

The influence of application of ergonomic principles and school physical infrastructure on teachers' job satisfaction

Samuel N. Kihara, Alice W. Kamau, David M. Gichuhi

¹ Researcher (Corresponding Author), Karatina University, Karatina, Murang'a, Kenya, E-mail: lemmysammykihara@gmail.com; ^{2,3} Lecturer, School of Business, Karatina University, Karatina, Kenya.

Abstract: The main objective of the study was to establish the influence of application of ergonomic principles to office furniture, computer equipment, physical factors and safety of physical infrastructure on teachers' job satisfaction in public primary schools. Descriptive survey design and cluster sampling were used. In data analysis, descriptive statistics, correlation and regression were applied. Majority of the respondents disagreed on proper application of ergonomic principles to office furniture and computer equipment but agreed on physical factors. On physical infrastructure majority agreed that the facilities met required standards except on emergency services and design of staircases which never existed or were below standards. On job satisfaction most of the respondents indicated satisfaction with the level of application of ergonomic principles. Regarding safety of the physical infrastructure majority of the respondents indicated moderate levels of job satisfaction with existing facilities except on the design of floors, staircases and emergency services where majority were dissatisfied. The study established that proper application of ergonomic principles to office furniture, computer equipment and physical factors positively influenced teachers' job satisfaction. Similarly adherence to safety standards in schools' physical infrastructure was found to positively influence teachers' job satisfaction in public primary schools.

Keywords: Ergonomic principles, Job satisfaction, Physical infrastructure, Primary schools.

A influência da aplicação de princípios ergonómicos e da infraestrutura física da escola na satisfação laboral de professores

Resumo: O objetivo principal do estudo foi estabelecer a influência da aplicação dos princípios ergonómicos no mobiliário de escritório, equipamentos de informática e dos fatores físicos e de segurança da infraestrutura física na satisfação profissional dos professores nas escolas primárias públicas. O desenho de um inquérito descritivo de levantamento e a amostragem por clusters foram utilizados. Na análise dos dados, estatísticas descritiva, de correlação e de regressão foram aplicadas. A maioria dos entrevistados discordou sobre a aplicação adequada dos princípios ergonómicos ao mobiliário de escritório e equipamentos de informática, mas concordou com fatores físicos. Na maioria das infraestruturas físicas, as instalações cumprem com os padrões exigidos, exceto em serviços de emergência e projeto de escadarias que nunca existiram ou estavam abaixo dos padrões. Na satisfação profissional, a maioria dos respondentes indicou satisfação com o nível de aplicação dos princípios ergonómicos. Em relação à segurança da infraestrutura física, a maioria dos entrevistados indicou níveis moderados de satisfação no trabalho com as instalações existentes, exceto no projeto de pisos, escadas e serviços de emergência, onde a maioria estava insatisfeita. O estudo estabeleceu que a aplicação adequada de princípios ergonómicos ao mobiliário de escritório, equipamentos de informática e fatores físicos influenciou positivamente a satisfação no trabalho dos professores. De modo semelhante, constatou-se que a adesão aos padrões de segurança na infraestrutura física das escolas influencia positivamente a satisfação profissional dos professores nas escolas primárias públicas.

Palavras-chave: Princípios ergonómicos, Satisfação no trabalho, Infraestrutura física, Escolas primárias.

1. Introduction

1.1. Background and purpose of the study

According to International Ergonomics Association (IEA, 2012) as cited in Kingsley (2012), ergonomics is a discipline anchored on scientific principles mainly concerned with knowledge on human relationship and other components of a system, and the occupation that applies theory, principles, data and methods to design in order to improve human well-being and overall system performance. Office ergonomics is a sub discipline of ergonomics. This branch of ergonomics tries to find out how to design main workplace components such as office chairs, desk, workstations, computers (Key board, a computer mouse device and monitors), lighting, office order and environmental conditions, office ventilation and aeration, room temperature regulation and sound disturbance levels to suit and improve occupational safety and health as well as improve job performance among workers. Ergonomic designs of tools and equipment have contributed to the reduction of cases of musculoskeletal disorders and repetitive strain injuries such as carpal tunnel syndrome among workers. Human engineering is another term that can be used to refer to ergonomics. (BusinessDictionary.com, 2013). Office Ergonomic Solutions (2011) maintains that ergonomics is the science of designing work tools (the desk, chair, keyboard, mouse, monitor, etc.) and the work environment to fit the physical capabilities of people. Office furniture and equipment design is vital because employees are not of the same physical build. They differ in arm lengths for accessing the keyboard, mouse and other documents on the desk. The difference also occurs in leg and trunk lengths that vary the correct seat and desk height needed for each person. These physical differences are why one desk size does not fit everyone, nor does one keyboard style, mouse type, monitor height or one chair. Yet many of the workstations in many workplaces look exactly alike. It is therefore evident that individual workers require adjusting their workstations to fit their individual characteristic and the employer facilitate the same (Office Ergonomics Solutions, 2011). Kingsley (2012) argues that the main aim of office ergonomics is to establish office workstation that suits and satisfactorily meets the workers' needs as they undertake to perform their work duties in the place of work.

School Physical infrastructure in this study referred to basic physical structures and facilities namely school buildings (Classrooms, staff rooms, ablution blocks, dining halls, principals' offices, libraries, etc.), floors, paths, staircases, equipment and other facilities constructed in a school environment to provide shelter and access to school to both the pupils and teaching staff (Jepchirchir & Achoka, 2015; Musyoka, 2013). In constructing these structures certain standards are stipulated by the government and school management to ensure the safety of the teachers and pupils, and an ideal and conducive learning environment is created. In Kenya these guidelines are contained in 'safety standards manual for schools in Kenya' of 2008 (Government of Kenya, 2008)

Job satisfaction is a contentment or positive state of mind or mood emanating from the evaluation or assessment of one's job or job experiences. It is a view and emotional reaction that employees possess about their work (Armstrong, 2006). Job satisfaction involves a set of internal factors to the worker and concerns how one feels about the job (Azuri, 2011). The sources of job satisfaction can arise from job itself, working environment, supervision style, interpersonal relationship and organizational culture (Tasnim, 2006). Hean and Garrett (2010) in an investigation on the nature of job satisfaction among Chilean secondary science teachers established that besides poor salary, excessive workload, student characteristics and resources, poor infrastructure can

also contribute to job dissatisfaction. Leigh (2012) suggests that teacher attitudes are directly influenced by conditions within the building. According to Shann (2001), as cited by Isaiah (2013), teacher's satisfaction has been shown to be a predictor of teacher retention, determinant of teacher commitment, and in turn, a contributor to school effectiveness. This implies that teacher's job satisfaction is a significant phenomenon for teachers, their employers and students at large.

Employees require a safe and healthy environment to perform their work. Occupational safety and health (OSH) is currently a matter of interest worldwide for employers, workers and national governments (Nzuve, 2012). Studies conducted across the world on the issue indicate that most employers have failed to put in place effective measures to make better and uphold the health and safety of their employees (Indakwa, 2013). The International Labour Organization (ILO) figures indicate that in every quarter of an hour, a worker loses life due to a fatal accident or ailment emanating from work. In the same duration, 153 workers sustain injuries due to accidents occurring in performance of their duties (Mwangi, 2017). Globally it is approximated that accidents and ailments occurring at the place of work result to more than 2.3 million deaths every year. From this figure more than 350,000 deaths are as a result of accidents and the rest which is nearly 2 million deaths from ailment which come due to performance of their work (ILO, 2001). Every year there are over 313 million non-fatal occupational accidents (which makes worker miss 4 days of work) which implies that worldwide work results to injuries for nearly 860,000 people daily (ILO, 2014). The associated overall costs of these injuries and fatalities are enormous to the organization, nation and world at large. Taking into consideration paying for the loss incurred by the worker, time lost, reduced production, constant enhancement of work skills, treatment costs and other related cost; ILO approximates that about 0.04 of the global gross domestic product (GDP), or around US\$2.8 trillion, is lost every year in related and unrelated expenses resulting from accidents and ailments emanating from work (Alli, 2008; ILO, 2014).

In the recent times, organisations are experiencing numerous challenges due to the ever-changing working environment. One of the main challenges is the need for employers to satisfy their employees so that the organisation can be successful, remain relevant and competitive in a rapidly evolving business environment. This calls, therefore, for the employers to provide apt working conditions so that they can enhance workers' efficiency, productivity and job commitment (Traziq & Maulabakhsh, 2015).

Failure by the employer to provide for application of ergonomic principles to office facilities results to pains and suffering of the workers and becomes a problem in trying to make teachers be satisfied with their work. Data from the Ontario Ministry of Labour (2009) indicate that Musculoskeletal disorders are a problem because they can affect every aspect of a worker's life and they are costly for workplaces. According to the Workplace Safety and Insurance Board, Musculoskeletal disorders are the principal reason for workers to file a compensation claim and lose time from work because of injury (Office ergonomic solutions, 2011) According to Kamarulzaman, Saleh, Hashim and Abdul-Ghani (2011) office employees use a better part of their time inside a building, where the physical environments influence their well-being and directly influence their work performance and productivity. In the workplace, it is often assumed that employees who are more satisfied with the physical environment are more likely to produce better work outcome. Tasmin (2006) opines that Physical environment is directly linked with job satisfaction. If one gets

favourable physical environment he or she may be satisfied with the job. Opposite is true that unfavourable working environment creates dissatisfaction.

This study focussed on some of above working conditions in public primary schools that were likely to impact on teachers' job satisfaction. Failure to provide for application of ergonomic principles in designing office facilities and unsafe physical infrastructure, it has been found, can likely bring injuries and health related issues to the teacher (Office of Ergonomic Solutions, 2011). The health and safety of a teacher is a fundamental aspect in delivery of teaching services (Kingsley, 2012). The current trends in ergonomics indicate that there is increased focus on design of office chairs, desks and computer equipment to prevent many injuries and diseases to employees as they deliver their services and also to conform to rapidly changing technological advancement (Strydom, 2014). There are also calls by policy makers both in private and in public sectors for employers to take a proactive role in designing physical infrastructure to cater for both gender and the physically handicapped persons (Government of Kenya, 2011; 2010)

1.2. Statement of the problem

Despite many studies being done on the influence of teachers' remunerations, training and other benefits on teachers' job satisfaction very little data existed on the influence of application of ergonomic principles to the office furniture and physical factors as well as schools' adherence to safety standards in development of school physical infrastructure on teachers' job satisfaction in public primary schools. This gap existed because many governments put more emphasis on the performance and welfare of the pupils but the welfare and job satisfaction of the teachers was relegated to the periphery; physical environments and status of buildings were overlooked by policy makers, but it was observed that this is where teachers spent better part of their time offering teaching services (Isaiah, 2013). This study, therefore, tried to bring matters related to the application of ergonomic principles to the office furniture, computer equipment, physical factors and adherence to safety standards in designing of schools physical infrastructure in public primary schools in the limelight with an aim of establishing how these aspects influenced teachers' job satisfaction.

1.3. Significance of the study

This study was very important because it tried to establish how the application of ergonomic principles and safety standards to office work environment and physical infrastructure in public Primary schools could influence the level of teachers' job satisfaction. It was hoped that it would help policy makers in educational institutions to take a proactive role in recommending to the owners, government and other stakeholders in education sector to provide necessary facilities and conditions at the place of work to boost morale and level of job satisfaction. There was hope that the study findings would equip institutions' managers with right skills on how to provide for the application of ergonomic principles to office furniture, development of computer infrastructure and enhancement of safety standards in schools' buildings and other physical infrastructure for the betterment of teachers' working conditions and thereby enhance their job satisfaction.

1.4. Scope and limitation of the study

This study was primarily concerned with the influence that application of ergonomic principles to the office Chairs, desks, computer equipment and physical factors in public

primary schools' office environment had on teachers' job satisfaction. It also looked at the influence that adherence to safety standards in buildings and other physical infrastructure in public primary schools had on teachers' job satisfaction. The study confined itself to application of ergonomic principles and adherence to safety standards to facilities provided in public primary schools for use by the teachers.

2. Methodology

2.1 Research Design

The study used the descriptive survey design. The descriptive part presented the demographic characteristics of the respondents and their rating in the Likert scale on their agreement with certain statements on application of ergonomic principles and adherence to safety standards in school physical infrastructure. The relationships between both the application of ergonomic principles and adherence to safety standards in school physical infrastructure on one hand and teachers' job satisfaction on the other were determined through correlation and regression techniques.

2.2 Respondents and Sampling Procedures

The study population was 596 teachers which was the total teaching staff in all 53 public primary school in Murang'a East Sub County in Kenya. Cluster sampling was used to pick the participants. In total 240 teachers were picked from 22 schools drawn from the four education zones in the study area.

2.3 Locale of the Study

The study was conducted among teachers in public primary schools in Murang'a East Sub County in Kenya. The place of study is approximately 85 Kilometers (53 miles) from Kenya's capital city, Nairobi. The respondents were picked from selected schools in the four education zones namely Gaturi, Gikindu, Municipality and Kimathi.

2.4 Data Collection Instruments

The study made use of self-administered questionnaires. The questionnaire had two sections. One section sought to get demographic data of the respondents. The other section was divided into two parts. First part involved respondents responding to statements on the application of ergonomic principles and safety standards to office work environment and physical infrastructure in their schools. In the second part the respondents were required to indicate their level of job satisfaction with statements on application of ergonomic principles to school facilities and adherence to safety standards in physical infrastructure (see table 1 and 2).

2.5 Data Collection Procedure

The researcher got the necessary authorization and the list of schools and teachers from Murang'a East Sub County education office and Teachers Service Commission (TSC) office respectively. Teachers' data (Name, Gender and school posted) in all the public primary schools in the four educational zones of Murang'a East Sub county were updated from TSC website: <http://www.teachersonline.go.ke/masterbasic.aspx>. The researcher used a self-administered questionnaire. This was crucial in establishing a rapport with the teachers and brought about trust of confidentiality for information given by

respondents. The participants were given a week to fill the questionnaires after which the researcher returned to collect them.

2.6 Statistical Treatment of Data

In this study descriptive statistics namely percentages, tables and mean were used to analyze the data. The Karl Pearson Product Moment Correlation Coefficient (r) was used to determine the correlation between the application of ergonomic principles and safety of physical infrastructure on one hand and teachers' job satisfaction on the other. Thus it established the strength and direction of the relationship. Linear Regression techniques were used to determine the strength of the influence of the application of ergonomic principles and safety of physical infrastructure on teachers' job satisfaction.

3. Data Analysis and Presentations

3.1. Demographic Data of Respondents

Gender: The research data indicated that 119 (55%) of the respondents were females, whereas 96 (45%) were males. This shows that majority of the public primary school teachers in Murang'a East were females.

Marital Status: When respondents were asked to indicate their marital status, 83% of respondents indicated they were married while 17% were single. Knerr (2006) opines that married people generally possess higher job-satisfaction than their single counterparts.

Age of the Respondents: The study results revealed that majority of respondents (36.3%) were on the 41-50 years age bracket, followed by 30.7% of the respondents in the over 50 year's age bracket. The respondents aged 31-40 years formed 22.8% while 10.2 % were in the 18-30 years age bracket. In a study done by Saner and Eyüpoğlu (2012) among academics in 5 of the North Cyprus universities, it was established that job satisfaction levels of the older age groups of academics are on the whole higher than younger age groups.

Academic Qualifications: The findings indicate that the respondents had attained different levels of academic qualifications. It was found that 52% of the respondents had O' Level Kenya Certificate of Secondary Education (KCSE) qualification followed by Bachelor's Degree at 19.5%. Those with Ordinary (O') Level Kenya Certificate of Education (KCE) qualifications formed 14.4%, Advanced Level(A'Level) qualification was at 13.5% while only 1(0.5%) who had post graduate qualification.

Professional Training: The study revealed that all the respondents had undergone through the teacher training. The information on teachers' professional qualification was sought because teacher's competence can influence job satisfaction (Ma & MacMillan, 1999; Arifin, 2015)

Other Trainings: The study findings revealed that 51(23.7%) of respondents had in addition to teacher training pursued other courses to enhance their career or get professional qualifications in other areas. The rest 164 (76.3%) had no other courses or qualifications apart from teaching. In a study done in private banking sector in Karachi in 2013 it was established that there is positive relationship between career development and employee job satisfaction (Shujaat, Sana, Aftab & Ahmed, 2013).

Length of Service: When asked the duration of time they have been in their current school majority (40%) of the respondents indicated they had worked in their current schools between 1 and 5 years, followed by those who had worked between 6 and 10

years (27.4 %). Those who had worked for over 10 years formed 16.3 % which was the same case with those who had worked for less than 1 year (16.3%). The information was sought because in a research done in Texas length of service was found to be related to job satisfaction for part-timers (Kirk, 2003).

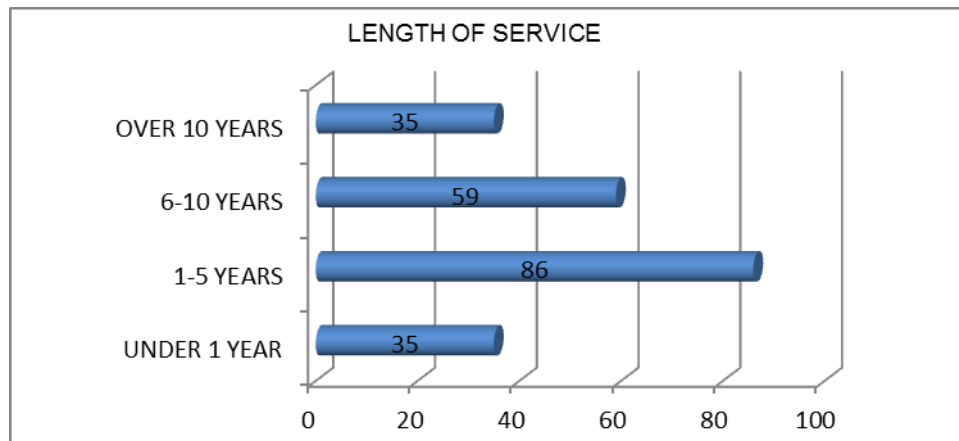


Figure 1. Length of service

Administrative Positions: Most of the respondents held different administrative positions in their respective schools; 4% were Head teachers, 5.6% were Deputy Head teachers, 1.4% Heads of Departments, 6.5% senior teachers, 3.7% were games masters or mistresses, 3.7% held positions such as Head of environment and dormitory masters while majority 76.7% were class teachers. Two respondents (0.93%) held no administrative positions in their schools. According to McGregor's theory Y, it is assumed if workers were respected and involved in the decision making process they were likely to be positively motivated. This motivation fostered a greater sense of work accomplishment and consequently improves job satisfaction (Wilson, 2009). Kamau, Gakure and Waititu (2013) state that staff participation in decision making among other factors motivates employees and ultimately brings about organizational and personal goal satisfaction.

3.2. Respondents' rating on application of ergonomic principles and adherence to safety standards.

The respondents were given statements to indicate their level of agreement with the application of ergonomic principles and safety standards to office furniture, office space, physical factors and school physical infrastructure in their schools (The likert scale was: Strongly Disagree-1, Disagree-2, Uncertain-3, Agree-4 and strongly agree-5). The main purpose of this section was to establish the application of the ergonomic principles and adherence to safety standards in the selected schools facilities before embarking on their influence on teachers' job satisfaction.

Application of ergonomic principles to office chairs and desks, computer equipment and physical environmental conditions.

Majority of respondents, 69%, disagreed with the statement that there was application of ergonomic principles to the design of chairs and desks in their schools to support the right body posture, 13.4% agreed while 17.7% were uncertain. Similarly majority of the respondents, 65.6%, disputed that there were enough office spaces that

allowed the teachers to work and move around in their offices and staff rooms while 23% agreed, 11.2% of the respondents indicated uncertainty. On the statement that there is application of ergonomic principles to the school's facilities for proper use of computer equipment such as computer desks and chairs, 70% of the respondents disagreed with the statement, 4% indicated uncertainty while 26% did agree with the statement.

Results of office physical factors were as follows:

- Regarding temperature levels, 41% disagreed that they were conducive, 34.4% agreed while 24.6% were uncertain.
- On the level of lighting, majority of respondents (69%) agreed there was good lighting levels in their schools, 14% refuted the statement while 17% were not sure whether they were conducive or not.
- On the statement on the level of sound levels in the staffroom, half of respondents (50%) agreed they were conducive, 27% negated the statement while 22% were uncertain.
- On housekeeping in the staffroom, majority of the respondents (40%), agreed with the statement that there was good order of equipment and facilities in the staffroom, 38% disagreed while 22% indicated uncertainty.

Table 1. Respondents' views on application of office ergonomics and safety standards.

Statements	Agree %	Disagree %	Uncertain %
The teachers' chairs and desks in the school support the right body posture.	13	69	18
There is enough office space that allows the teacher to work and move around the office/staffroom.	23	66	11
Your school has facilities for proper use of ICT devices e.g. computer desks and chairs.	26	70	4
The temperature levels at your work place are conducive.	34	41	25
The level of lighting is sufficient.	69	14	17
Sound levels in the staffroom is sufficient.	50	27	22
There is Housekeeping-good order of equipment and facilities in the workplace.	40	38	22
Provision of emergency services and First aid kits is in Place.	36	59	5
There are Safeguards against electrical hazards in your School e.g. provision of enough sockets and insulated cables in the staffroom.	57	36	7
The building structures (classrooms and staffroom) meet safety standards e.g. to guard against man-made or natural disasters.	36	41	23
School equipment and facilities provided in your school meet the required safety standards.	36	39	25
Floors and staircases are well designed to prevent slips and fall as teachers move around in the school compound.	32	57	11

Adherence to safety standards in school physical infrastructure

On the statement on the existence of emergency services and first aid kit equipment 59% of the respondents disagreed, 36% agreed while 5% indicated uncertainty. On school connectivity to electricity 9 respondents from one school indicated that their school was not connected to electricity, the rest 206 had their schools connected to electricity. Therefore the 9 respondents were excused from responding to the statement that safeguards have been put in place against electrical hazards in the school such as provision of enough

sockets and insulated cables in the staffroom and offices. The remaining respondents, 57% agreed that there were enough safeguards, 36% disagreed while 7% were not sure. On the statement that the building structures (classrooms and staff rooms) met safety standards namely to guard against man-made or natural disasters, 41% of the respondents disagreed with the statement, 36% agreed while 23% were uncertain. Response to the statement that School equipment and facilities provided met the required safety standards 39% refuted the statement, 36% agreed while 25% were uncertain. A statement that design of the floor and staircases met safety standards got the following response; 56.8% disagreed with the statement, 32.6% agreed while 10.7% were not sure.

3.3. Level of job satisfaction

The term job satisfaction refers to the attitude and feelings people have about their work. Positive and favourable attitudes towards the job indicate job satisfaction. Negative and unfavourable attitudes towards the job indicate job dissatisfaction (Armstrong, 2006). Syauta, Troena and Margono Setiawan (2012) states that job satisfaction is a needed condition by someone in doing their work, because where the work is able to bring satisfaction, then the employee is expected to do the job well and display good performance. Statements on application of ergonomic principles to office furniture, computer equipment, physical factors and adherence to safety standards in school physical infrastructure were posed to respondents to know their level of job satisfaction. In Likert scale these levels of job satisfaction were ranked as follows; highly satisfied (5), satisfied (4), fairly satisfied (3), dissatisfied (2) and highly dissatisfied (1). On the design of chairs and desks 83% of the respondents indicated different levels of job satisfaction while 17% indicated dissatisfaction. On office space 172 respondents (80%) indicated satisfaction while 43 respondents (20%) indicated dissatisfaction. A statement on teachers' job satisfaction with application of ergonomic principles to ICT facilities 75 respondents (35%) indicated different levels of job satisfaction while 140 (65%) were dissatisfied. On physical factors the level of job satisfaction was as follows:

- Temperature levels: 166 respondents (77%) were satisfied, 49 respondents (23%) indicated dissatisfaction.
- Lighting levels: 187 respondents (87%) were satisfied while 28 respondents (13%) indicated that they were dissatisfied.
- Sound levels: 181(84%) of respondents indicated satisfaction while 34 of respondents (16%) were dissatisfied.
- Housekeeping: 172 respondents (80%) indicated different levels of satisfaction while 43 respondents (20%) were dissatisfied.

On provision of emergency services and first aid kits in schools 75 respondents (35%) indicated satisfaction while 140 respondents (65%) were either highly dissatisfied or just dissatisfied. As pertains safeguard against electrical hazards 9 respondents did not participate as their schools were not connected to electricity. For those who participated 104 (50.5%) indicated different levels of satisfaction while 102 participants (49.5%) indicated dissatisfaction. In relation to school compliance to school safety standards as stipulated by the ministry of education in the construction of school buildings namely classrooms and staffroom, 130 (60%) of the respondents indicated satisfaction while 85 (40%) indicated dissatisfaction.

On matters pertaining to adherence to safety standards in provision of school equipment and facilities, 125 respondents (58%) indicated satisfaction while 90 (42%)

indicated dissatisfaction. Finally, on adherence to safety standards in the design of the floors and staircases to avoid slips, trips and falls, 105 respondents (49%) indicated various levels of satisfaction while 110 respondents (51) indicated dissatisfaction.

3.4. Relationship between application of ergonomic principles and physical infrastructure and Teachers' Job Satisfaction

From data in table 2 on level of job satisfaction and correlation between application of ergonomic principles and teachers job satisfaction it is evident that higher level of application of ergonomic principles to office facilities leads to high level of job satisfaction.

Table 2. Level of job satisfaction on application of ergonomic principles and safety standards.

Statements	Satisfied	Dissatisfied	Correlation coefficient		Sig.
			r	r ²	
Provision of chairs and desks that support the right body posture.	178 (82.8%)	37(17.2%)	0.42	0.17	.000
Provision of enough office space that allows the teacher to work and move around the office/staffroom.	172 (80%)	43 (20%)	0.37	0.14	.000
The provision of facilities for proper use of ICT devices e.g. computer lab, desks , chairs etc.	74 (34.4%)	141(65.6%)	0.35	0.13	.000
The existence of the following Physical environmental factors in the staffroom and classroom that are conducive for work:	166 (77%)	49 (23%)	0.32	0.10	.000
i) Level of temperature					
ii) Level of lighting.	187 (87%)	28 (13%)	0.26	0.07	.000
iii) Sound levels in the staffroom.	181(84%)	34 (16%)	0.14	0.02	.000
iv) Housekeeping-cleanliness and good order of equipment and facilities in the school.	172 (80%)	43 (20%)	0.30	0.88	.000
Provision of emergency services and First aid kits.	75(35%)	140(65%)	0.68	0.46	.000
Safeguards against electrical hazards.	104 (51%)	102 (50%)	0.25	0.06	.000
School compliance to school safety standards as stipulated by the ministry in the construction of school buildings-classrooms and staffroom.	124(58%)	91 (42%)	0.48	0.23	.000
Compliance to safety standards in provision of School equipment and facilities.	125(58%)	90 (42%)	0.55	0.30	.000
Design of floors and staircases to avoid slips, trips and falls.	105(49%)	110(51%)	0.56	0.31	.000

NB: r-Pearson's correlation/parametric correlation r²-Coefficient of determination. Significance value: < 0.05

On adherence to safety standards in construction of school physical infrastructure in these public schools, the data in Table 2 indicated that majority of respondents were satisfied except on the design of staircases and floors where slightly a higher number of the respondents showed dissatisfaction with safety standards in place than those who were satisfied. Figure 2 shows correlation between level of adherence to safety standards in construction of school buildings and other infrastructures and the level of job satisfaction using the Pearson's correlation coefficient technique. Generally in the 5 cases there was positive relationship between the two. This means that where there was a high level of compliance to safety standards in physical infrastructure in public primary schools there

was a high level of job satisfaction among teachers and vice versa. This was clearly demonstrated by graphical presentation in figure 3. whereby high values in vertical bars representing adherence of safety standards in physical infrastructure tended to go with high level of job satisfaction shown by a red line running from left to right side of the graph and vice versa.

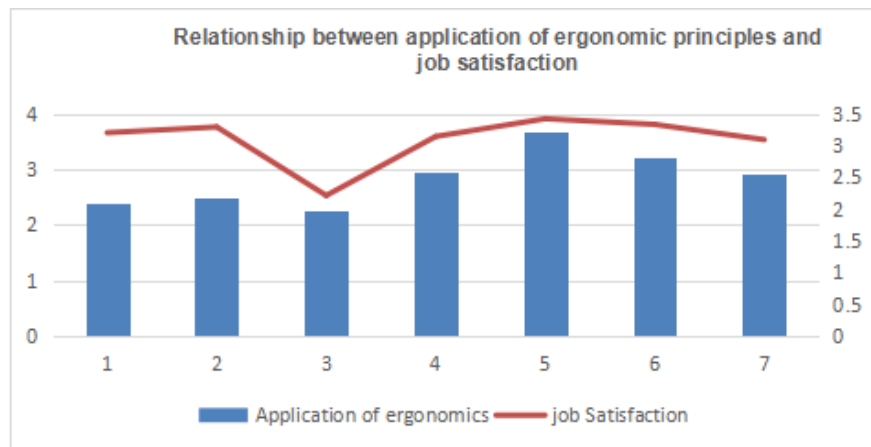


Figure 2. Relationship between application of ergonomic principles and job satisfaction.

Table 3. indicated respondents' level of agreement with statements on application of ergonomic principles to the office furniture, computer equipment and office physical factors. Similarly it also indicates the mean level of respondents' views on adherence to safety standards in the school buildings and other physical infrastructure. The mean level of respondents' job satisfaction was also displayed. In both cases, it was established that, there is a significant correlation between the application of ergonomic principles and adherence safety standards on one hand and teachers' job satisfaction on the other hand.

3.5. Influence of ergonomic principles and schools' physical infrastructure safety standards on Teachers' Job Satisfaction.

Using linear regression as indicated in Table 4 it was established that a unit increase in the application of ergonomic principles increases teachers' job satisfaction by a factor of 0.519. This indicated that application of ergonomics to the office furniture, computer equipment and in physical factors brought about a positive influence on teachers job satisfaction. A unit increase in the level of application of ergonomic principles brought about an increase in teachers' job satisfaction variable by a factor of 0.519 which showed a significant positive influence.

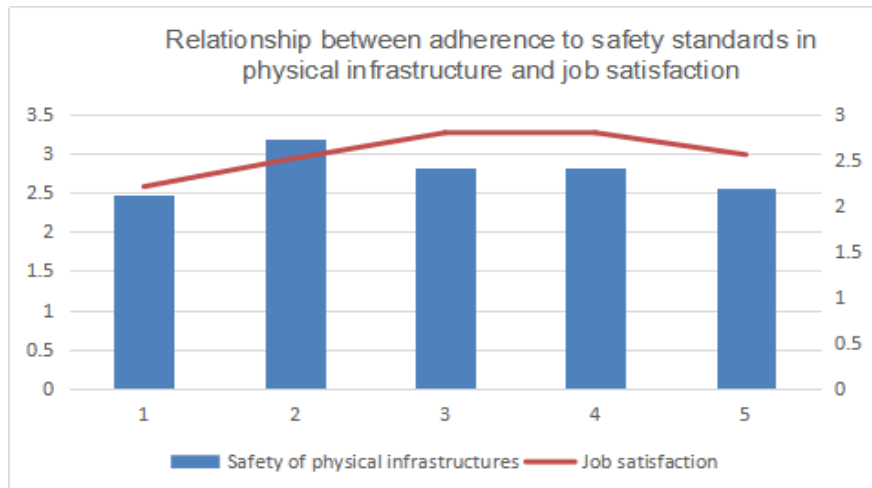


Figure 3. Relationship between safety of physical infrastructure and job satisfaction.

Table 3. The correlation of ergonomic principles and safety of physical infrastructures with teachers' job satisfaction.

Variable	Mean-rating on existence the independent variable	Mean level of job satisfaction	R	R ² Coefficient of determination	Sig.	Type of relationship
Application of ergonomic principles	2.84	3.1	0.6319	0.3993	.000	A positive correlation
School Physical infrastructure safety standards	2.78	2.57	0.4371	0.1911	.000	A positive correlation

* Significance value: < 0.05

In table 5 using linear regression it was established that a unit increase in adherence of safety standards in school buildings and physical infrastructure increases teachers job satisfaction variable by a factor of 0.361 which shows a noticeable positive influence of the variable on teachers' job satisfaction.

Table 4. The influence of application ergonomics principles on job satisfaction.

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.624	.818		1.984	.104	-.480	3.728
	ERGONOMIC	.519	.285	.632	1.823	.128	-.213	1.252

a. Dependent Variable: SATISFACTION

Table 5. The influence of application of safety standards to school physical infrastructure on teachers' job satisfaction.

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
	(Constant)	1.563	1.197		1.306	.283	-2.246	5.371
1	Infrastructure	.361	.429	.437	.842	.462	-1.004	1.727

a. Dependent Variable: SATISFACTION

a. Dependent Variable: SATISFACTION

4. Discussion

The results on demographic data of the respondents indicated that female teachers formed majority of respondents (55%), This can relate well with Wailer (1995) and Griffiths (1996) findings that the field of teaching, mostly at the primary and secondary levels, is one of the few occupations that have attracted quite a number of women, to the extent that the profession is now "feminized" or labelled as women's career especially in developing countries. Most of respondents were married which can be explained by the fact that majority of respondents (90%) were over the age of 30 years. All the respondents had an O'level qualification (Kenya Certificate of Secondary Education) which is minimum qualification required by government for one to be trained as teacher in Primary school in Kenya (Government of Kenya, 2018). This can also be explained by the fact that all respondents had trained as teachers. The findings also indicated that nearly a quarter of the respondents had pursued other trainings in addition to teachers training. A study done in 2015 by Kenya National Union of Teachers (KNUT) found that that teachers have specific personal and professional needs. The findings showed that 60.8% of the respondents admitted their needs have not been addressed in the last five years (KNUT, 2015). Kalai (2016) argues that most of these teachers pursue other professional training with hope of leaving teaching either through career switch, join the private sector, voluntary resignation or seek departmental transfers. They quit teaching to take up better paying jobs that are available for those who have acquired more education or further training. It is also evident that most respondents had worked for less than 10 years (73.7%) which means they have not overstayed in their current work station. It was also observed that most of respondents had administrative duties ranging from being a class teacher, games masters up to higher administrative posts such as deputy and head teachers. This puts the respondents at the heart of decision making in their schools.

Regarding application of ergonomic principles to chairs, desks, office space and computer equipment most of the respondents disagreed that ergonomic principles had been applied in designing these items. This is why UNESCO (2008) Report on the conditions of school facilities recommends that these facilities should be upgraded to enhance safety for teachers. However there was a good number of respondents who were not sure or aware about application of ergonomics principles to office desk, chairs and office equipment. For these group of people Mani (2018) and Middleworth (2015) suggest training and creating awareness of various risk factors associated with work-related musculoskeletal disorders (WMSDs) and educate them on healthy work behaviours. Kingsley (2012) and Olabode, Adesanya and Bakare (2017) add that employees should be made to undergo periodic training on office ergonomics issues such as correct sitting

posture, the right way to use and adjust computer monitor to avoid neck, back and eye strain, how to reduce stress and strains in repetitive work and how to avoid injury and disorders at the workplace so that they are aware of the benefits derivable from it and be able to fit into organization's design.

On office physical environmental factors most respondents agreed that lighting, sound and housekeeping levels were conducive for their work. However on temperature levels 41% disagreed that they were conducive, 34% agreed and the rest were not sure whether they were conducive or not. On job satisfaction respondent expressed job satisfaction with application of ergonomic principles to desks and chairs, office spaces and physical factors but most were dissatisfied with application of this science on computer equipment. A research by Makhbul, Abdullah and Senik (2013) concluded that an ergonomically designed working environment can reduce human resource problems, including fatigue, job dissatisfaction and intention to quit. In a study on the Influence of physical work environment on Hotel Back-of-the-House Employees' satisfaction and productivity in Five star hotels in Egypt-Hilton Hotels and Resorts, Dardeer, Tag-Eldeen and Salem (2017) links the physical work environment such as sound, lighting, colour, temperature, workspace, design, layout of equipment and tools with employees' satisfaction and productivity. The findings also revealed that the most satisfied and most productive employees at Hilton Hotels in Egypt are those who have the highest level of convenient physical work environment.

On adherence to safety standards in school's physical infrastructure such as school buildings, staircases and other physical infrastructure, most of the respondents disagreed that safety standards have been complied to except on provision of safeguards against electrical hazards where most the respondents agreed they are in place. On job satisfaction majority of the respondents showed some level of satisfaction with the current facilities except on provision of emergency services and First aid kits. Majority of the respondents said that these facilities do not exist in their schools. According to government of Kenya regulation on the safety of school infrastructure contained in safety standards manual for schools in Kenya (2008) such physical structures should be appropriate, adequate and properly located, devoid of any risks to users or to those around them. They should also comply with the provisions of the Education Act (Cap 211), Public Health Act (Cap 242) and Ministry of Public Works building regulations/standards. In a research done by Muthoni (2015) found out that to a larger extent government guidelines are not adhered to due to what Nyakundi (2012) calls inadequate funds and supervision. The major recommendations therefore were policy makers to follow up, monitor and evaluate safety situation in all educational institutions and provide funds to all schools to enhance disaster preparedness (Nyakundi, 2012). Nyagaya (2012) recommends improvement of school infrastructure for more teachers' job satisfaction. Kemunto, Role and Balyage (2015) attribute the failure to implement the safety standards to lack of safety awareness. They recommend that the government should ensure their compliance by equipping teachers with skills through training and incorporating the safety education in the school curriculum. It should also encourage safety audits and awareness to be conducted regularly by Red Cross and other agencies. School management should encourage other stakeholder to be involved in safety matters and ensure they set up safety committees. Most of the respondents indicated moderate level of job satisfaction except on provision of emergency services and first aid kit as well as design of floors and staircases. Edem, Akpan and Pepple (2017) argue that physical infrastructure affect worker's job satisfaction; they

recommend that workers should be provided with necessary infrastructure and necessary tools they need to do their job.

5. Conclusion

The study found out that in most schools in the study area, there is inadequate application of ergonomic principles to office chairs and desks, office space and computer equipment. However most of the respondents seemed satisfied with their current state. Majority of those who had uncertainty in application of ergonomic principles seem to be satisfied with the limited application of the ergonomic principles. However on physical factors (Temperature, lighting, sound and housekeeping levels), data from most of the schools indicate better conditions seem to exist and higher level of job satisfaction was also noted. Using both correlation and regression techniques the application of ergonomic principles was found to have a moderate positive correlation with teachers' job satisfaction. On adherence to safety standards in school physical infrastructure most of the respondents indicated inadequate application of the safety standards in most of these public primary schools. In situations where the safety standards were noted it elicited high level of job satisfaction, but still a good number of the respondents appeared to be indifferent. The adherence to safety standards in school's physical infrastructure had a positive correlation with teachers' job satisfaction. This means increase in schools adherence to safety standards in designing and provision of its physical infrastructure brought about an increase in the level of teachers' job satisfaction.

The study established that application of ergonomic principles to office chairs, desks, computer equipment and office physical factors brought an increase in the level of teachers' job satisfaction. Similarly schools' adherence to safety standards in construction of physical infrastructure in public primary schools brought about an increase in the level of teachers' job satisfaction. In conclusion, from the study findings, it can be said that proper application of ergonomic principles to office furniture, computer equipment and physical factors in public primary schools positively influenced teachers' job satisfaction. Similarly adherence to safety standards in schools' physical infrastructure was found to positively influence teachers' job satisfaction in public primary schools.

There is need for employers to take proactive role in ensuring ergonomic principles are applied in designing office furniture, computer equipment and physical infrastructure such as buildings and staircases at the place of work to meet the required safety standards as a way of improving working conditions for workers and enhancing their job satisfaction. Teachers need to be sensitised on matters related to occupational safety and health. There is also need for a detailed study to explore on the new trends in application of ergonomic principles to modern office furniture and latest computer equipment. There is also need to relook at the development of modern school physical infrastructure to see how it can bring job satisfaction to both gender and people living with disability.

References

- Alli, B. O. (2008). *Fundamental Principles of Occupational Health and Safety*. Geneva: International Labour Organization.
- Armstrong, M. (2006). *A handbook of human resource management practice*. London and Philadelphia: Kogan Page, Tenth edition.

- Arifin, H. M. (2015). The Influence of Competence, Motivation, and Organisational Culture to High School Teachers' Job Satisfaction and Performance. *International Education Studies*, 8(1): 38-43.
- Azuri, B (2011). Job Satisfaction: A Literature Review. *Management Research and Review*, Vol 3(4), 77-86.
- Dardeer, M., Tag-Eldeen, A., & Salem, I. (2017). The Influence of Physical Work Environment on Hotel Back-of-the-House Employees' Satisfaction and Productivity: A Case Study on Hilton Hotels. *Journal of Tourism Research*, 43, 53-60.
- Edem, M.J., Akpan, E.U. & Pepple, N.M. (2017). Impact of workplace environment on Health workers, *Occupational medicine & Health affairs*, 5 (2), 1-4.
- Government of Kenya. (2008). Safety Standard Manual for Schools in Kenya. Nairobi: Government printer.
- Government of Kenya. (2010). Public service commission code of practice on mainstreaming disability. Nairobi: Government Printer.
- Government of Kenya. (2011). Gender Policy (Ministry of gender, Children and Social Development. Nairobi: Government Printer.
- Griffiths, M. (2006). The feminization of teaching and the practice of teaching. Threat or opportunity? *Educational Theory*, 56(4), 387-405.
- Hean, S., & Garrett, R. (2010). Sources of job satisfaction in science secondary school teachers in Chile. *Compare: A Journal of Comparative and International Education*, 31(3), 363-379.
- Indakwa, D. O. (2013). Perceived influence of occupational health and safety practices on job satisfaction among employees in Chemelil sugar company limited, Kenya (Doctoral dissertation, University of Nairobi).
- International Labour Organisation (2014). Creating safe and healthy workplaces for all. Report prepared for the G20 Labour and Employment Ministerial Meeting Melbourne, Australia, 10-11 September 2014.
- International Labour Organization (2001). Your health and safety at work: Introduction to occupational health and safety. Geneva: Bureau of Workers Activities.
- Isaiah, M. N. (2013). Linking the school facilities conditions to teachers' level of job in the South Central Region of Botswana. *Int. Rev. Soc. Sci. Hum*, 4(2), 196-205.
- Jepchirchir, G. & Achoka, J.S.K. (2015). Influence of enrolment on physical infrastructure in public primary schools in Nandi Central sub county, Kenya. *International Journal of Research in Humanities and Social Studies*, 2 (2), 69-73.
- Kalai, D. J. (2016). Factors Influencing Teacher Attrition in Public Secondary Schools In Mbooni East Sub-County, Kenya, *International Journal of Education and Research*, 4(3), 376.
- Kamau, A. W, Gakure, R. W. & Waititu, A. G. (2013). Influence of Institutional Leadership on Talent Management in Public Universities in Kenya. *Prime Journal of Social Science (PJSS)*, 2(8) 430-437.
- Kemunto, N. J., Role, E., & Balyage, Y. (2015). Safety policy implementation framework for secondary schools in Kenya. *Baraton interdisciplinary research journal*, 5 (special issue) pp. 27-40.
- Kenya National Union of Teachers (2015) Trends of the needs of teachers in public schools in Kenya. Cited from <https://www.knut.or.ke> on 18th October 2018.
- Kingsley, A. (2012). The impact of office ergonomics on employee performance: a case study of the Ghana National Petroleum Corporation (GNPC) (Doctoral dissertation, Institute Of Distance Learning, Kwame Nkrumah University of Science and Technology).
- Kirk, C. T. (2003). An examination of the relationship between length of service, job satisfaction and propensity to leave for faculty at a Texas community college (Doctoral dissertation, Texas Tech University).
- Knerr, M. J. (2001). An empirical analysis of the relationship between marital status & job satisfaction. *Undergraduate Research Community Research Journal*, 8, 1.

- Leigh Jr, R. M. (2012). School facility conditions and the relationship between teacher attitudes (Doctoral dissertation, Virginia Polytechnic Institute and State University).
- Ma, X., & MacMillan, R. B. (1999). Influences of workplace conditions on teachers' job satisfaction. *The journal of educational research*, 93(1), 39-47.
- Mani, K. (2018). Ergonomics Education for Office Computer Workers: An Evidence-Based Strategy. Retrieved from: <https://cdn.intechopen.com/pdfs/57980.pdf> on 21.10.2018
- Makhbul, Z. M., Abdullah, N. L., & Senik, Z. C. (2013). Ergonomics and Stress at Workplace: Engineering Contributions to Social Sciences (Ergonomik dan Stres di Tempat Kerja: Sumbangan Kejuruteraan untuk Sains Sosial). *Jurnal Pengurusan* (UKM Journal of Management), 37, 125-131.
- Middlesworth, M. (2015). MSD prevention. How to Prevent Sprains and Strains in the Workplace. Retrieved from: <https://www.ergo-plus.com> on 21.10.2018.
- Mwangi, P.T. (2017). Assessment of the level of compliance with occupational safety and health act 2007 in public institutions in Nairobi County, Kenya (Masters Thesis, Jomo Kenyatta University of Agriculture and Technology).
- Musyoka, L. (2013). Influence of provision of school physical infrastructure on students' performance in Kenya Certificate of Secondary Education in Mwingi Central District, Kenya (A research project presented to University of Nairobi, 2013).
- Muthoni, K. P. (2012) Adherence to Government guidelines on infrastructural development and students' performance at Kenya Certificate of Secondary Education in public day secondary schools in Kirinyaga East Subcounty, Kenya (A research Project submitted to University of Nairobi, 2012).
- Nyagaya, P.A (2015). Factors influencing teachers' level of job satisfaction in public primary schools in Kayole Division, Embakasi sub county, Kenya (A research project submitted to university of Nairobi, 2015).
- Nyakundi, O. (2012). Implementation of safety standards and guidelines in public secondary schools in Marana District, Kisii County, Kenya (A Research project submitted to Kenyatta university, May 2012).
- Nzuve, S.N.M. (2012). The extent of compliance with occupational safety and Health regulations at Registered workplaces in Nairobi, *International Journal of Business, Humanities and Technology*, 2 (2), 115-120.
- Office ergonomic solutions (2011). Office Ergonomics, Help Is Here! [Online]. Retrieved from: <http://www.office-ergonomic-solutions.com/> [accessed: 11 April 2011].
- Olabode, S. O., Adesanya, A. R., & Bakare, A. A. (2017). Ergonomics Awareness and Employee Performance: An Exploratory Study. *Economic and Environmental Studies*, 17(44), 813-829.
- Ontario Ministry of Labour (2009). Why are Pains and Strains/Musculoskeletal Disorders (MSDs) a Problem? [Online]. Retrieved from: <http://www.labour.gov.on.ca/english/hs/pubs/pains/problem.php> [accessed: 16 March 2011].
- Ontario Ministry of Labour. 2011. Why do Pains and Strains / Musculoskeletal Disorders (MSDs) Occur in the Workplace? [Online]. Retrieved from: <http://www.labour.gov.on.ca/english/hs/pubs/pains/occur.php> [accessed: 1 March 2011].
- Republic of Kenya (2012) Education Act. Nairobi: National Council for Law Reporting. Republic of Kenya (2012) Public Health Act. Nairobi: National Council for Law Reporting.
- Saner, T. & Eyüpoğlu Ş. Z. (2012). The age and job satisfaction relationship in higher education. *Procedia-Social and Behavioral Sciences*, 55: 1020-1026.
- Shujaat, S., Sana, S., Aftab, F., & Ahmed, I. (2013). Impact of Career Development on Employee Satisfaction in Private Banking Sector Karachi. *Journal of Management Social Sciences*, 9(2), 1-8.
- Strydom, E.A. (2014). Information administration technologies, ergonomics and health: regulatory compliance in an e-environment (Thesis presented to University of South Africa).
- Syauta, J. H., Troena, E. A., & Margono Setiawan, S. (2012). The Influence of organizational culture, organizational commitment to job satisfaction and employee performance (study at

Municipal Waterworks of Jayapura, Papua, Indonesia). *International Journal of Business and Management Invention*, 1(1): 69-76.

Tasnim, S. (2006). Job Satisfaction among Female Teachers: A study on primary schools in Bangladesh (Master's thesis, The University of Bergen).

Teachers' Service Commission (2016). Listing of Schools. Retrieved on 03.06.2016 from: <http://www.teachersonline.go.ke/masterbasic.aspx>

Teachers' Service Commission (2018). Teacher registration and recruitment requirements Available from: <http://www.teachersonline.go.ke>. Retrieved on 18th October, 2018.

UNESCO, (2008) Global Monitoring Report. Retrieved from: <http://unesco.org/image/001776e.pdf>. Retrieved on 3rd December, 2013. United Nations (2017).

Universal Declaration of Human Rights. Available from <http://www.un.org/en/universal-declaration-human-rights>. Retrieved on 29th September, 2017.

Weiler, A. K. (1995). Women and the profession of teaching. In W. A. Lorin (Ed.), *International encyclopedia of teaching and teacher education* (pp. 76–79). New York, NY: Pergamon.

Wilson, C. (2009). Relative influences of arizona high school principals' job satisfaction (Doctoral dissertation, University of Arizona).