level, symbolic level, and emotional level.

Political conflict results from closely related processes whereby two or more individuals are in contact and are carrying out incompatible functions at the same time. This can be likened to the type experienced in Nigerian higher education institutions.

Causes of Conflict

William 1978 (cited in Ejiogu, 2002) made a summary of eight causes of conflict as follows:

Line-staff competition: It occurs when there are two different categories of staff struggling for power and trying to assume the authority of the other staff.

Functional interdependence is when conflict occurs as a result of two or more departments working to achieve a goal. The resulting conflicts are as a result of non-performance by a producer unit.

Labor-management polarization: This is when conflict occurs as a result of disagreement between top management and union leaders in terms of staff welfare, discipline and conditions of service.

Organization-Individual disagreement: This results when employees fail to meet the organizational demands and also when an organization fails to fulfill the employees' demands.

Disagreement over goals: It arises as a result of imbalance between the personal objectives of managers and employees with that of the organizational goals.

Overlapping or ambiguous responsibility: This arises when roles are not clearly defined for staff and also when the roles and expectations are too many for the staff to cope with.

Bottleneck in the flow of work: It occurs when an obstruction in a particular section of the work place affects another section leading to crisis.

Personality clash: These are differences in attitudes, ability, goals, values which can lead to conflict, such differences normally results in power tussle.

Fajana (2000) classified causes of conflicts into two major sources: Internal and external. The internal causes are disagreements arising within the enterprise while those cropping up outside it are referred to as external. Internal causes include employee grievances, individual workers grievances and collective grievances. External causes of conflict could be as a result of government's industrial and economic policies, the nature of labor legislation, and unpatriotic unethical behavior of the political and economic classes.

Classifying causes of conflict in relation to the antecedent conditions, Ojo (200) mentioned the following as some of the major causes of conflict:

Information: The parties have different information or no information;

Perceptual: The parties have the same information, but look at the issue differently;

Communication barriers: These include space, time and position;

Role of different organizations: These are the different roles of the parties, which make them to take different positions on the issues;

Goals: These are the different organizational or personal goals of the parties;

Values: These are the different values of the parties which lead them to choose different solutions to a situation;

Dependence on one party: This is a situation when conflict ensues as a result of the reliance of one party on another for resource;

Association of parties: The more the parties work together, the greater the chances of conflict;

Unresolved prior conflict: The aftermath of unresolved prior conflicts likely leads to further conflicts (p.2).

Cases of Conflicts in Nigerian Universities

Conflicts in Nigerian universities date back to the 1960s with the unsuccessful attempt of the first republic politicians to change the pre-independence statutory image of the university system by bringing universities under undue government control. The university lecturers embarked on series of strike dating back from 1973. In the regime of General Yakubu Gowon, university staff embarked on strike for improvement in their conditions of service due to the deplorable condition left behind by the Nigeria civil war. The spate of strikes continued under Alhaji Shehu Shagari in 1980. When President Obasanjo was elected in 1999, ASUU further demanded for the adoption of the 1992 agreement. Pressure from the university staff led to FGN and ASUU agreement of 2001.

After series of appeal by ASUU to FGN for the implementation of the 2001 Agreement, ASUU called its members on 29th December 2002 to embark on a total and indefinite nationwide strike (Olatunji, 2003). FGN failure at fulfilling its own part of the agreement by using avoidance strategy led to another three day warning strike on April 24, 2006. The election of President Yar'Adua into power in 2007 brought some hope to the academia, but this was proved to be a false hope as nothing was done to implement the agreement. After several failed negotiations, the staff went on an indefinite strike in 2009. The 2009 strike can be termed the highest over time as it further involved all the facets of the university including NASU.

The suspended 2009 strike could be termed only as a repetition of the usual past, for the technical committee/inter-ministerial committee undermined the agreement already reached. Failure of state to honor the agreement reached in 2009. The national body of ASUU joined the strike in June 2010 when all attempts to make the five East-South State Governors to budge failed. This according to Ubabukoh (2011) is called the university staff union strike as it affects all the university unions.

The issue of strike being a perennial problem seemed not abated. The universities continuous press for the full implementation of the agreement reached in 2010 met deaf ears by the federal government. As usual in the circle of the universities conflicts, ASUU decided to drive home their demands in a one week warning strike in September 26th, 2011. NASU also followed with their warning strike effective from 3rd October. The song of victory is yet to be sung as the universities launched a full blown nationwide indefinite strike from December 5th 2011 to February 2nd, 2012. Conflicts in the Nigerian federal universities continue due to most unfulfilled agreements.

Impact of Conflicts on Universities Staff Effectiveness

Staff effectiveness according to Todd (2009) is the total input of workers in their duties. It involves the overall dexterity of staff in his duties to achieve the organizational goals. This includes the conduct of staff, their skills, expertise, morale, interpersonal relationships with colleagues and their ability to abide with management policies without stress. The work environment generally is a collectivity of various individuals and groups from different cultural, social, political and economic backgrounds. Given this scenario, the interests and expectations of employees in organizations is bound to differ (Igbaji, 2009). These variations in staff are expressed in their various responses to duties during conflicts. Workers' collective interest is represented through expressions by the workers' trade unions like ASUU and NASU in the universities.

Staff work effectiveness during or after conflicts is usually a reflection of the extent to which universities unions persuade workers to react to the issues yet to be resolved. This according to Ongori (2009) would manifest in various work attitudes such as low or high morale and inaction or lack of zeal for duties. As most conflicts are as a result of clamoring for better welfare, continuation of conflicts influences workers' productivity and ultimately hinders the achievement of goals in the organization. Most employers' attitude to the trade union, particularly in the tertiary institutions where the government (state or federal) is both employer and umpire, has been hostile. The union therefore finds it difficult to persuade unsatisfied and unwilling workers to increase their productivity to enable organizations achieve their goals.

Educational sub-sector, specifically tertiary institutions (universities) in Nigeria have been recording series of industrial unrests in the recent past (Ubabuko, 2010). The effects of repeated and abrupt closure of universities due to industrial bluffs on academic programs and the goals for which they were established can better be imagined. Educational standard is now believed to be questionable. Many academic calendars in the universities have been disorganized with some academic sessions out rightly lost. Students' academic performances have comparatively taken a nose dive while various forms of examination malpractices are on the increase. The situation has assumed such an alarming dimension that the public now accuses the 'ivory towers' of turning out graduates that are ill-equipped in character to contribute to the growth and development of the nation.

Empirical findings according to Ongori (2009) show that organizations are adversely affected by conflicts in terms of performance and wastage of scarce resources. Similarly organizational conflicts like those of the Nigerian universities do have positive effects especially in increasing innovativeness and improving the quality of decisions in the institutions. In addition, conflicts build the spirit of teamwork and cooperation among the employees. This occurs especially when the staff of the universities come together to resolve the conflict.

METHODOLOGY

The study adopted the survey research design. The target population of the study includes all the academic and non-academic staff in the three South-West first generation federal universities. All the staff belongs to the three unions (ASUU, SSANU and NASU). A sample size of 1,385 staff (academic and non-academic) was randomly selected from the total population of 10,659, comprising 13% of the total population. Two instruments: a questionnaire titled "Conflict and Staff Effectiveness Questionnaire" (CSEQ) and an interview schedule were used for data collection. The interviews were conducted through one-on-one questions and answers using the prepared questions and their responses were recorded (see attached interview data). The instruments measured the variables under study: conflict resolution strategies, staff effectiveness, and causes of conflict. The instruments were given to management experts in the field for validity check while the test and re-test method was used to establish reliability of the instruments with a reliability coefficient of 0.85. Three research questions and two research hypotheses were answered and tested in the study. The research questions were answered using descriptive statistics of percentages, frequencies, and means while the hypotheses were tested using inferential statistics such as, the t-test and Pearson Product Moment Correlation. The analyses were done through the use of the Statistical Package for Social Sciences (SPSS). All the findings were held significant at 0.05 probability level.

ANALYSIS OF RESULTS

Research Question One: What are the causes of unresolved conflicts in the South-West federal universities?

Table 1: Causes of Incessant Conflicts

Causes	Frequency	%
The universities inability to arrive at a consensus	49	3.5
The federal government insensitivity to the universities demand	260	18.8
The overbearing power of the federal government	208	15.0
The inability of personalities to be impersonal in their judgment	60	4.3
Unwillingness of universities and government to shift ground during negotiation	24	1.7
The weak nature of collective bargaining strategy by not enforcing compliance during negotiation	166	12.0
The constant resort to the use of arbitration panel	120	8.7
The inability of the 3 rd party to bring both parties to accept solution	72	5.2
The universities usual rush to call off strike without concrete evidence	36	2.6
Non-implementation of agreements reached during conflict resolution	390	28.2
Total	1385	100.0

Finding of data analysis as shown in Table 1 revealed that most of the participants (28%) perceived non-implementation of agreement reached during conflict resolution as the most probable cause of the frequent unresolved conflicts in the universities.

Research Question Two: How do conflicts in Nigerian South-West federal universities impact staff effectiveness?

Table 2: Conflict Resolution Strategies and Staff Effectiveness

Effectiveness Impact	Frequency and Percentage
High	504(36%)
Low	881(64%)

As indicated in Table 2, 64% of the participants experienced low effectiveness after the conflicts while 36% of the participants experienced high effectiveness impact after the conflicts.

Research Question Three: How do the activities of the unions (ASUU, NASU, SSANU) during conflicts impact the staff effectiveness in the Nigerian South-West federal universities?

The findings as a result of data analysis as shown in Table 3 showed that the responses of university staff indicated a low impact on staff effectiveness after conflicts were resolved. The findings also revealed a slight variation of opinions among members of the different worker unions.

Table 3: Union Activities and Staff Effectiveness

S/N	Staff Effectiveness indices	Union of Staff	Strongly Disagree	Disagree	Agree	Strongly Agree	Total
1.	My job becomes fascinating and I put in my best at work	ASUU	40 (18.5)	30 (13.9)	104 (48.1)	42 (19.4)	216 (100)
		NASU	124 (16.5)	88 (11.7)	388 (51.7)	150 (20.0)	750 (100)
		SSANU	40 (9.5)	36 (8.6)	238 (56.8)	105 (25.1)	419 (100)
2.	I feel a sense of satisfaction in my job that I try to work harder	ASUU	36 (16.2)	51 (23.6)	80 (37.0)	50 (23.1)	216 (100)
		NASU	117 (15.6)	183 (24.4)	296 (39.5)	154 (20.5)	750 (100)
		SSANU	61 (14.6)	113 (27.0)	165 (39.4)	80 (19.1)	419 (100)
3.	My job becomes boring that I can hardly meet up the usual pace	ASUU	36 (16.7)	160 (74.1)	15 (6.9)	5 (2.3)	216 (100)
		NASU	21 (2.8)	64 (8.5)	529 (70.5)	130 (18.1)	750 (100)
		SSANU	11 (2.6)	41 (9.8)	293 (69.9)	74 (17.7)	419 (100)
4.	I become so creative in my job that I improve on the job	ASUU	18 (8.3)	11 (5.1)	151 (69.9)	36 (16.7)	216 (100)
		NASU	130 (17.3)	493 (65.7)	52 (6.9)	75 (10.0)	750 (100)
		SSANU	70 (16.7)	272 (64.9)	39 (9.3)	38 (9.1)	419 (100)
5.	My job seems meaningless and I become less enthusiastic at work	ASUU	40 (18.5)	30 (13.9)	104 (48.1)	42 (19.4)	216 (100)
		NASU	124 (16.5)	88 (11.7)	388 (51.7)	150 (20.0)	750 (100)
		SSANU	40 (9.5)	36 (8.6)	238 (56.8)	105 (25.1)	419 (100)
6.	The job no longer challenges me and I hold back some of my potentials	ASUU	22 (10.2)	46 (21.3)	65 (30.1)	83 (38.4)	216 (100)
		NASU	97 (12.9)	186 (24.8)	204 (27.2)	263 (16.8)	750 (100)
		SSANU	58 (13.8)	105 (25.1)	118 (28.2)	138 (32.9)	419 (100)
7.	The job place seems uncomfortable that I hardly wait to go home	ASUU	36 (16.7)	149 (69.0)	13 (6.0)	18 (16.7)	216 (100)
		NASU	90 (12.0)	50 (6.7)	484 (64.5)	126 (16.8)	750 (100)
		SSANU	56 (13.4)	31 (7.4)	262 (62.5)	70 (16.7)	419 (100)
8.	My job puts me on guard that I always improve on my past performance	ASUU	20 (9.3)	142 (65.7)	30 (13.9)	24 (11.1)	216 (100)
		NASU	69 (9.2)	470 (62.7)	134 (17.9)	77 (10.3)	750 (100)
		SSANU	36 (8.6)	254 (60.6)	86 (20.5)	43 (10.3)	419 (100)
9.	I become withdrawn from my usual duties that I am less bothered about cooperating with others at work	ASUU	16 (7.4)	133 (61.6)	38 (17.6)	29 (13.4)	216 (100)
		NASU	59 (7.9)	424 (56.5)	169 (22.5)	98 (13.1)	750 (100)
		SSANU	31 (7.4)	232 (55.4)	96 (22.7)	61 (14.6)	419 (100)
10.	I derive a lot of respect from my job and I become more productive	ASUU	24 (11.1)	20 (9.3)	144 (66.7)	28 (13.0)	216 (100)
		NASU	92 (12.3)	80 (10.7)	470 (62.7)	108 (14.4)	750 (100)
		SSANU	40 (9.5)	255 (60.9)	50 (11.9)	48 (11.5)	419 (100)

Key: Figures in parenthesis are percentages

Hypothesis One: There is no significant relationship between conflicts in Nigerian South-West federal universities and staff effectiveness.

Table 4: Correlational Analysis- Relationship between Conflict Resolution Strategies and Staff Effectiveness

Variables	Mean	SD	N	Df	r-cal	r-critical	p-value	Remark
Effectiveness	56.73	2.18	1385	1383	0.64	0.20	0.01	Significant
Conflict Resolution Strategies	2.97	2.09						

Findings as a result of correlation analysis as shown in Table 4 indicated a significant relationship existed between the conflict resolution strategies and staff effectiveness. This is evident with the r-cal 0.64 greater than r-crit of 0.20 at $p = 0.01$. Thus, the null hypothesis is rejected. This implies that there is a relationship between the strategies employed in resolving the universities conflicts and staff morale.

Hypothesis Two: There is no significant difference in staff effectiveness among worker unions (ASUU, NASU, SSANU) in the Nigerian South-West federal universities.

Table 5: Analysis of Variance- Differences in Staff effectiveness among Unions

	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
ASUU	216	52.467	3.249	.221	52.031	52.903	45.00	60.50
NASU	750	48.178	9.602	.350	47.490	48.867	19.00	59.50
SSANU	419	52.165	3.120	.152	51.866	52.465	44.00	62.50
Total	1385	50.053	7.658	.205	48.650	50.457	19.00	62.50

	Sum of Squares	df	Mean Square	F-cal	F-tab	p-value	Remark
Between Groups	5764.689	2	2883.344	52.827	3.99	.000	Sig.
Within Groups	75404.054	1382	54.562				
Total	81168.743	1384					

Table 5 shows that the mean scores of ASUU staff in effectiveness (52.47) is the highest. This was closely followed by that of SSANU staff (52.17) while NASU staff had the lowest morale (48.18). The f statistics of 52.83 is significant at $p = 0.00$ level. This implies that a significant difference existed in staff effectiveness among the members of the unions. The null hypothesis is therefore rejected.

In order to ascertain the variation in staff effectiveness by the union type, a post hoc analysis was performed and the result of the analysis is presented in Table 6. Findings of the analysis as shown in Table 6 indicates that the effectiveness of ASUU staff is significantly higher than that of NASU member ($p = 0.000$). In addition, a significance difference exists in the effectiveness of NASU staff and SSANU staff ($p = 0.000$). However, there is no significance difference in the effectiveness of ASUU members and SSANU members ($p > 0.05$).

Table 6: Post Hoc Comparison of Union Type in Staff Effectiveness

(I) Unions	Comparison	Mean Difference (I-J)	Std. Error	Sig.
ASUU	NASU	4.28893*	.57039	.000
	SSANU	.30172	.61872	.626
NASU	ASUU	-4.28893*	.57039	.000
	SSANU	-3.98720*	.45052	.000
SSANU	ASUU	-.30172	.61872	.626
	NASU	3.98720*	.45052	.000

DISCUSSION OF FINDINGS

The result of the study shows that the staff of the universities was all abreast of the major causes leading to these unresolved conflicts in the universities. Most of the participants (28%) perceived non-implementation of agreement reached during conflict resolution as the most probable cause of the frequent unresolved conflicts in the universities. This finding is consistent with that of Welsh (2005) that the constant resort to conflicts signifies major obstacles yet to be well tackled and that the strategies should be modified.

A significant relationship existed between the conflict resolution strategies and staff effectiveness of the universities staff (see testing of Hypothesis 1). This is quite understandable as constant conflicts means the resolution strategies are not adequate resulting in staff demands not being met. This finding has implications on the management of frequent conflicts in the universities. For sure, conflicts have impacted the staff effectiveness in their zeal and willingness to effectively do their job. The finding of this study also echoed those of Marsano (2003), Adebayo (2009) and Albert (2005). They all asserted that there is a high relationship between the strategies employed in resolving conflict and staff effectiveness. Thus there is need to boost staff effectiveness through programs.

There lies significant difference in staff effectiveness among the unions (ASUU, NASU and SSANU) after each resolved conflict in the Nigerian South-West federal universities. This finding confirmed that of Onyeonosu (2004) that each union in the tertiary institutions played significant roles and at other times, the context of struggles dictated distinct and separate roles and values. That morale of the NASU staff was more affected because most non-academic staff is young, versatile and more vibrant in their approach to issues. This poses implication for the continuous in-service of staff in the lower cadre.

IMPLICATIONS FOR EDUCATIONAL PLANNING

Conflict is inevitable in organizations to which the Nigerian universities belong. These findings are quite relevant in Nigerian universities as strikes have always marred most academic sessions. The university management can now assess the weight of staff ineffectiveness and knowing the implications to students' growth will address the conflict issues with a more intelligent approach by learning from previous experiences. Alternative strategies should be explored in resolving the university conflicts as the usual remedies have not been adequate. It is very expedient that caution should be taken in terms of stemming the incessant conflicts. The administrators of universities may want to consider the collective bargaining strategy of resolving conflicts to avoid the after effect of low job effectiveness. This finding has implication for policy planners for the inclusion of ameliorating policies that will reduce the effects of conflict on the staff especially those in the lower cadre who are mostly affected in their job effectiveness. In-service training programs may be needed to be offered to enhance staff morale which relates to productivity. Future planning strategies may include an independent body to be created to act as an umpire that would monitor all the negotiations during the conflict resolution.

CONCLUSION

The persistent conflicts in the Nigerian university system with seemingly unending solutions have necessitated the tendency to evaluate their influence on staff effectiveness thereby ascertaining the relevance of the resolution strategies employed. The Nigerian universities can explore alternative approach to manage conflicts to the minimum to make meaningful impact on the nation's growth and development. This will in turn increase the job effectiveness of the staff of the universities.

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ATTAINING 21ST CENTURY SKILLS IN A VIRTUAL CLASSROOM

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ABSTRACT

As society moves further into the 21st century and focuses on becoming more global, current and future learners will need to meet another set of requirements that are viewed as quality indicators and necessary dimensions for future success. These requirements are outlined by The National Education Association as the “Four Cs” of 21st century skills. They include communication, collaboration, critical thinking and problem solving, and creativity. Typically, these skills are taught in traditional settings as the instructor and students interact face-to-face. However, the “Four Cs” can be achieved in online environments as well through the use of various forms of technology. This article addresses teaching and learning the four quality indicators within a virtual classroom. Digital resources that address each of the “Four Cs” and tie into content learning are identified and described. Through the use of the recommended resources, virtual classrooms may have more to offer than seated classrooms in terms of attaining and becoming proficient in the 21st century skills. Further, these recommendations offer a valuable service for making online instruction more effective by way of a comprehensive list of digital resources.

INTRODUCTION

Distance learning is a staple in many postsecondary institutions as online classrooms have become an integral part of coursework in many colleges and universities throughout the United States (Kim & Bonk, 2006). The establishment of fully online, hybrid online, and virtual classrooms have seen a steady increase in the last decade. Since 1995, virtual classrooms alone have grown exponentially throughout the country (Schutte, 1997), suggesting that, now more than ever before, students can learn from anywhere without losing the facets of a seated classroom. All online classrooms are typically defined as “online environments that enable students and instructors to communicate in a synchronous or asynchronous manner” (Parker & Martin, 2010, para. 2). Fully online classrooms take place in an entirely computer-generated setting with no in-person meetings. Hybrid online classes can incorporate both in-person and computer-generated experiences. This article addresses teaching and learning in a virtual environment in which the instructor and students are logged into an online platform at the same time and engage in synchronous instruction (Palloff & Pratt, 2007). More specifically, numerous digital resources are identified that tie into content learning and address the 21st century skills.

The requirements that instructors address in a traditional classroom are quite similar for virtual classroom instructors: creating the course content, structuring the course, teaching the content, and trying to ensure that students learn. However, as society moves further into the 21st century and focuses on becoming more global, current and future learners will need to meet another set of requirements that are viewed as quality indicators and necessary dimensions for future success. The National Education Association (NEA) (2014) has described these requirements as 21st century skills, stating that the study of the three Rs (reading, writing, and arithmetic) in the modern world will not be sufficient enough for the students of today to be attractive, hireable, and employable in the world of tomorrow. They need to be more proficient in the “Four Cs” that outline the 21st century skills as noted in Figure 1: Communication, Collaboration, Critical Thinking and Problem Solving, and Creativity (National Education Association, 2014).

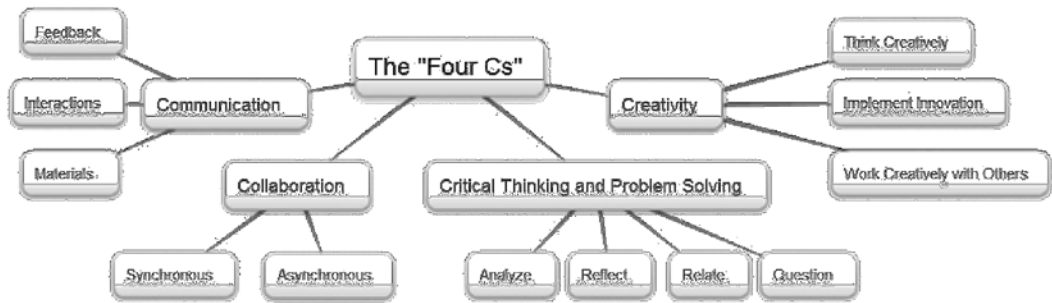


Figure 1: The “Four Cs” of 21st Century Skills created with Bubbl.us

Although the National Education Association (2014) makes it clear that the “Four Cs” need to be fully integrated into classrooms” (p. 6), it is not as clear as to how these skills can be achieved in an online setting such as a virtual classroom. Since the growth rate of online programs is only expected to increase (Howell, Williams, & Lindsay, 2003), each of the “Four Cs” is described along with various digital resources that can be used to implement each one of them.

COMMUNICATION: FIRST OF THE “FOUR Cs”

According to Gay (2015), “teaching and learning cannot occur without communication” (para. 1). The NEA (2014) defines communication as one’s ability to “articulate thoughts and ideas effectively; use oral, written, and non-verbal communication skills in a variety of forms and contexts; listen effectively to decipher meaning, including knowledge, values, attitudes, and intentions; use communication for a range of purposes; use multiple media and technologies, and know how to assess impact and their effectiveness a priori; and communicate effectively in diverse environments” (p. 14). Given the enormous scope of the aspects of communication, there is no doubt that “effective communication skills are critical for instructors to employ in the delivery of pedagogy, classroom management and interaction with their class” (Sng Bee Bee, 2012, para. 1). Various types of communication ebb and flow in every classroom. They include the communication of material to be learned, student-to-student interactions, instructor-to-student interactions, and the feedback loop. As illustrated in Figure 2, these types of communication work as a cyclical process in the classroom.

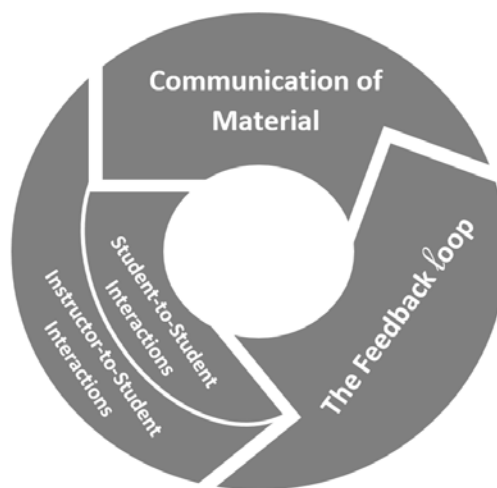


Figure 2: The Cyclical Process of Communication created with Microsoft Word

As these forms of communication occur in seated classrooms, they can and should be part and parcel in online courses as well. There is a plethora of communication technology tools that can be integrated in virtual classrooms, making all the types of communication not only possible, but effective as well.

Communication of Material

There are a number of technologies that instructors in a virtual setting can implement in order to deliver instruction and communicate course content. Presentation platforms such as Prezi, Microsoft PowerPoint, or Blendspace support the ability to communicate content. Much like a classroom setting where a presentation would include supplemental features, the visuals in these platforms have the capacity to be accompanied by audio, thus adding that extra “human” touch making them even more personal and effective. However, unlike traditional classroom presentations where visuals are separate from the instructor's oral lecture, and wherein the instructor's lecture may change from one class period to the next, these platforms accept embedded audio which allows participants to access *both* visuals and audio simultaneously and experience the same presentation without any change or modification in the communication of material each and every time the platform is played.

Videos are another dynamic means to communicate course content. Demonstration videos accessed from YouTube, lecture videos from TED talks, or educational videos such as those on Khan Academy or TeacherTube can be utilized in virtual classrooms as learning tools. These platforms are able to mimic demonstrations, offer guest speakers at no cost, and provide opportunities to practice new learning. Unlike traditional classrooms where experiences like these can only be lived one time, the platforms allow participants to access the material over and over and “relive” the experiences as many times as desired.

Likewise, using an electronic whiteboard such as Camtasia opens the door for instructors to write directly on the screen while participants listen and watch on their own monitors. Unlike a traditional classroom whiteboard, Camtasia offers the ability to archive so that the instructor can record and save an entire class session. Archived material can provide participants a second or third viewing for those who need more processing time. Capturing the material by archiving it for later use fulfills the need for repetition which is almost impossible to achieve in a traditional classroom with a one-and-done lecture.

Interactions

Just as conversations and interactions among students and instructor play an important role in seated courses, the progression of discourse is as vital in a virtual setting. Unlike a campus setting where the majority of interaction is face-to-face, virtual classroom interactions must utilize various technologies to offer a variety of instructor-to-student and student-to-student interactions.

Instructor-to-student interactions

Instructor-to-student interactions are communications initiated by the instructor and directed towards students. These interactions serve a fundamental role in any learning environment, including virtual classrooms. The first and arguably the most important communication instructors direct towards students is the outline of their expectations. This instructor-to-student communication format usually takes the form of a syllabus. With today's society so accustomed to information being presented in many different ways, it seems counter-intuitive to only have one online document act as a course guide. Remind can supplement the course syllabus as instructors connect instantly with participants by way of quick, simple messages to any device, such as a smartphone or computer. Working much like a text message but without access to the instructor's phone number, this platform allows the instructor to send one-way reminders directly to participants' devices regarding items such as assignments, various projects they should be working on, upcoming events, class changes, or any other pertinent course

information. Further incorporating the human element, this platform allows instructors to attach files or voice clips to announcements they send or to announcements scheduled for a later date. In seated classes, reminders are relayed directly in class often with some participants paying attention, others not, and some not in attendance. This is not an issue in a virtual classroom when Remind is used. Announcements that the instructor sends appear instantly on the participant's account and can be referenced at any time for further clarification or confirmation. Remind allows back and forth communication between instructor and student in a multidimensional manner that 21st Century students are comfortable and familiar with as well.

Student-to-student interactions

An important aspect of learning is the assurance that students are given the opportunity to think and reflect on class instruction, reading material, projects, etc. Just like a traditional classroom, it is necessary for a virtual classroom instructor to afford the time and space for participants to work in small groups. Sococo provides online workspaces that connect remote users by recreating the personal proximity and functionality of a physical setting. This platform offers breakout rooms, chat sessions (with optional text, visual, audio, and screen share), and the means to engage in thoughtful conversation and practice with material that is presented. Small group opportunities allow participants to engage in learning through social processes such as recalling information that was presented, exploring an understanding of the material, or even designing and executing a challenging project to its culmination. The instructor can use the breakout rooms to differentiate instruction as members in each of the rooms are directed to various discussions, activities, or challenges. After a period of time, the students in each breakout room can return to the main classroom for continued whole class discussion and reflection, or evaluation of the challenge that was posed. Although often used for student-to-student interactions, each breakout room can be as independent of each other as the instructor affords.

Feedback Loop

One of the most beneficial elements of the education process occurs when students provide responses to the instructor, and the instructor reciprocates. This process creates a feedback loop, ensuring that interchange is never one sided. In a seated classroom, the feedback loop is easily illustrated when instructors query the class for answers through various questioning techniques. Likewise, instructors in a virtual classroom can implement the feedback loop through the use of virtual surveys and polls. An opinion-oriented instrument that can be used is Poll Everywhere. This platform utilizes a simple three-step procedure: ask a question, obtain responses, and view real time results. The straightforwardness, coupled with the interactive, subjective, and innately fun nature of this platform holds student interest and attentiveness. Polls can also be used to obtain brief snapshots of the classroom climate such as whether the students understand the material, agree or disagree with presented concepts, etc. Everyone in the class shares his/her opinion, including the instructor. This polling practice can often lead to lively discussion and debate.

In contrast to the more opinion based polls, virtual surveys can serve as a content-focused mechanism, gauging immediate comprehension of content. Socrative and Kahoot! offer features that instructors can use to ask participants on-the-spot questions pertaining to content material. These questions can increase course participation and engagement and provide the instructor with quick, valuable insight into material comprehension. Data received from the survey results on these platforms can be accessed effortlessly for instant feedback that can be made available to everyone simultaneously, or used by the instructor to better define the direction of instruction or develop future lessons.

Another form of on-the-spot feedback is the use of a point system to sanction classroom participation, cooperation, team building, etc. In a seated class, this could be activity oriented

wherein points are posted somewhere in sight for team challenges, review games, etc. ClassDojo enables instructors to assign positive and/or negative points (or 'dojos') for students' dispositions, cooperation, or participation. The instructor can also request more participation from participants or assess their contribution to the class. Participants can see this feedback privately. They have immediate, real-time insight as to how the instructor is interpreting and/or responding to their participation; from this, they can make any necessary adjustments. The type of instant feedback that this platform provides allows online instructors the ability to boost classroom discussion, reinforce positive remarks, and encourage sharing in a virtual environment.

Successful classrooms employ many techniques to enable the communication of material, student-to-student interactions, instructor-to-student interactions, and effective feedback looping. These same techniques are, and should be no different in a virtual setting. With the utilization of some of the abovementioned technologies, virtual classrooms help attain the first of the "Four Cs": Communication.

COLLABORATION: SECOND OF THE "FOUR Cs"

Wherever communication exists, the opportunity to collaborate can occur as well. The NEA (2014) offers its definition of collaboration as an experience wherein one "demonstrates the ability to work effectively and respectfully with diverse teams", exercises "flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal", and assumes "shared responsibility for collaborative work, and value the individual contributions made by each team member" (p. 20). Collaborative learning is not new. It became popular when twentieth century research suggested that students learned faster and retained more when they became partners in the process of teaching and learning instead of remaining mere receivers of knowledge from their educators (Banerjee, 2012). The NEA (2014) promotes the importance of collaboration by including it as one of the "Four Cs". They state that when students work collaboratively, the group is able to generate more knowledge than one single individual and collaborative efforts put forth by any group are keys to future success in today's global society (NEA, 2014).

It is very common to see active collaboration in seated classrooms as individuals work together in partners, teams, and groups. Collaboration is often avoided in a distance education setting due, perhaps, to unfamiliarity with the technology tools that might be required. The avoidance however, could be due to a misinterpreted mindset. "The essential ingredient for successful distance education is not the technology: it is collaboration between the key participants using that technology" (Beaudoin, 2015; Duffy & Kennedy, 2004, p. 203). Technology is the infrastructural backbone for the delivery of online courses (Duffy & Kennedy, 2004) and is not the end goal. As outlined in Figure 3, the use of synchronous and asynchronous formats provides the means and opportunity for each virtual classroom participant to reach the end goal of the second 21st Century Skill: Collaboration.

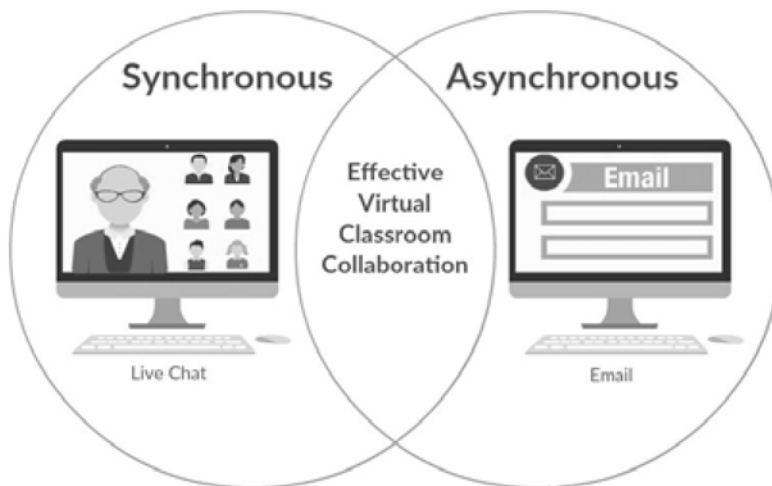


Figure 3: Blending of Online Formats to Attain Collaboration created with Creately

When educators realize that the end goal is really to harness “diverse human skills with information and communications technology to deliver effective distance education” (Duffy & Kennedy, 2004, p. 210), rather than mastering collaborative technologies, effective collaboration can begin. Present day technologies such as the examples described below offer a vast range of opportunities for promoting collaboration in any format of virtual classroom learning environments (Beldarrain, 2006).

Synchronous Collaborative Technologies

The synchronous learning environment in a virtual classroom involves learners and instructors participating simultaneously (Hrastinski, 2008). Synchronous technologies transform online courses into a distance learning communities where participants consistently interact with one another during the learning process. Typically, these interactions involve users asking and answering questions in real time and are “commonly supported by media such as videoconferencing and chat” (Hrastinski, 2008, p. 52).

Google made synchronous communication easier with Google Drive and Google Hangout, platforms that increase real-time collaboration between learners. Google Drive is a service that has the capacity for collaborators to simultaneously edit the most widely used Microsoft Office applications. Participants can work together to edit documents, spreadsheets, and presentations with the changes appearing instantly for others to see and to continue adding. This platform utilizes color codes that change for each participant, thus easing the identification of individual edits. In addition, a text chat feature allows participants to discuss changes in real-time and to collaborate on future ideas. Google Hangout also increases real-time collaboration through face-to-face virtual meetings. This platform enables invitation-only access to a virtual space where individuals can have a one-on-one conversation or a live group chat for up to 100 people; host a free video call with one individual or a group of up to 10 individuals; share photos, maps, emoji, and stickers all in real time; and participate in chats from any device, across Android, iOS, and the web. The collaborative tools described above provide participants the opportunities to learn together, increase social presence, promote interactivity and build a sense of community (Parker & Martin, 2010). The features of these two synchronous technologies demonstrate the possible versatility that virtual classroom participants can take advantage of to collaborate in real-time.

Asynchronous Collaborative Technologies

In contrast to a synchronous learning environment, an asynchronous learning environment “supports work relations among learners and teachers, even when participants cannot be online at the same time” (Hrastinski, 2008, pp. 51-52). This type of learning “makes it possible for learners to log-on to an e-learning environment at any time, download documents or send messages to teachers or peers”, and is “commonly facilitated by media such as e-mail and discussion boards” (Hrastinski, 2008, p. 51). Blogs, such as Edublogs, can be used in asynchronous virtual environments as a platform for group work. The instructor can individualize or group students, have a selected group work on creating a blog collaboratively, and can monitor continuous progress with detailed user reports. WIKIS, like Dreamhost, can foster collaboration through the collaborative building and editing of an online site. A WIKI is a “collection of web pages that are linked to each other, and reflect the collaborative works of many authors” (Beldarrain, 2006, p. 142). Much like Google Drive, WIKI edits are recorded and logged as participants collaboratively work on a project. WIKIS are often compared to blogs, but “are thought to be more permanent and serious than blogs and serve as repositories of knowledge” (Beldarrain, 2006, p. 142). WIKIS, like Dreamhost, can be used in the classroom in an effort to gain common interest, similar to the students at Bowdoin College who initiated their own collaborative WIKI to share their love of romantic literature and poetry (Beldarrain, 2006). This example demonstrates how asynchronous technologies can be used in an educational setting through collaboration in delayed-time.

Synchronous and/or asynchronous learning environments contribute to collaborative learning. Synchronous courses are innately more social. Asynchronous courses, due to the nature of their structure are more content-related. “Many people take online courses because of their asynchronous nature, combining education with work, family, and other commitments.” (Hrastinski, 2008, p. 52) However, when educators rely mainly on an asynchronous format, they risk the result that participants may feel isolated and not part of a learning community (Hrastinski, 2008). Used together, synchronous and asynchronous technologies can create an online environment where “the learner may access the information while actively collaborating in real, or delayed time at the learner’s convenience” (Beldarrain, 2006, p. 145). As technology advances (which it always does), more opportunities for real-time and/or delayed-time instructor-to-student and student-to-student collaborations will develop. Regardless of what type of collaborative technique the instructor chooses to use, it must “seek to motivate, cultivate, and meet the needs of the 21st-century learner” (Beldarrain, 2006, p. 140). When used in this manner, technologies foster the 21st century skill of collaboration that NEA (2014) states is “not only important but necessary” for present day participants (p. 19).

CRITICAL THINKING AND PROBLEM SOLVING: THIRD OF THE “FOUR Cs”

Bullen (1998) provides the argument that “distance education is rooted in a transmission model of learning that inhibits the development of critical thinking” (para. 4). Contrasting this point of view, instructors of online classes can choose instructional technologies to address critical thinking and problem solving, increase the ability to reason, formulate judgments, make decisions, and solve problems (NEA, 2014). Additionally, instructional technologies that “involve students doing things and thinking about what they are doing” (Bonwell and Eison, 1991, p. 2) promote active learning, which in turn, enhance critical thinking and problem solving (Mandernach, Forrest, Babutze, & Manker, 2009). The implementation of critical thinking and problem solving skills in any instructional setting, including virtual classrooms, are valuable skills that enhance learners’ abilities to make connections across disciplines, think about and analyze how they are thinking, and face real world situations now and in the future, with more independence and ownership. To cultivate critical thinking and problem solving skills, instructors need to build upon lessons and activities that enable their students to complete the steps outlined in Figure 4 that illustrates the steps and skills of critical thinking and problem solving.

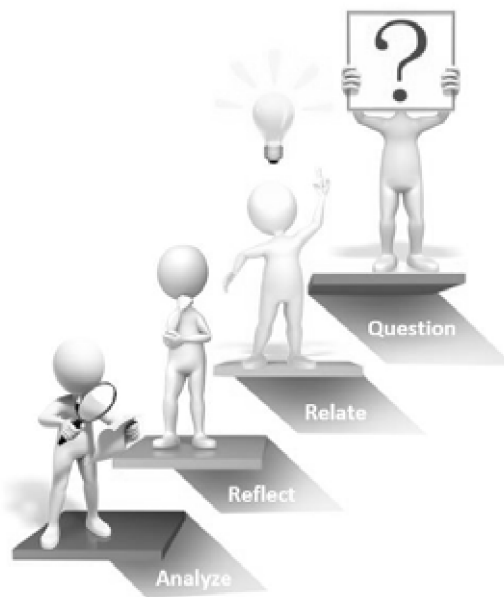


Figure 4: The Steps and Skills of Critical Thinking and Problem Solving created with Presenter Media

Analyze

Critical thinking and problem solving are promoted when individuals are given opportunities to analyze important concepts, results of research findings, and differing theories or ideas (Alexander, Commander, Greenberg, & Ward, 2010). Analysis is really “a form of detective work” that involves breaking down the elements or structure of something and then formulating judgments and connections in an effort to better understand (Rosenwasser & Stephen, 2011, p. 79). An example of analysis in a traditional classroom is note taking that occurs when participants annotate material with thoughts, ideas, and/or connections. The use of annotations allows instructors to ascertain whether there is a general understanding of fundamental principles, or conversely, whether content material is being misunderstood or misinterpreted. Analysis in a virtual classroom is possible when participants use platforms like Scribble or Diigo to annotate material and record notes right *in* a webpage or online document. The annotations can be saved, continuously edited, and shared. Scribble and Diigo enable the instructor to view and track all annotations in real-time in order, for example, to ascertain the students’ understanding of material and overall conceptual understanding.

Reflect

According to Alexander, Commander, Greenberg and Ward (2010), students need to be given opportunities to reflect, to determine the importance of a concept, research finding, theory, or idea. Content reflection involves sharing thoughts about material. Process reflection includes perceptions, thoughts, feelings, and actions as participants sift through the material presented (Ostorga, 2006). Penzu Classroom is a journaling tool that supports both content and process reflection. Virtual classroom participants can use this platform to construct an electronic journal specifically for reflection. The individual journals can be shared with and/or assessed by the instructor using the same platform through typed or handwritten comments adding a more “human touch.”

Reflection also involves work. Its importance lies in the fact that through reflection, learning occurs. Therefore, much practice is necessary. However, as often as participants actively engage in reflection, Ostorga (2006) noted that “educators often find that many students struggle to engage in reflection” (p. 6). A simple and engaging mechanism that virtual instructors can use to promote reflection is OneWord . Students are given sixty seconds to reflect on one word that is provided by the instructor as a prompt on a webpage. They use the next sixty seconds to write anything that comes to their mind as they reflect on the word. This platform feature is quick, fun, and can be used repeatedly by providing different words that constantly change and challenge the students. By doing so, students become more and more proficient. OneWord helps guide and assist the growth of online participants as they generate quick, personalized, and progressively deeper learning responses.

Relate

Participants need to have opportunities to relate or apply what has been learned to some aspect of their lives (Alexander, Commander, Greenberg, & Ward, 2010). When students see connections between themselves and the content learned, they naturally become more engaged. Typically, connections are made to three broad areas: oneself, the community, and the world (Keene & Zimmerman, 1997). There are a number of tools that enable participants to make connections to the world. A Virtual Field Trip (VFT) is a great connection tool because it offers first-hand sights and sounds. Premade VFT experiences such as Discovery Education Virtual Field Trips, Google Art Projects, Smithsonian, Inside the White House, and Google Sky to name a few, offer “visits” to iconic locations for rich and immersive learning experiences. The benefits of using premade VFTs are pretty obvious. They reduce the legwork it takes to produce a self-made virtual field trip, and they are typically of excellent quality for both visual and auditory modalities. However, there are limitations. Due to the fact that they are pre-made, they often do not fit into all of the content an instructor may want to cover. They might cover too much or too little. One way an instructor can “adequately cover all of the material that she wishes on a virtual field trip is through the use of a ‘personalized’ field trip” (Mandel, n.d., para. 11). EDpuzzle can be employed to create a more customized and personalized virtual experience. Instructors can upload any video and embed questions, comments, and feedback. The instructor can also video his/her own experiences and share them as a VFT. The instructor can customize embedded questions, comments, and feedback as he/she acts as a docent and thus assures that the goals and objectives of the content are being met.

Question

The oldest, and still most powerful teaching tactic for fostering critical thinking and problem solving is Socratic teaching, a process that focuses on giving students questions, not answers (Paul & Elder, 1997). By probing participants through questioning techniques, the instructor keeps the discussion focused, stimulating, and intellectually responsive. The instructor applies questioning techniques to periodically summarize and draw as many individuals as possible into the discussion (Paul & Elder, 1997). The use of Socratic in a virtual classroom makes the process simple through a “quick question” feature. The instructor can follow up content material by posing facilitating questions, and can respond to students’ answers with further relevant questions that require them to think critically and find solutions to problems. This platform has the option for participants to view peer responses. Additionally, roles between instructor and participant can be reversed when participants take the lead and pose probing questions.

It is vital that virtual classroom participants be given opportunities to foster the same abilities that a traditional classroom provides, including the ability to “effectively analyze” content, “to reflect critically on learning experiences”, “to interpret information”, and “to ask

significant questions” (NEA, 2014, p 9). These talents are not innate and can be fostered with the use of technologies similar to the ones outlined in this section. When used in a manner that addresses the four aspects of critical thinking and problem solving outlined by Alexander, Commander, Greenberg, and Ward (2010), technologies work as tools to support this 21st century skill.

CREATIVITY: FOURTH OF THE “FOUR Cs”

Since the ability to possess an “innovative capacity and a creative spirit are fast becoming requirements for personal and professional success” (NEA, 2014, p. 24), it stands to reason that the NEA places so much importance on creativity as a necessary 21st century skill. Virtual classrooms have the capacity to be valued as much as traditional classes. It is essential that they too focus on the development of creativity (Shaheen, 2010). It may prove beneficial to think of creativity in terms of common synonyms and educational terminology. Figure 5 outlines dimensions that are viewed synonymously with creativity.



Figure 5: The Dimensions of Creativity created with Wordle

These dimensions can be cultivated within a virtual classroom setting. With the use of instructional technologies, participants can engage with tools that build on their ability to practice creative thinking, work creatively with others, and innovate (NEA, 2014).

Thinking Creatively

Creative thinking is a state of mind and that involves creating ideas either alone or as a member of a collaborative group (NEA, 2014). Sparking creative thought can begin initially through brainstorming, sometimes referred to as mind-mapping. Bubbl.us and Popplet offer virtual mind-mapping experiences as participants construct mind-map diagrams that capture facts, thoughts, and images. Much like a web, relationships and connections can be further generated to continue the dialogue and foster more ideas. Stromboard offers virtual classroom participants the ability to collaborate. This platform was originally designed for business use and it stretches mind-mapping a step further. Stromboard allows participants to create a personal mind-map or collaborate with others to generate and build mind-maps together, as they are able to comment and vote on ideas, and/or share an ongoing or finished product.

Working Creatively with Others

Working creatively with others involves being open and responsive to new and diverse perspectives other than one’s own (NEA, 2014). Virtual classrooms have the innate ability to

incorporate perspectives from around the globe. Pen pal platforms like ePals and PenPal Schools can expand participants' views on topics as they engage in content related conversations with global partners. These conversations take place in the security of a registration-required environment. They can involve email, photographs, images, as well as sound and video clips. Conversations can involve the digital presentation of an idea or discourse stemming from creative thinking activities such as mind-maps described above. To add an extra element of creativity, participants can use Voki and create an avatar to share with their pen pal rather than just sharing a photo. These pen pal platforms provide participants with diverse perspectives needed to foster creative thinking. When used simultaneously with Voki, participants are able to put their creativity into action.

Implementing Innovation

There comes a time in the creative process when participants must act on creative ideas. This is called implementation innovation (NEA, 2014, p. 25). There are countless ways that technology can assist participants in harnessing creative thought. One example involves the creation of digital fiction or nonfiction stories. Creatavist and Steller have the capacity to merge video, image, audio, and text together so that a digital story reads much like a digital magazine, eBook, or web page. Powtoon and Animaker take a more animated approach to digital storytelling by involving stock and customizable cartoon animations alongside texts and audios that are embedded in a video format. Unlike traditional classrooms where written stories either incorporate sight (reading) *or* sound (listening), a virtual classroom allows digital stories to combine both senses.

It is vital that instructors challenge participants to think more systematically and creatively (Jenkins et al. 2009). The use of technologies can encourage creative thinking, offer opportunities to work creatively with others, and serve as the anchor for participants to gather, collaborate, and innovate. Incorporating technologies into virtual classrooms can influence potent learning experiences that encompass much of what society hopes that students will be able to achieve in the 21st century and beyond (Bernard Robin as cited in University of Houston College of Education, 2016).

CONCLUSION

A number of digital resources have been offered that make online instruction through virtual classrooms effective. By supporting the use of these resources, this article has paved the way for instructors to effectively incorporate the NEA (2014) 21st Century Skills into virtual classroom settings. Technologies, such as those discussed in this article, can be utilized to provide participants the time needed to remember, understand, apply, analyze, evaluate, and create factual, conceptual, procedural, and metacognitive knowledge (Krathwohl, 2009).

In a global society, there is an innate need for students to become proficient in each of the "Four Cs". When merged into and threaded through instructional content, communication, collaboration, critical thinking and problem solving, and creativity are completely accessible and possible through a virtual environment. Thanks to extensive innovation in the field of technology, it is easier than ever to embed and combine these closely intertwined 21st century skills. When used appropriately by instructors, virtual environment participants can "harness technology to become effective problem solvers, collaborators, communicators, and creators" (NEA, 2014, p. 31) in their fields of study today and the challenges that lay beyond. The use of technologies like those outlined in this article suggest that, not only can students learn from *anywhere* without losing the aspects of a seated classroom, but the virtual classroom experience may have *more* to offer in terms of attaining and sustaining imperative skills in the 21st century.

APPENDIX

The “Four Cs” of 21st Century Skills: Technologies and URLs

Communication	
Technology	URL
Blendspace	https://www.tes.com/lessons?redirect-bs=1
Camtasia	https://www.techsmith.com/camtasia-education.html
ClassDojo	https://www.classdojo.com
Kahn Academy	https://www.khanacademy.org
Kahoot!	https://getkahoot.com
Microsoft PowerPoint	https://products.office.com/en-us/powerpoint#
Microsoft Word	https://products.office.com/en-us/word
Poll Everywhere	https://www.polleverywhere.com
Prezi	https://prezi.com
Remind	https://www.remind.com
Sococo	https://www.sococo.com
Socrative	http://www.socrative.com
Teachertube	https://www.teachertube.com
TED Talks	http://www.ted.com
YouTube	https://www.youtube.com
Collaboration	
Technology	URL
Creately	https://creately.com
Dreamhost	https://www.dreamhost.com
Edublogs	http://edublogs.org
Google Drive	https://www.google.com/drive
Google Hangout	https://hangouts.google.com

Critical Thinking and Problem Solving	
Technology	URL
Diigo	https://www.diigo.com
Discovery Education Virtual Field Trips	http://www.discoveryeducation.com/Events/virtual-field-trips/explore/index.cfm
Edpuzzle	https://edpuzzle.com
Google Art Projects	http://www.googleartproject.com
Google Sky	http://www.google.com/sky
Inside the White House	https://www.whitehouse.gov/about/inside-white-house/interactive-tour
OneWord	http://www.oneword.com
Penzu Classroom	http://classic.penzu.com/content/products/classroom
Presenter Media	http://www.presentermedia.com
Scribble	http://www.scribble.com
Socrative	http://www.socrative.com
Smithsonian	http://naturalhistory.si.edu/panoramas
Creativity	
Technology	URL
Animaker	http://www.animaker.com
Bubbl.us	https://bubbl.us
Creativist	https://www.creatavist.com
ePals	http://www.epals.com
Mindmup	https://www.mindmup.com
PenPal Schools	https://www.penpalschools.com
Popplet	http://popplet.com
PowToon	https://www.powtoon.com

Steller	https://steller.co
Stormboard	https://www.stormboard.com
Voki	http://www.voki.com
Wordle	http://www.wordle.net

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EXAMINING STUDENT BEHAVIOR UNDER TWO CORRELATED COLOR TEMPERATURE LEVELS OF LIGHTING IN AN ELEMENTARY SCHOOL CLASSROOM

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ABSTRACT

Numerous studies suggest a correlation between a school's physical environment and children's academic success. A variable within the classroom environment that has received little attention in the literature is the interior lighting. It is known that higher levels of correlated color temperature (CCT) lighting influence worker productivity in a workplace or laboratory setting. The CCT is the color of light emitted from a light source ranging from low (red) to high (blue). It is therefore necessary to uncover if a higher CCT level of lighting compared to the typically specified lower CCT level of lighting would influence student productivity and academic success in a classroom environment. This is a mixed method within-subjects case study designed to observe student behaviors as a way to gauge student productivity and academic success. Two different CCT levels of fluorescent lighting, which is the standard lighting fixture in most American public school classrooms, were installed in an existing second grade classroom using an ABAB study design. The study utilized both behavior mapping techniques to record student physical locations in the room and a time sampling non-participate observation technique to record on-task behaviors of the students for a duration of 5 months. The findings on the relation between the CCT of the lighting fixtures and student on-task behavior in an elementary classroom concluded that the higher CCT of the lighting the more student on-task behaviors were ($p = .038$) even while more male students physically moved around the classroom. This study has practical implications to facility managers and school officials interested in bettering classroom physical environments to advance student academic success.

INTRODUCTION

The physical variables within a classroom environment have a direct influence on student academic success and development (Duran-Narucki, 2008; Evans, 2006; Uline, 2008). Studies have examined various classroom variables including room size and color (Moore & Lackney, 1993), indoor air quality (Ferreira & Cardoso, 2014), noise levels (Maxwell & Evans, 2000), and room temperature (Theodosiou & Ordoumpozanis, 2008). Possible links between the classroom's electrical lighting and student behavior have received little attention in the empirical literature, specifically with younger students (Sleegers, Moolenaar, Galetzka, Pruyn, Sarroukh, & Zande, 2012).

Past interior lighting studies have focused on the occupant's visual acuity and productivity within a workplace or laboratory setting (DeKort & Veitch, 2014). The association between child development, cognition, and lighting in the interior environment is unclear (Mahdjoubi & Akplotski, 2012). This is of concern for children since they process and respond to stimuli differently than do adults because of their smaller physical size (Evans, 2006). Since it is known that interior lighting influences worker productivity in the workplace it is hypothesized that the interior lighting would influence student productivity in a school classroom environment. Productivity is displayed as on-task behaviors in young children. Children ages 2-7 are in the preoperational developmental stage and have yet to develop appropriate cognitive abilities to

complete a standardized academic test (Piaget, 1964). A way to gauge productivity and learning for this developmental stage is to observe students engaged with the academic material which is displayed through on-task behaviors leading to more academically successful students (Fisher, Godwin, & Seltman, 2014)

Previous interior lighting studies show that lighting quality contribute toward cognition and worker productivity in the workplace (Knez, 2014; Kretschmer, Schmidt, & Griefahn, 2012). Good light quality is achieved with the correct illumination level, correlated color temperature, and color rendering index (Barkmann, Wessolowski, & Schulte-Markwort, 2012). Illuminance is used to specify lighting levels for commercial facilities depending on facility use (IES, 2011). The correlated color temperature is the color of light emitted from the lamp and the color rendering index is the color appearance of an object under a light source relative to natural light (Veitch & McColl, 2010).

These qualities of light influence cognitive performance. They also affect how humans perceive the ambience and impression of the environment, their alertness, the quality of the atmosphere, and their productivity (Heerwagen, 2010; IES, 2014). These human actions are in response to a stimulus. In this situation, the interior light travels through the eyes to the brain via the optic nerve. Light enters the part of the brain that controls stimuli and transfers that into human behavior. Some behavior takes place without conscious awareness resulting in subliminal perception influenced by the interior lighting (Knez, 2014).

Previous studies with adults suggest that subliminal perception from interior lighting can influence subjects on biological, hormonal, and psychological levels. On a psychological level, humans perceive a room as brighter and more pleasant with higher CCT levels of lighting (Boyce, 2004; Wei et al., 2014). Higher levels of CCT lighting in a room also subliminally influence human heart rate (Schlangen, 2010), autonomic nerve tone, hormonal secretion and motor function (Yasukouchi & Ishibashi, 2005). These actions occur from an increase in brain activity as a response to non-visual short wavelengths present in lighting with high CCT levels (Keis et al., 2014). Thus, it is important that classroom lighting has the appropriate CCT level to promote student well-being and behavior in order to promote academic success, however, architectural codes and standards currently do not specify a CCT level for classroom lighting (IES, 2014). Most public school classrooms across the United States have fluorescent lighting fixtures installed with a low CCT level around 3000K. Fluorescent fixtures are specified because of their low price point and energy efficiency yet good color rendering abilities (Knez, 2014). With budget constraints and half of American school buildings over the age of forty years (Evans, Yoo, & Sipple, 2010; Uline, 2008), replacing or changing the fluorescent lighting fixtures with new technologies will most likely not occur. Thus, it is necessary to uncover if the typically installed low CCT level of fluorescent lighting compared to a higher CCT of fluorescent lighting influences student on-task behavior in a classroom setting.

PURPOSE OF THE STUDY

We reasoned that students would display more on-task behaviors in a classroom lit with a high CCT level of lighting that resembles natural daylighting based upon the literature review. Due to findings indicating that CCT levels above 4100K and below 3000K are not typically specified in commercial built environments (IES, 2011) and to keep the illumination levels similar between the two lighting conditions, these two standard CCT levels of fluorescent lamps were included. An ABAB within subject research design was employed as a field investigation in an existing elementary classroom environment. The purpose of this case study was to examine if a high CCT level as compared to low CCT level of fluorescent lighting in an existing elementary school classroom setting influenced student on-task behavior.

METHODOLOGY

Research Participants

A total of 27 students, 16 males and 11 females, participated in the study. Ages were between 7 and 8 years old. No student in the class was visually overweight, unhealthy, or had any visually recognizable physical disability. Throughout the course of the study two students, one male and one female, started to wear eyeglasses. No other student had any visual eye constraints.

Setting

This study took place in a second grade classroom in a K-5th grade public school in the Pacific Northwest that implements the Common Core State Standards. According to the 2013-2014 Report Card, the student academic abilities scored a 94% rating at this school compared to public elementary schools in the nation. Fifteen percent of the school population is economically disadvantaged and 8% of the school population have disabilities (ODOE, 2014).

The classroom had 15 troffer light fixtures lamped with two T8 lamps (Figure 1) installed in an 2'-0" x 4'-0" acoustical tile ceiling system. The overall classroom size was approximately 990 square feet and the ceiling height was 8'-0". The classroom had a 12'-0" wide x 3'-0" high window and standard metal door located on the north wall. The light reflectance values, or how much light is reflected by a surface, of the walls were 70% according to matching a Sherwin Williams paint sample to the wall color. The estimated light reflectance value of the flooring was around 60%.

The classroom furniture layout is shown in Figure 1. Four children sat at one of six tables in the center of the room, labeled 1-6. Three children sat at the remainder table labeled "A". The researcher sat at the table labeled "X". The teacher's desk is labeled "T" and the table shaped like a jellybean is labeled "B". The number of and gender of the children were recorded at each table since children relocate periodically.

Procedure

The study used non-participant group observations of student behavior through recording both on-task behaviors and behavior mapping techniques. The researcher recorded on-task table group behavior using a time-interval sampling method and behavior mapping. These two data collection recording methods were used on alternate days during data collection. Data collection was from 8:40 am to 10:00 am then from 10:20 am to 11:20 am and 12:15 pm to 1:30 pm, which followed the school's daily academic schedule.

On-task behavior method

Non-participant observations of student on-task behavior recorded data every 5 seconds for 5 minute intervals for a total of approximately 90 minutes per day. The observation data were recorded using a laptop onto the pre-developed observation data sheet. On-task behavior scored '1' if three of the four students at that table were actively engaged in the class activity. Off-task behavior was scored as a '3' if three of the four students at the table were engaged in any activity not related to the task at hand given by the teacher. If two of the students were on-task and two students were off-task, the on-task behavior score was scored as '2'. At the end of the 5-minute observational round, all of the on-task behavior scores were averaged together to result in a single score to reflect the average score of the whole class. A total of 355 scores were collected.

Behavior was only recorded while students were located at the tables. Observation order of tables was randomly selected using a random number generator. Data collection occurred over a five-month period. On-task behavior was recorded for 14.58 hours for Lamp A and 14.33 hours for Lamp B for a total of 28.91 hours.

Behavior mapping method

The student and teacher classroom location in the room were recorded every minute for 15 minutes with location markers on the floorplan. After the first student was observed, another

student was observed in the same manner. A total of fifty-eight observations were completed under Lamp A of which 31 were male students and 25 female students. Gender was not recorded for two observations due to researcher oversight. A total of fifty-nine observations were completed under Lamp B of which thirty-eight were male students and 19 were female students while gender was not documented for two of the observations due to researcher oversight.

Protocol

Upon university IRB approval, a Parent Notification letter was sent home with all students a week prior to the start of this study. No parents objected to the study. The control lamp, Lamp A (Philips F32T8/TL830/ALTO), which has a CCT of 3000K was installed first. After a two-week adjustment period, data collection followed for two weeks. At the end of the observation period the lamps were changed to Lamp B (Philips F32T8/TL841/ALTO) which has a CCT of 4100K. Another two-week adjustment period occurred and then data were collected for the following two weeks. The lamps were changed back to the CCT of 3000K and this pattern continue for the duration of the study.

At the start of the study, new lamps and ballasts (Phillips Advance ICN2P32N351) were installed. The illumination level, temperature, minimum and maximum noise level, and relative humidity were recorded with an Extech Industries 5 in 1 Environmental Meter Model EN300 at pre-determined intervals during all observation periods. The illumination levels at each table were recorded twice each day. Average illumination at desk height for Lamp A was 711 lux and Lamp B was 715 lux. To control for outside variables, the window blinds were turned horizontal and the back corner lights were turned off.

The variables of type of work, scholastic subject, time of day, and day of week were recorded for their contributing relationship, either independently or with CCT, towards on-task behavior. Type of work was the academic activity and categorized as active listening, independent desk work, group work, or the transition between the task. Active listening was scored when the student was engaged with the speaker by either looking at the speaker, reading along, or answering questions. Independent desk work included when the student was engaged in an activity individually while seated at their table. Group work was defined as two or more students engaged with the academic activity while transition included the change between academic activities. Scholastic subject includes the academic subject area such as math, reading, writing, art, or spelling. Time of day refers to the hour and day of week was either Monday, Tuesday, Wednesday, Thursday, or Friday.

Analysis

On-task behavior

All data were imported into IBM statistical package SPSS and analyzed. Hypothesis testing was carried out using a paired-samples t-test to determine whether there was a statistically significant mean difference between student on-task behavior scores under the classroom lit with 3000K CCT compared to the same classroom lit with 4100K CCT lighting. Graphs and boxplots were created to visually analyze the data based upon the multiple variables. Correlations between CCT, on-task behavior average scores, type of work, time of day, scholastic subject, and day of week found independent or interacting relationships. Multiple linear regression on the variables with correlations found power of relationships.

Behavior mapping

Student movement throughout the classroom was documented on separate floorplans. Each documented floorplan was overlaid over the original floorplan to compare where student and teacher movement occurred. The frequency floorplans were created from the results of the initial floorplan. Each student in each location was given a 1-foot diameter circle and coded by gender. If multiple students were located within the same area, the size of the circle increased to include their 1-foot diameter circle in order to graphically show the gender and number of students in each

location. The overall frequency plans combined all students regardless of gender into frequency circles based upon each student having a 1-foot diameter circle representation. Only areas with 3 or more students were recorded to find the most populated areas within the room.

RESULTS

On-task Behavior

The result of a paired-samples t-test indicated that students had more on-task behavior under the classroom lighting of 4100K CCT as compared to the lighting of 3000K CCT ($M = .033$, 95% CI [.002, .065], $t(154) = 2.103$, $p < .05$). Descriptive data on all of the variables are included in Table 1. The interacting effect of the CCT and on-task behavior is included in the matrix to see the zero-order intercorrelations among all of the data. As can be seen in Table 1, significant correlations occur between on-task behavior and scholastic subject as well as between scholastic subject and type of work. To control for effect, on-task behavior x CCT interaction was used.

To test correlations, we used multiple linear regression on all relationships with and without CCT to all on-task behavior scores, scholastic subject, day of the week, and type of work. On-task behavior, scholastic subject, and type of work are statistically significant on predicting on-task behavior with and without CCT ($adj. R^2 = .025$, $F(3, 335) = 3.933$, $p < .01$). See Table 2.

To further examine effect of CCT on the interior variables, multiple linear regression was performed on all variables independently to compare the two lighting conditions. Table 3 indicates that scholastic subject is statistically significant at predicting on-task behavior in the 4100K CCT ($F(5, 156) = 9.242$, $p < .001$, $adj. R^2 = .204$) as well as the 3000K CCT ($F(5, 171) = 2.645$, $p < .05$, $adj. R^2 = .045$). Table 4 also shows that time of day and type of work are statically significant to on-task behavior under the 4100K CCT lighting condition ($F(2, 131) = 6.224$, $p < .003$, $adj. R^2 = .073$).

Further investigation into time of day reveals that student on-task behavior starts at approximately the same in the morning hours but varies throughout the day between lighting situations as depicted in the line graph of time of day (Figure 2). Two peaks in off-task behavior occur at 9:50 am and 11:20 am under the CCT of 3000K, which is immediately before both breaks. A spike in on-task behavior occurs at 12:15 pm under the 4100K, when the students return from lunch break yet this did not happen when they came back from their morning break at 10:20 am. More variation between on-task behaviors are present under the 4100K CCT with the most on-task behaviors occurring at 1:15 pm, directly after the most off-task behaviors. Larger variations occur at the end of the day in the CCT of 4100K opposed to the CCT of 3000K.

Behavior Mapping

The floorplans indicate that students frequented the water fountain and cubbies equally under each CCT lamp. Students gather around the teacher's desk more under the 4100K CCT as well as the jellybean table, whereas students moved in between tables while under the 3000K CCT. More students gathering on the carpet and at the teacher's desk in the 4100K CCT than the 3000K CCT. The gender frequencies (Figure 3) reveal that more male students moved around the room under the 4100K CCT, and were at the jellybean table as well as the teacher's desk more than the 3000K CCT. More students, mostly female, stopped around and between the tables under 3000K CCT than 4100K CCT. Figure 4 shows the overall locations in the rooms that were most frequented by the student regardless of gender.

DISCUSSION

This study makes a valuable contribution to the empirical literature on the classroom physical environment and student on-task behavior. The findings on the relation between the correlated color temperature of the lighting fixtures and student on-task behavior in an elementary classroom conclude that the higher CCT of the lighting does influence more student on-task behaviors ($p = .038$). However, multiple variables and combinations of variables are present that contribute towards student behavior as shown in Tables 1 and Table 2.

The results of this study concur with other lighting studies that indicate lighting as an

unconscious stimulus (Knez, 2014). The lighting enters the brain through the eyes and is then transferred into a change in the occupant's behavior due to unconsciously perceived stimuli (Merikle, Smilek, & Eastwood, 2001). Results indicate that students' behavior changed under the different CCT levels the lighting. One factor that may contribute to this behavior change is the different frequency rates between the two lamp types. Even though frequency rates are not visible to the human eye, some special populations still feel the effects (Knez, 2014; Veitch & McColl, 2010). Occupants sensitive to flicker from fluorescent lighting feel more stressed when under lower frequency lamps (Knez, 2014) thus influencing performance. Since lamps with a higher CCT have higher frequency (Veitch & McColl, 2010) it is assumed that lamps with a lower CCT have lower frequency and those students who were more sensitive to this, had more stressful behavior or distractions resulting in off-task behaviors while under the lamps with a lower CCT.

We reasoned that another factor which could contribute to more on-task behaviors might be that a higher CCT in lighting is perceived by the occupant as having a higher illumination level though it measured the same lux as the lighting with a lower CCT. Occupants view lighting with a lower CCT level as intimate and compensate behaviors by waiting longer to answer questions and display a decrease in eye contact (Carr & Dabbs, 1974). Whereas, a higher illumination level has been shown to increase alertness, arousal, and productivity (Smolders & De Kort, 2014; Wei et al., 2014). The increased alertness that is associated with higher illumination levels may have unconsciously influenced students who displayed more on-task behaviors since the higher CCT level lamp was perceived as having a higher illumination level.

Physical movement around the room could be due to the fact that arousal levels in the students may have been influenced by the shorter wavelengths that occur in blue light exposure (Keis, Helbig, Streb, & Hille, 2014). The results indicate that more students physically moved around the room, specifically male students, under the lighting of 4100K CCT than the 3000K CCT. This could be attributed to the fact that higher CCT levels of lighting are more activating because it increases human cortisol levels thus increased arousal (Keis et al., 2014). This occurrence is referred to as ascending reticular activation system. Cortisol levels measured higher in men under higher CCT lighting as compared to lower CCT levels (Yasukochi & Ishibashi, 2005). Knez and Kers (2000) concluded that male and female genders responded differently to CCT levels with mood changes. Higher activity levels in men were found when subjects were exposed to blue light (Lehrl et al., 2007). Males also tend to respond positively to higher CCT levels (Knez & Kers, 2000) which was perhaps why they were more active than their female peers while under the lamp with 4100K CCT.

Although there were limitations to the study design, it was completed in an existing classroom environment, which acknowledges that changes in the classroom interior variables occur from normal educational activities. The window blinds were to remain in the horizontal position and the lighting in the back turned off to block out the influence of natural light and other light sources. This was not always possible due to teacher instruction and activities which is typical in any classroom environment. Other outside factors such as diet, sleep, home life situations, illness, exercise and parental support which affect student readiness to learn (Moore, 2011) were not included in this study. However, the study design and study duration were created to acknowledge these limitations and verify that a higher CCT level could be utilized in an existing classroom setting. Although there is a need for a larger sample size, controlling for subject activity, and a longitudinal study which would provide stronger correlational evidence for the conclusions that CCT of the interior lighting influences student on-task behavior, this study demonstrates that this topic is worthy of further investigation.

In conclusion, this study extended prior work on the CCT level of interior lighting by hypothesizing that students would display more on-task behaviors under the higher CCT of fluorescent lighting. The CCT level of interior lighting influenced student on-task behavior in an elementary classroom environment, however, other variables contributed towards student on-task behavior. Further interior lighting research focusing on CCT levels would clarify this information.

FUTURE RESEARCH DIRECTIONS

Findings from this study provide opportunities for additional investigations into student on-task behavior in regards to the CCT of the interior lighting in classrooms. Because this study was performed on one classroom with a small number of subjects, it is unknown if this would be true for other socio-economic status's or geographical locations. Future investigations should include a larger sample size with multiple age levels and school locations in a longitudinal study design to provide further evidence that the higher CCT level of lighting is correlated to student on-task behaviors. Studies that include higher CCT levels, such as 5000K that more closely resemble natural daylighting, may have different results and should be included in future studies. Since school operating budgets are of extreme importance examining energy savings and life cycle costs of standardizing the lamps and ballasts to the correct system to promote academic success may prove useful and provide economic benefit to school systems.

A variable that was not measured in this study that is of value in future studies is to investigate different CCT levels of lighting on developmentally disabled students compared to normally developing students. Since developmentally disabled students are included in public school systems, investigating a CCT level to enhance their success would be beneficial to the overall classroom environment. Studying this topic could yield more clues towards creating a classroom environment to promote student academic success.

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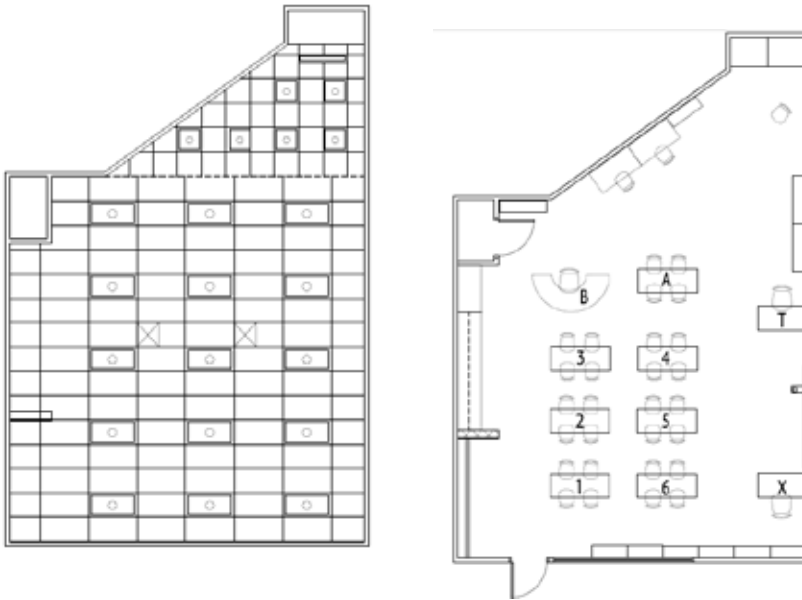


Figure 1: Classroom Reflected Ceiling Plan on Left and Classroom Furniture Plan on Right

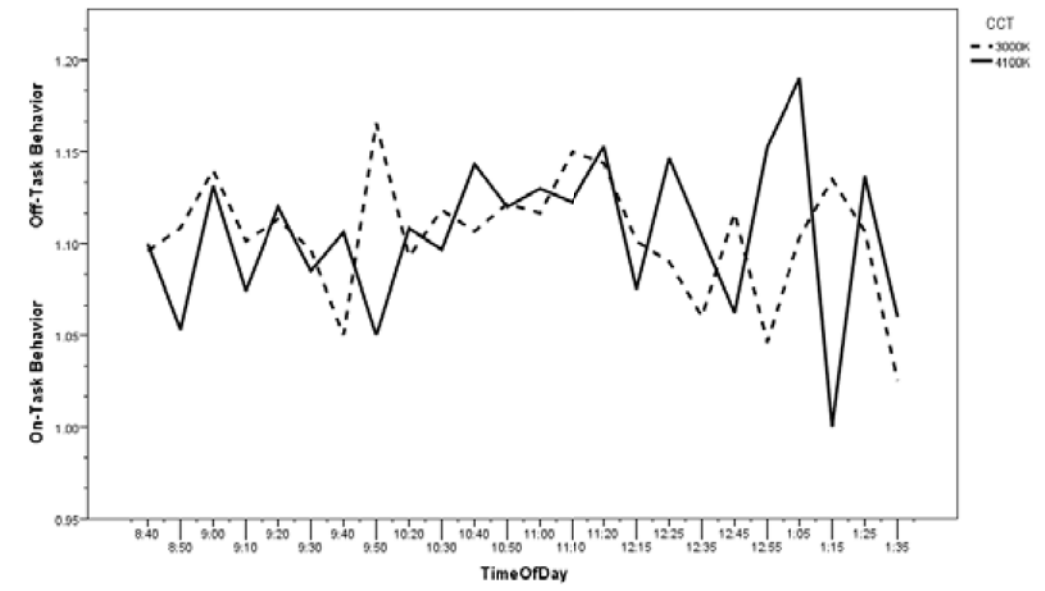


Figure 2: Line Graph of Time of Day and On-task Behavior

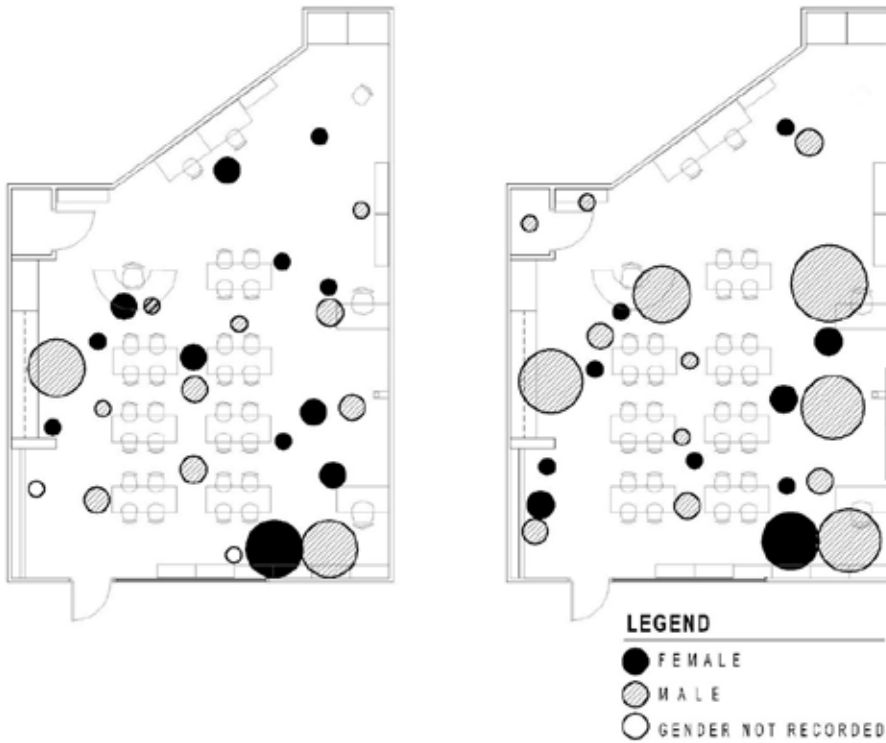


Figure 3: Frequency Results of Student Movement Mapping by Gender - Lamp A on Left and Lamp B on Right

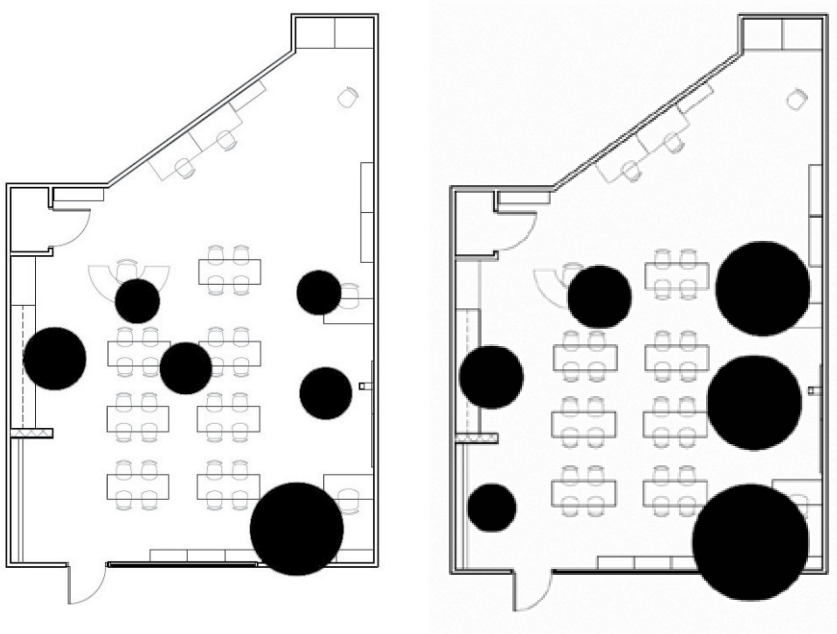


Figure 4: Overall Results of Student Movement Mapping – Lamp A on left and Lamp B on Right

Table 1

Descriptive Statistics and Zero Order Correlation Matrix of All Variables

Variable	Mean (SD)	2	3	4	5	6	7
1. On-task Behavior	1.16(.16)	0.042	0.173*	0.023	0.400	-0.056	.198**
2. Time of Day	12.19(6.39)		-0.047	-0.047	0.008	-0.052	0.033
3. Scholastic Subject	1.54 (1.24)			0.137**	0.026	0.073	0.07
4. Type of Work	0.90 (1.25)				-0.148	-0.145	-0.138
5. CCT	0.48 (.50)					0.024	.979**
6. Day of Week	1.88 (1.27)						0.016
7. CCT x On-task Behavior	0.56(.60)						

Note. * Significant at the $p < .01$ level; **Significant at the $p < .05$ level.

Table 2

Summary of Regression Analysis for all Variables With and Without CCT Predicting On-task Behavior (N=339)

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Intercept	1.141	.020		1.134	0.022	
Time of Day	.001	.001	.046	.001	.001	.045
Scholastic Subject	0.024*	0.007	0.183	0.024*	0.007	0.183
Type of Work	0.005*	0.007	0.039	0.006*	0.007	0.045
Day of Week	-0.008	0.006	-0.064	0.008	0.006	-0.064
CCT				0.014*	0.018	0.043
R^2		0.036			0.038	
<i>F</i> for change in R^2		4.201			0.63	

Note. *Significant at the $p < .01$ level.

Table 3

Summary of Regression Analysis for All Variables on Predicting On-task Behavior Under the Different CCT Levels (N=147)

Variable	Model 1 (3000K CCT)			Model 2 (4100K CCT)		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Intercept	1.200	0.034		1.058	0.041	
Time of Day	-0.002	0.002	-0.104	0.005**	0.002	0.178
Scholastic Subject	0.002**	0.009	0.013	0.047*	0.011	0.032
Type of Work	0.000	0.008	-0.005	0.002**	0.013	-0.014
Day of Week	-0.006	0.008	-0.059	-0.010	0.010	-0.074
R^2		0.015			0.133	
<i>F</i> for change in R^2		0.665			6.032	

Note. *Significant at the $p < .01$ level, **Significant at the $p < .05$ level.

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