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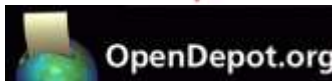
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A Research about Emotional Intelligence according to Gender

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ABSTRACT

Emotional intelligence is described as the ability to monitor one's own and others feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions. Several publications have appeared on the subject of emotional intelligence. The main objective of this research is to examine whether there is any significant difference about emotional intelligence according to gender. In this study, 215 surveys were conducted. A Mann-Whitney test indicated that emotional intelligence was greater for females than males.

KEYWORDS: Emotional intelligence, EI, gender.

INTRODUCTION

It is required for the people in today's business world to have a specific IQ level and EQ to be attuned to uncertainties and changes they face. Some researches which analyzed the relationship between the success and the intelligence have been made so far. However, it has

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been realized that IQ is not enough to be successful in both business and personal life. Therefore, researchers in related field have started to research about emotional intelligence. The height of emotional intelligence is important to obtain information correctly, progress it, direct it to a specific aim, observe the results, and check it in a critical view. But it is not enough merely. With the action of EQ, logic and emotion start to act together and provide people to make correct decisions. People with high EQ is the ones who can have better relationships in their families and social lives, control themselves, understand the others, and express their thoughts well. So the effectiveness of both intelligence types brings the success. In our research, EQ is analyzed in the context of gender. The emotional intelligence levels of different genders have been compared and evaluated.

Literature Review

Emotion and Emotional Intelligence

The term of emotion has several definitions in related literature. According to Feldman (1996); emotion is defined as factors like happiness, hopelessness and sadness which affect behaviors and combine physical components with cognitive components. To Feldman; emotions are organized reactions. Sherer defines the most important functions of emotion in three groups; to prepare the individual to prompt, to shape their next behaviors, and to help organizing social relationships (Feldman, 1996: 98).

Intelligence has been defined in different meaning during history. The most often accepted definition is Wechsler's statement. To him, intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment (Wechsler, 1958).

Goleman (1996) explains emotion as a kind of sense and thoughts, physiological and biological attitudes peculiar to this sense and a series of behaviors tendency. Many authors have researches about basic emotional facial expressions. They generally name the basic emotions as anger, sadness, fear, happiness, love, surprise, disgust, and shame. While these emotional expressions can be seen on faces one by one, sometimes they unite and appear as a mixture expression on faces.

Izard (1999) submits that determining the basic priorities of emotion compromised by majority is more suitable than defining emotion. And based on this idea, he says that emotion researchers agree on that emotion contains expressions or motor components and at least performs a expressive activity on central nervous system. (Lewis and Havilan- Jones, 2003: 260).

Emotions are organized responses, crossing the boundaries of many psychological subsystems, including the physiological, cognitive, motivational, and experiential systems. Emotions typically arise in response to an event, either internal or external, that has a positively or negatively valenced meaning for individuals. The organized response of emotions is adaptive and can potentially lead to a transformation of personal and social interaction into an enriching experience (Mayer and Salovey, 1990: 776).

The origin of emotional intelligence is based on the term of social intelligence defined by Thorndike in 1920. He expresses social intelligence as the ability of understanding and managing individuals. And the term of emotional intelligence is firstly defined as emotion-focused coping skill of individuals by two psychologists, Peter Salovey and Mayer (1990) (Wong, 2002: 246). According to their integrated approach, because of the fact that the definitions of emotion differ, emotions can be defined as transducer organized reactions containing psychological systems which are empirical and based on motivation, physiological, and cognitive. They maintain that emotions act as intrinsic movements coordinating many psychological subsystems such as physiological reactions of individuals. EQ (Emotional quotient) definition of Mayer and Salovey (1990) is explained in detail. According to their definition, the components of EQ are as follows (Mayer, Di Paolo and Salovey, 1990: 780):

- Understanding emotions; realizing relationships between senses and emotions; understanding complicated senses, realizing switching between emotions.
- Managing emotions; the ability of distinguishing emotions, observing and supervising emotions on both individual's own and others, destroying negative emotions and strengthening positive ones.
- Defining emotions; defining emotions on both individual's own and others (Güllüce, 2010).

Emotional intelligence was described formally by Salovey and Mayer (1990). They defined it as “The ability to monitor one’s own and others” feelings and emotions, to discriminate among them and to use this information to guide one’s thinking and actions” (Mayer and Salovey, 1990).

According to Yaylacı (2006: 49), emotional intelligence is:

- Not the opposite of the intelligence. To be able to think more logically we need our senses, signals of our emotions; to use them more effectively we need a rationalist brain. It is important to make heart and brain work together.
- Connecting with emotions or letting them completely free is not behaving unrestrainedly or impulsively. And it is not suppressing or controlling but using the correct emotion at the correct time.
- Not being good or kindhearted. Sometimes individuals with emotional intelligence need to say unpleasant things in relationships.
- Not a fact only about personal improvement. Skills related to emotional intelligence are about empathy, active listening, conflict, dialogue management –mostly- work success and performance.
- Not an activity to increase performance or provide discipline for individuals. It is not software which shows some differences immediately. Individuals can learn a new word or a new operation in an hour. But learning to manage their anger or excitement can take a long time. Emotional intelligence is a process which lasts during lifelong.

In the light of these explanations, it is possible to explain emotional intelligence as a process of strategy development which creates positive energy and effect in individuals’ lives and as a process of understanding both individuals’ owns and others’ emotions, defining, and controlling them (Yaylacı, 2006: 49).

It is seen that two different approaches appear related to the term of emotional intelligence in researches. One of them is “ability approach” and the other is “integrated approach”. While the ability approach defines emotional intelligence as a group of abilities, the other defines emotional intelligence ability together with social skills, features and behaviors (Çakar and Arbak, 2004).

It is quite possible for the people who know her/his emotions and understand emotional clues correctly-for instance, people expressing themselves without destroying norms even they know they are angry- to be effective individuals. A simulation work demonstrates that students who can know their emotions and differ them from each other make more beneficial investment decisions. And in another research, the researchers have analyzed the successes and failures of eleven prime ministers of the U.S.A from Franklin Roosevelt to Bill Clinton and evaluated them on six facts: communication, political skills, vision, cognitive style and emotional intelligence. As a result of this research, it has been seen that the main difference between the ones who succeed and the ones who failed is emotional intelligence (Robbins and Judge, 2012: 113).

A well-known model related to emotional intelligence has been developed by Bar-On. This model is a mixture model which combines some cognitive skills such as self-consciousness and some cognitive characteristic such as self-respect, and mood (Çakar and Arbak, 2004). In Bar-On model emotional intelligence is explained on five main aspects –personal aspect, interpersonal aspect, adaptability, overcoming the stress, and general psychology- and fifteen sub-aspects based on these five main ones. Bar-On maintains that emotional intelligence skills can change in time during the life long and it can be improved by several education and improvement programs. Also, he claims that these aspects have a structure to bring into open the potential emotional intelligence in individuals rather than performing it (Günlü and Erkuş, 2008: 192).

Especially following competences is determinant for EQ (Çetinkaya and Alparslan, 2001: 367):

- Self-consciousness: It means that individual know his/her emotions, needs, targets and make own decisions and realize his/her power and sources.
- Self-management: It means that individual manages his/her emotions by controlling them. He/she is saved from being slaves of his/her emotions but can shape them.
- Motivation: Self motivating is the willing of being always successful and controlling the excitement. This ability is quite beneficial especially in the case of emerging difficulties and occurring the things against individual's desire.

- Empathy: It means individual can understand others' emotions, needs, worries and put him/herself into their positions. Understanding them is to accept them the way they are and respect their emotions, behaviors and thoughts.
- Social Competence: It contains being able to connect with others and make these relationships valid for a long time. Besides good relationships between people, forming a group, creating the group spirit, and showing ability to manage the group also occur by this competence.
- Communication Skill: Good communication skill is an essential fact for EQ. This idea can be explained in two ways: The first is the skill of self-expressing clearly, and the second is listening to others carefully at the same time.

Also, emotional intelligence provides individuals firstly to understand their own emotions, and manage them. Besides that, it is a term giving opportunities to improve self-confidence for understanding others' emotions, developing empathy and increasing motivation. So, the interest of emotional intelligence, and improvement of emotional intelligence has increased nowadays. When we observe successful organizations today, it is seen that not only the intelligence level height has developed but also their technical and logical capacities for productivity growth or customer satisfaction level heights. It must be said that besides cognitive intelligence, individuals who have high emotional intelligence, and developed social sides, and can manage their emotions have important attributions to this success.

Cognitive Intelligence and Emotional Intelligence

IQ is defined as the intellectual, analytical and rational skills of an individual and according to the researchers in related field, intelligence is "the ability of abstract thinking", "the ability of having good reaction", "the capacity of advising, adjudication and critising", "personal knowledge bank", "individual's memory", "vocabulary", "brain coordination", "the ability of knowing right from wrong", "the ability of solving problems and defining logical relationships", "acting for individual's aim, thinking rationally, communicating with the environment effectively", "choosing, shaping the environment and necessary skills to adopt it", "The ability of adopting the environment, lessoning from experiences" (Aslan, 2013).

IQ and EQ have a complete mutual dependency relationship. These two term are not opposite of each other but they are different competences (Goleman, 2013). The main differences between IQ and EQ can be explained as follow (http://www.siviltoplumakademisi.org.tr/index.php?option=com_content&view=article&id=838:gencliin-oencelikli-haklar-&catid=47:stadan-haberler&Itemid=120):

- IQ is used to define some progress forced on brain which is far from social environment focused on mind. EQ defines the individual who is in social relationships.
- If IQ is math then EQ is psychology.
- If IQ is defined as finding alternative solution ways for a problem, EQ is defined as the ability of finding new adaptation ways and managing emotions in trouble.
- If IQ is a laboratory, EQ is the life.
- While IQ has an upper limit by birth, is a projection of the faith on human brain, EQ is not about the faith that much. It is a skill that can be improved with individual's effort and learning managing emotions on both him/herself and others.
- IQ demonstrates individual's intelligence quotient and evaluates intelligence functions. But EQ shows emotional syntheses, determination and functions.

Emotional Intelligence and Gender

Goleman (1995) has some generalizations about the relationship between gender and emotional intelligence as a result of his researches. Males with high emotional intelligence are extravert, balanced socially, cheerful, and unfearful. They like having responsibilities and attaching. They are at peace with both themselves and the world they live. Besides that, females with high emotional intelligence are the people who can express themselves and their emotions easily and are optimists. They are extravert, cheerful, meeting new people easily (Goleman, 1995).

Undeveloped emotional intelligence causes some problems in interpersonal relationships especially in male-female relationships. While females are more successful at verbal or nonverbal communications, understanding emotions, expressing themselves and their

emotions, and telling them, Males have ability to decrease their emotions such as fear, pain, guilt (Tuğrul, 1999: 17).

There are many researches about emotional intelligence and gender in related literature. As a result of these researches, it has been appeared that there is relationship between empathy and gender mostly. Feshbach (1968), Köksal (1997), Hoffman and Levine (1976) in their researchers have found that females are more empathic and show more emotional reactions in contrast with males. Steven and Howard (2011) claims that females have higher attention about social responsibilities and empathy in everywhere around the world.

Another research is about comparing emotional intelligence in term of gender (Goleman, 1995):

Males with high EQ have a wide intellectual interest and series of skills. They are ambitious, productive, steady, not worrying personal problems, critical, rigorous, self-righteous, undemonstrative, and shy about sexuality and emotional experiences, cool about sensuality. However they are extravert, balanced socially, cheerful, and unfearful. They take attention for their features such as attaching to others, taking responsibilities, having ethical views. They are lovely and interested to others. They have generous but controlled emotional lives. They are at peace with both themselves and the world they live.

Females with high emotional intelligence have intellectual confidence and aesthetic interests as being expected. They can express their thoughts clearly. At the same time, these kind of females can analyses themselves and are tend to worry, think deeply, and they avoid to express their anger clearly. These females can make themselves case, express their emotions directly, find a meaning in life and are optimist. Also, females with high emotional intelligence can express themselves and their emotions easily and are extravert, cheerful.

The factor of Emotional Intelligence in Management

Subjects such as the situations and duties of employees in an organizations, and their expectations from the organization, or expectations of the organizations from them require to exploit several scientific disciplines. Today's management conception buys into the idea claiming that not only cognitive intelligence is enough but also understanding emotions poisedly. Nowadays, it is not accepted the conception of negative, disincentive, limiter

management. The management buying into participative conception, and based on producing service/product and costumer worth, and having employees improving themselves constantly is preferred (Yalçın, Şeker and Bayram, 2014: 87).

Emotional Intelligence which provides individuals to feel better emotionally and physically is used as an important means in improving good relationships between employees and employers, and in increasing productivity and optimism among the employees. If it is considered that individuals with emotional intelligence are creative and the creativity is one of the most important features of entrepreneurs, it can be clearly said that emotional intelligence features are effective on entrepreneurial behaviors (Codier, Freitas and Muneno, 2013: 26). Also, emotional intelligence has importance for retention of employee, communication in organization, workplace safety, customer satisfaction, quality, employee turnover rates, and the immediate adaptation of the organization to changes (Gül and İnce, 2014).

Objectives

The main objective of this research is to examine whether there is any significant difference about emotional intelligence according to gender.

Testing of Hypothesis

H₀: There is a no significant difference about emotional intelligence according to gender.

MATERIALS AND METHODS

The main scale used to measure emotional intelligence is Chan's (2006) EI12 scale. The survey questionnaire is used as a research instrument which captures the general information about the emotional intelligence level of the employer using five-point Likert Scale ranging from 1 being "Not Important" to 5 "Most Important". The total number of questions asked are 12.

The original scale was implemented to Turkish by Konakay (2013). The implemented scales Cronbach Alfa coefficient was found as 0,813 (Konakay, 2013: 131).

In this study, the survey has been conducted as face to face survey and the researchers has managed to have 215 working surveys.

The below table shows the descriptive statistics of the respondents depending on their sex.

Table 1: The descriptive statistics of the respondents.

Females		Males	
N	N %	N	N %
103	47,9 %	112	52,1 %

The statistical software, Statistical Package for the Social Sciences (SPSS) version 20.0 has been used to perform all statistical calculations.

RESULTS AND DISCUSION

The data obtained has been scanned for differences according to gender. In order to determine the test method, Shapiro-Wilk Test is conducted to understand if the dependent variable is normally distributed. The results show that for the "male" and "female" participants the dependent variable, "emotional intelligence" was not normally distributed. Given that $p = .001$ for females, $p = .000$ for males – and using $\alpha = .005$ – we would conclude that each of the levels of the independent variable are not normally distributed. Therefore, the assumption of normality has not been met for this sample.

A Mann-Whitney test indicated that emotional intelligence was greater for females than males, $U = 4998.5$, $p=0.91$, $r=0.115$.

Therefore it can be concluded that there is a significant difference about emotional intelligence according to gender and females' emotional intelligence was greater than males.

Conclusion

The term of Emotional Intelligence, which is described as the ability of perceiving emotions, producing them for helping to think and the ability of regulating them to improve intellectual and emotional growing by Mayer and Salovey (1997), has a serious importance among the recent intelligence researches. Genders, which have different features emotionally, physically

and hormonally, have different behaviors and attitudes in their professional lives with the effect of their characters. Different genders have different professional life views and different balance perceptions between emotions and mind. Emotions are a vital factors for each individual to make correct decisions, to act against problems correctly, and to reach the success whatever their educations, growing environments and experiences are. That's why, emotions have an important place in work life.

Here in this point, our research has been prepared to evaluate emotional intelligence and gender together, and to analyze whether emotional intelligence differs from gender to gender. According to the research results, it has been seen that there is a difference between the emotional intelligence of males and females and that females have higher emotional intelligence than males. Emotional Intelligence differs among genders. In many researchers conducted to analyze the relationship between emotional intelligence and genders, a certain consensus has not been built about whether the gender is a factor to create a meaningful difference on emotional intelligence. In many research like our research, it has been seen that females have higher emotional intelligence than males (Gürbüz ve Yüksel, 2008: 187, Erdoğan, 2008:69, Petrides ve Furnham, 2006: 554).

On the other hand, in some researches although not yet so much (Çelik ve Deniz, 2008: 380, Acar, 2002: 60, Canbulat, 2007: 194, Acar, 2007: 133) it has been seen that gender does not create a difference on emotional intelligence. Because the fact that it has been seen that there is no any recent research in this field in literature for last 7-8 years, It has been found helpful to analyze this subject especially on these days when we can see the intensive effect of Generation Y.

Emotional Intelligence is the indivisible part of social and cognitive intelligence and it can be improved. Emotions, the effective using of emotions, and managing emotion support individuals to make correct decisions and increase their motivations. Notwithstanding genders, if both males and females employees value their emotions, learn their emotional intelligence abilities, and then apply them, it will be easy to reach success in the Professional life.

There are some explanations in the literature about that some other demographic features (age and education, marital status, having kids, etc.) affect emotional intelligence beside genders.

In this way, emotional intelligence can be analyzed with other factors. According the research results, the possible advices for other works can be defined as to make the research with a larger group, to analyze data by comparing subjects belonging to different generations, and to analyze emotional intelligence and social intelligence together.

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**A Study of the Perceptions Held by Information Technology Professionals
in Relation to the Maturity, Value, and Practical Deployment of Big Data
Solutions**

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ABSTRACT

This research study investigated relationships between an information technology (IT) professional's self-assigned understanding of big data and their assessment of the maturity, value, hype, and future trends of big data. The study also examined if there was any relationship between an IT professional's understanding of big data and the position they occupy professionally. The study consisted of a twenty question survey. Research findings indicate that IT professionals are still becoming familiar with big data and related technologies. The results supported rejecting two of the five hypotheses. The study produced evidence that there is a relationship between an IT professional's level of big data understanding and their expectation that there will be an increase in technological developments related to big data in the near future.

KEYWORDS: Big Data, Analytics, Business Intelligence, Information Technology, Data Management, Management Information Systems, Information Technology Professionals.

INTRODUCTION

The explosion of data being captured and stored in information systems has created a new area of challenges and opportunities for information technology (IT) professionals. Every day

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millions upon millions of bytes of data are being collected, as related to customer transactions, social media postings, government operations, and traffic sensors. The advent of this rise in data is termed “big data” and it presents challenges from technical, managerial, and analytical perspectives. Organizations are being faced with difficult decisions related to the retention of data and how to analyze stored data to extract value. If organizations hope to obtain value from big data, they must understand the breadth and depth of big data awareness held by their IT employees.

LITERATURE REVIEW

Big data is essentially a simple set of words but it is also term that hides a surprising degree of complexity upon further inspection. Big data in the most basic sense relates to extremely large data sets. Big data also generally relates to data sets that are not able to be managed using typical relational database management systems with respect to size, quality, or other characteristics of the data. (Chen, M., Mao, S., & Liu, Y., 2014; Manyika, et al., 2011).

The definition of big data also varies based upon who you ask. Big data might be a collection of web logs to an IT system engineer or a vast trove of clinical trial data for research scientist. Since there is typically some type of business case related to big data it is necessary to examine the basic features and aspects of big data to establish a baseline of understanding (Chen, Mao, & Liu, 2014).

One the most basic frameworks used to characterize big data is that of the three “V’s”. The three “V’s” are Volume, Variety, and Velocity. Volume corresponds to the record count and size of the data elements being stored. Variety relates to the differences in nature and qualities of data being stored. This typically calls out the types of files or formats being stored. Velocity relates to the rapid pace at which new data is being acquired. Velocity is what distinguishes big data from relational database data most distinctively. The three “V’s” cause the industry standard relational database model to falter. Velocity and Volume are the main reasons that the physical limitations of RDBMS frameworks are reached and any attempt to tame these large data sets by conventional means fails. (McLellan, 2013). Generally speaking MIS and IT professionals place the “big data” label on data volume that exceeds several hundreds of terabytes up to the order of several petabytes. (Manyika, et al.,

2011). Gartner, a leading technology research firm and IT advisor sums up big data in the following manner: “ ‘Big data’ is high -volume, -velocity and -variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision-making” (Gartner, 2013).

Big data though in and of itself does not offer much value. And it is around this concept of value that a different perspective on big data has emerged. The research firm IDC has included the idea of value in its big data definition: big data is “a new generation of technologies and architectures, designed to economically extract value from very large volumes of a wide variety of data, by enabling high-velocity capture, discovery, and/or analysis” (Gantz & Reinsel, 2011). Big data cannot be stored and maintained simply for the sake of doing it. Jay Parikh, the Vice President of Infrastructure Engineering at Facebook makes the following observation on big data: “If you aren't taking advantage of the data you're collecting, then you just have a pile of data, you don't have big data” (Chen, M., Mao, S., & Liu, Y., 2014; Constine, 2012).

STATEMENT OF THE PROBLEM

There has been little research conducted related to IT professionals and big data. Specifically there have been no studies to determine if relationships exist between IT professionals and their awareness of the maturity, value, hype, future trends, and practical understanding of big data solutions. When IT executives or other leaders in an organization clearly understand the knowledge, skills, and awareness of their staff in relation specific technologies they can develop plans to proceed with the deployment of big data solutions. They can also conduct training and awareness sessions to confirm that their staff has the level of understanding needed to ensure strategic goals are being met as aligned with big data.

PURPOSE OF THE STUDY

This study was designed to evaluate perceptions held by IT professionals in regards to big data. The study focuses on an assessment of IT professionals and their self-assigned understanding of big data in relation to their perceptions of the maturity, value, hype, and future trends of big data. The study also looks at levels of big data understanding in

conjunction with occupying a managerial role. The study should prove helpful in determining linkages between training and awareness of big data and the ability of an organization to advance big data initiatives.

HYPOTHESES

A survey tool will be used to address five hypotheses aimed at answering the intended areas of focus related to big data and the beliefs or perceptions held by IT professionals. The hypotheses are as follows:

Hypothesis H₁: An IT professional's understanding of the principles of big data and related technologies is independent of his / her responsibilities in a managerial capacity.

Hypothesis H₂: An IT professional's perception of the value of big data solutions is independent of his / her understanding of big data solutions.

Hypothesis H₃: An IT professional's expectation of beneficial future development in the area of big data technologies is independent of his / her understanding of big data solutions.

Hypothesis H₄: An IT professional's perception of hype in regards to the market recognition of big data technologies is independent of his / her understanding of big data solutions.

Hypothesis H₅: An IT professional's perception of the maturity of big data and related technologies is independent of his / her understanding of big data solutions.

SIGNIFICANCE OF THE STUDY

This study will represent a new contribution to the field of IT management. It will illustrate levels of significance of critical concepts as they relate to the big data understanding of IT professionals and their perception of the innovation and value of big data solutions. The study will also help determine reasons why certain organizations have been more successful with big data projects, and move more rapidly along the path of the adoption of advanced analytic solutions. This study will also provide a baseline at a particular point in time for the pulse of IT professionals. The study is being conducted when there are a lot of advancements and innovation in the tools and techniques used in relation to big data.

ASSUMPTIONS AND LIMITATIONS

The survey is focused specifically on IT professionals who self-identified themselves as filling such a role. The survey also asks respondents to state whether or not they fill a management role. Individuals are requested to rate their understanding of big data and their agreement with certain statements related to big data technologies. As with any study there could be inflation of results, however with the completely anonymous nature of the survey individuals gain no benefit from providing such answers. A final limitation of the survey is that respondents will self-select for participation in the study. A wide distribution of messaging via LinkedIn and Twitter will be used to reach as many IT professionals as possible.

METHODOLOGY

This study was designed to evaluate perceptions held by information technology (IT) professionals in regards to big data. The study focused on an assessment of IT professionals and their self-assigned understanding of big data in relation to their perceptions of the maturity, value, hype, and future trends of big data. The study also looked at big data understanding in conjunction with IT professionals occupying a managerial role. The framework for the study was a survey instrument administered on-line.

Sample Design

The theoretical study population was all IT professionals regardless of their particular job role. The actual study population was IT professionals in the United States. Using data provided by United States Bureau of Labor Statistics, the estimated number of IT professionals in the United States is slightly less than 4 million.

Table 1: IT Professionals in the United States (adapted from Bureau of Labor Statistics)

Job title	May 2010 employment	January 2015*
Computer support specialists	607,100	661,739
Computer systems analyst	544,400	604,284
Software developers, applications	520,800	593,712
Software developers, systems software	392,300	455,068
Computer programmers	363,100	384,886
Network & computer system admins	347,300	395,922
Computer & information systems managers	307,900	335,611

Information Security Analysts, Web Developers, and Computer Network Architects	302,300	335,553
Database administrators	110,800	127,974
Total	3,496,000	3,894,749

** Estimate based on annual percent growth using BLS forecasts to 2020*

For global applicability, it was assumed that in regards to a series of questions related to a particular technology family (in this case big data), that US IT professionals would hold no particularly different attitudes or preconceptions about big data than IT professionals in other parts of the world.

Survey respondents participated in the survey via a custom response form that was developed on Google Forms. Study participants received an invitation to participate in the survey via Twitter alerts and the use of LinkedIn's email tool.

Survey Design

Part one of the survey was used to gather key demographics on the respondent. Questions were asked to determine the principal IT responsibility held by the respondent. Questions were also asked to establish a baseline regarding the respondent's industry of employment, length of time with their employer, and length of time as an IT professional. Respondents were also asked if they work in a managerial role.

Part two of the survey was used to gain insight into the respondent's perception of big data as it related to their awareness of the maturity, value, hype, future trends, and understanding of big data solutions. This section consisted entirely of five-point Likert scale questions so as to pinpoint precise results from the survey audience.

Part three of the survey was used to gain insight into the respondent's interaction or observation of the deployment (or non-deployment) of big data solutions in their organization. Questions also measured the overall sense of importance of big data in their organization and who is the visionary for big data within their organization.

The entire survey consisted of twenty questions and contained no open-ended or narrative style questions. The expectation was that the survey could be completed in less than five minutes in virtually every administration.

Validity and Reliability

The survey instrument's validity was evaluated using pre-test assessments. The researcher examined similar IT-oriented survey models to determine if the technical orientation of the questions was appropriate. Since the study was not being administered to determine causality of action there was no reason to evaluate internal validity (Cooper & Schindler, 2010).

The survey instrument was however evaluated for reliability, to determine its durability of repeated results. The Cronbach Alpha was measured using the open source statistical software program PSPP and returned at a high co-efficiency of internal consistency at 0.96 which indicates strong reliability for the scaled section of the survey tool.

Variables

The scaled section of the survey consisted of six main variables to enable the evaluation of the hypotheses.

The variables are as follows: Managerial position, maturity, value, hype, future trends, and understanding of big data solutions.

Managerial position was evaluated using a simple 'yes/no' question to determine if the respondent occupies a supervisor role. This variable was assessed by question 5.

Maturity was the respondent's perception of big data as being a solution or set of technologies that are sufficiently developed to be used in a production capacity and are capable of generating value. This variable was assessed by question 6.

Value was the respondent's perception of big data solutions being worth time, effort, and resources required for deployment. This variable was assessed by question 7

Hype was the respondent's perception of the industry and other IT professionals overstating the usefulness, value, or ease of deployment of big data solutions. This variable was assessed by question 8.

Future trends was the respondent's perception of near-term future for advances in big data solutions and technologies. This variable was assessed by question 9.

Understanding was the respondent's perception of his or her knowledge of the scope and individual components of big data solutions. This variable was assessed by question 10.

Data Collection

The collection of data, via an on-line survey tool, occurred over a one week period from August 5 to August 12, 2014. The survey was available twenty-four hours a day for the respondents.

To address any concerns about their responses being used in a manner that could directly affect their employment, all respondents were advised that results were confidential. They were also informed that the Google Forms survey tool stored no personally identifiable information along with their responses. Survey results were uniquely identified only by a data-time stamp in the co-located data collection spreadsheet.

Data Analysis

Each of the five hypotheses was tested using a One-Way Analysis of Variance test in the open source software PSPP with a significance level of 0.05.

Results

There were 76 responses to the survey which represents an outstanding response rate for a survey administered solely by non-direct contact between the researcher and respondents. The number of responses exceeded a pre-study goal of 68 responses. With the overall population of IT professionals in the United States being an estimated 4 million this response rate allows a confidence interval of 90% to be established with a 9.5% +/- margin of error.

There was a relatively rapid initial response to the survey over the first two days with a few residual responses over the remaining period the survey was open.

There appear to be no indications of extreme views that might result from a non-response bias. In addition, it was assumed that the results accurately reflect the population since there was a good distribution of respondents with varying degrees of experience, fields of employment, and work role in the IT field.

Test of Hypothesis H₁

Hypothesis H₁ stated (null): An IT professional's understanding of the principles of big data and related technologies is independent of his / her responsibilities in a managerial capacity.

This hypothesis was evaluated by comparing responses to question 5 and question 6 on the survey. Question 5 was “Do you occupy a role where you manage other IT staff?” Question 6 was “How would you categorize your understanding of big data?”

Based upon survey responses the respondents were divided into two groups, those who reported that they held a managerial role and those who said they did not. The One-Way Analysis of Variance of these groups had a p-value of .155, which is greater than the established significance level of .05. Based on these findings, the null is not rejected. The data produced insufficient evidence to conclude that being a manager has any impact on an individual's understanding of big data solutions.

Table 2: One-Way Analysis of Variance – Hypothesis H1

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	2.24	1	2.24	2.06	.155
Within Groups	80.12	74	1.08		
Total	82.36	75			

Table 3: Managerial Status by Big Data Understanding - Raw Data

		Big Data Understanding ¹					
		1	2	3	4	5	Total
Manager	Count	3.00	3.00	13.00	12.00	2.00	33.00
	Row %	9.09%	9.09%	39.39%	36.36%	6.06%	100.00%
	Column %	75.00%	33.33%	50.00%	46.15%	18.18%	43.42%
	Total %	3.95%	3.95%	17.11%	15.79%	2.63%	43.42%
Non-Manager	Count	1.00	6.00	13.00	14.00	9.00	43.00
	Row %	2.33%	13.95%	30.23%	32.56%	20.93%	100.00%
	Column %	25.00%	66.67%	50.00%	53.85%	81.82%	56.58%
	Total %	1.32%	7.89%	17.11%	18.42%	11.84%	56.58%
Total	Count	4.00	9.00	26.00	26.00	11.00	76.00
	Row %	5.26%	11.84%	34.21%	34.21%	14.47%	100.00%
	Column %	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	Total %	5.26%	11.84%	34.21%	34.21%	14.47%	100.00%

¹ *Big Data Understanding: 1-No Understanding, 2-Basic Understanding, 3-Familiarity, 4-Firm Understanding, 5-Understand Completely*

Test of Hypothesis H₂

Hypothesis H₂ stated (null): An IT professional's perception of the value of big data solutions is independent of his / her understanding of big data solutions. This hypothesis was evaluated by comparing responses to question 6 and question 8 on the survey. Question 6 was “How

would you categorize your understanding of big data?” Question 8 was answered using a Likert scale with values starting with “Strongly Disagree” going to “Strongly Agree.” The statement was: “I feel that big data solutions are worth the investment of time, resources, and money.”

Based upon survey responses the respondents were divided into five groups determined by their response to Question 6 assessing their understanding of big data solutions. The One-Way Analysis of Variance of these groups had a p-value of .205, which is greater than the established significance level of .05. Based on these findings, the null is not rejected. The data produced insufficient evidence to conclude that an individual's understanding of big data solutions impacts their perception of the value of big data solutions.

Table 4: One-Way Analysis of Variance – Hypothesis H2

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	3.78	4	.94	1.52	.205
Within Groups	44.01	71	.62		
Total	47.79	75			

Table 5: Big Data Understanding by Assessment of Big Data Value - Raw Data

		Value of Big Data Solutions ²					
Big Data Understanding ¹		SD	D	N	A	SA	Total
1	Count	.00	.00	2.00	2.00	.00	4.00
	Row %	.00%	.00%	50.00%	50.00%	.00%	100.00%
	Column %	.00%	.00%	14.29%	4.76%	.00%	5.26%
	Total %	.00%	.00%	2.63%	2.63%	.00%	5.26%
2	Count	.00	.00	3.00	4.00	2.00	9.00
	Row %	.00%	.00%	33.33%	44.44%	22.22%	100.00%
	Column %	.00%	.00%	21.43%	9.52%	11.76%	11.84%
	Total %	.00%	.00%	3.95%	5.26%	2.63%	11.84%
3	Count	1.00	1.00	4.00	17.00	3.00	26.00
	Row %	3.85%	3.85%	15.38%	65.38%	11.54%	100.00%
	Column %	100.00%	50.00%	28.57%	40.48%	17.65%	34.21%
	Total %	1.32%	1.32%	5.26%	22.37%	3.95%	34.21%
4	Count	.00	1.00	4.00	14.00	7.00	26.00
	Row %	.00%	3.85%	15.38%	53.85%	26.92%	100.00%
	Column %	.00%	50.00%	28.57%	33.33%	41.18%	34.21%
	Total %	.00%	1.32%	5.26%	18.42%	9.21%	34.21%
5	Count	.00	.00	1.00	5.00	5.00	11.00

		Value of Big Data Solutions ²					
Big Data Understanding ¹		SD	D	N	A	SA	Total
	Row %	.00%	.00%	9.09%	45.45%	45.45%	100.00%
	Column %	.00%	.00%	7.14%	11.90%	29.41%	14.47%
	Total %	.00%	.00%	1.32%	6.58%	6.58%	14.47%
Total	Count	1.00	2.00	14.00	42.00	17.00	76.00
	Row %	1.32%	2.63%	18.42%	55.26%	22.37%	100.00%
	Column %	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	Total %	1.32%	2.63%	18.42%	55.26%	22.37%	100.00%

¹*Big Data Understanding: 1-No Understanding, 2-Basic Understanding, 3-Familiarity, 4-Firm Understanding, 5-Understand Completely*

²*Value of Big Data Solutions: SD-Strongly Disagree, D-Disagree, N-Neutral, A-Agree, SA-Strongly Agree*

Test of Hypothesis H₃

Hypothesis H₃ stated (null): An IT professional's expectation of beneficial future development in the area of big data technologies is independent of his / her understanding of big data solutions. This hypothesis was evaluated by comparing responses to question 6 and question 10 on the survey. Question six is “How would you categorize your understanding of big data?” Question 10 was answered using a Likert scale with values starting with “Strongly Disagree” going to “Strongly Agree.” The statement was: “I believe that there will be significant development and improvement in big data technologies over the next five years.”

Based upon survey responses the respondents were divided into five groups determined by their response question number six assessing their understanding of big data solutions. The One-Way Analysis of Variance had a p-value of .001, which is less than the established significance level of .05. Based on these findings, the null is rejected. There is enough evidence to conclude that an individual's understanding of big data solutions impacts their perception of the value of big data solutions.

Since the null was rejected, the use of a Post-Hoc test following the One-Way Analysis of Variance is required to identify the groups between which there was the greatest difference.

The Post-Hoc Tukey Test was used to perform multiple comparisons of the means. Table 7 provides the results of the test. The p-value for big data understanding 1 vs. big data

understanding 4 was .003, and the p-value for big data understanding 1 vs. big data understanding 5 was .003. Since these values are below the established significance level of .05, it can be concluded that the differences between these groups are significant.

Table 6: One-Way Analysis of Variance – Hypothesis H3

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	6.39	4	1.60	5.06	.001
Within Groups	22.40	71	.32		
Total	28.79	75			

Table 7: Multiple Comparisons of Means / Tukey Test

(I) Big Data Understanding ¹	(J) Big Data Understanding ¹	Mean Difference (I - J)	Std. Error	Sig.	Lower Bound	Upper Bound
1	2	-.94	.34	.050	-1.89	.00
	3	-.77	.30	.091	-1.61	.08
	4	-1.15	.30	.003	-2.00	-.31
	5	-1.23	.33	.003	-2.15	-.31
2	1	.94	.34	.050	.00	1.89
	3	.18	.22	.928	-.43	.78
	4	-.21	.22	.870	-.82	.40
	5	-.28	.25	.795	-.99	.42
3	1	.77	.30	.091	-.08	1.61
	2	-.18	.22	.928	-.78	.43
	4	-.38	.16	.110	-.82	.05
	5	-.46	.20	.168	-1.02	.11
4	1	1.15	.30	.003	.31	2.00
	2	.21	.22	.870	-.40	.82
	3	.38	.16	.110	-.05	.82
	5	-.07	.20	.996	-.64	.49
5	1	1.23	.33	.003	.31	2.15
	2	.28	.25	.795	-.42	.99
	3	.46	.20	.168	-.11	1.02
	4	.07	.20	.996	-.49	.64

¹ Big Data Understanding: 1-No Understanding, 2-Basic Understanding, 3-Familiarity, 4-Firm Understanding, 5-Understand Completely

Table 8: Big Data Understanding by Assessment of Big Data Future Growth - Raw Data

		Future Growth of Big Data Solutions / Technology ²					
Big Data Understanding ¹		SD	D	N	A	SA	Total
1	Count	.00	.00	2.00	2.00	.00	4.00
	Row %	.00%	.00%	50.00%	50.00%	.00%	100.00%
	Column %	.00%	.00%	40.00%	6.25%	.00%	5.26%
	Total %	.00%	.00%	2.63%	2.63%	.00%	5.26%
2	Count	.00	.00	.00	5.00	4.00	9.00
	Row %	.00%	.00%	.00%	55.56%	44.44%	100.00%
	Column %	.00%	.00%	.00%	15.63%	10.26%	11.84%
	Total %	.00%	.00%	.00%	6.58%	5.26%	11.84%
3	Count	.00	.00	2.00	15.00	9.00	26.00
	Row %	.00%	.00%	7.69%	57.69%	34.62%	100.00%
	Column %	.00%	.00%	40.00%	46.88%	23.08%	34.21%
	Total %	.00%	.00%	2.63%	19.74%	11.84%	34.21%
4	Count	.00	.00	1.00	7.00	18.00	26.00
	Row %	.00%	.00%	3.85%	26.92%	69.23%	100.00%
	Column %	.00%	.00%	20.00%	21.88%	46.15%	34.21%
	Total %	.00%	.00%	1.32%	9.21%	23.68%	34.21%
5	Count	.00	.00	.00	3.00	8.00	11.00
	Row %	.00%	.00%	.00%	27.27%	72.73%	100.00%
	Column %	.00%	.00%	.00%	9.38%	20.51%	14.47%
	Total %	.00%	.00%	.00%	3.95%	10.53%	14.47%
Total	Count	.00	.00	5.00	32.00	39.00	76.00
	Row %	.00%	.00%	6.58%	42.11%	51.32%	100.00%
	Column %	.00%	.00%	100.00%	100.00%	100.00%	100.00%
	Total %	.00%	.00%	6.58%	42.11%	51.32%	100.00%

¹ Big Data Understanding: 1-No Understanding, 2-Basic Understanding, 3-Familiarity, 4-Firm Understanding, 5-Understand Completely

² Future Growth of Big Data Solutions / Technology: SD-Strongly Disagree, D-Disagree, N-Neutral, A-Agree, SA-Strongly Agree

Test of Hypothesis H₄

Hypothesis H₄ stated (null): An IT professional's perception of hype in regards to the market recognition of big data technologies is independent of his / her understanding of big data solutions. This hypothesis was evaluated by comparing responses to question 6 and question 9 on the survey. Question six is “How would you categorize your understanding of big data?” Question 9 was answered using a Likert scale with values starting with “Strongly Disagree” going to “Strongly Agree.” The statement was: “I believe that there is a significant amount of hype in the marketplace in relation to big data.”

Based upon survey responses the respondents were divided into five groups determined by their response question number six assessing their understanding of big data solutions. The One-Way Analysis of Variance had a p-value of .017, which is less than the established significance level of .05. Based on these findings, the null is rejected.

Since the null was rejected, the use of a Post-Hoc test following the One-Way Analysis of Variance is required to identify the groups between which there was the greatest difference.

The Post-Hoc Tukey Test was used to perform multiple comparisons of the means. Table 6 provides the results of the test. The p-value for big data understanding 3 vs. big data understanding 4 was .023. Since this value is below the established significance level of .05, it can be concluded that the differences between these groups are significant.

Table 9: One-Way Analysis of Variance – Hypothesis Four

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	6.68	4	1.67	3.25	.017
Within Groups	36.48	71	.51		
Total	43.16	75			

Table 10: Multiple Comparisons of Means / Tukey Test

		Mean Difference				
(I) Big Data Understanding ¹	(J) Big Data Understanding ¹	(I - J)	Std. Error	Sig.	Lower Bound	Upper Bound
1	2	-.50	.43	.773	-1.71	.71

		Mean Difference				
(I) Big Data Understanding ¹	(J) Big Data Understanding ¹	(I - J)	Std. Error	Sig.	Lower Bound	Upper Bound
2	3	-.35	.38	.896	-1.42	.73
	4	-.96	.38	.103	-2.04	.12
	5	-.68	.42	.484	-1.85	.49
	1	.50	.43	.773	-.71	1.71
	3	.15	.28	.981	-.62	.93
3	4	-.46	.28	.462	-1.24	.31
	5	-.18	.32	.980	-1.08	.72
	1	.35	.38	.896	-.73	1.42
	2	-.15	.28	.981	-.93	.62
	4	-.62	.20	.023	-1.17	-.06
4	5	-.34	.26	.691	-1.06	.39
	1	.96	.38	.103	-.12	2.04
	2	.46	.28	.462	-.31	1.24
	3	.62	.20	.023	.06	1.17
	5	.28	.26	.814	-.44	1.00
5	1	.68	.42	.484	-.49	1.85
	2	.18	.32	.980	-.72	1.08
	3	.34	.26	.691	-.39	1.06
	4	-.28	.26	.814	-1.00	.44

¹*Big Data Understanding: 1-No Understanding, 2-Basic Understanding, 3-Familiarity, 4-Firm Understanding, 5-Understand Completely*

Table 11: Big Data Understanding by Assessment of Hype related to Big Data - Raw Data

		Is There Significant Hype Related to Big Data ²					
Big Data Understanding ¹		SD	D	N	A	SA	Total
1	Count	.00	.00	2.00	2.00	.00	4.00
	Row %	.00%	.00%	50.00%	50.00%	.00%	100.00%
	Column %	.00%	.00%	16.67%	5.26%	.00%	5.26%
	Total %	.00%	.00%	2.63%	2.63%	.00%	5.26%
2	Count	.00	.00	1.00	7.00	1.00	9.00
	Row %	.00%	.00%	11.11%	77.78%	11.11%	100.00%
	Column %	.00%	.00%	8.33%	18.42%	4.17%	11.84%
	Total %	.00%	.00%	1.32%	9.21%	1.32%	11.84%
3	Count	.00	1.00	6.00	15.00	4.00	26.00
	Row %	.00%	3.85%	23.08%	57.69%	15.38%	100.00%
	Column %	.00%	50.00%	50.00%	39.47%	16.67%	34.21%
	Total %	.00%	1.32%	7.89%	19.74%	5.26%	34.21%
4	Count	.00	.00	3.00	8.00	15.00	26.00
	Row %	.00%	.00%	11.54%	30.77%	57.69%	100.00%
	Column %	.00%	.00%	25.00%	21.05%	62.50%	34.21%
	Total %	.00%	.00%	3.95%	10.53%	19.74%	34.21%
5	Count	.00	1.00	.00	6.00	4.00	11.00
	Row %	.00%	9.09%	.00%	54.55%	36.36%	100.00%
	Column %	.00%	50.00%	.00%	15.79%	16.67%	14.47%
	Total %	.00%	1.32%	.00%	7.89%	5.26%	14.47%
Total	Count	.00	2.00	12.00	38.00	24.00	76.00
	Row %	.00%	2.63%	15.79%	50.00%	31.58%	100.00%
	Column %	.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	Total %	.00%	2.63%	15.79%	50.00%	31.58%	100.00%

¹ *Big Data Understanding: 1-No Understanding, 2-Basic Understanding, 3-Familiarity, 4-Firm Understanding, 5-Understand Completely*

² *Significant Hype related to Big Data: SD-Strongly Disagree, D-Disagree, N-Neutral, A-Agree, SA-Strongly Agree*

Test of Hypothesis H₅

Hypothesis H₅ stated (null): An IT professional's perception of the maturity of big data and related technologies is independent of his / her understanding of big data solutions. This hypothesis was evaluated by comparing responses to question 6 and question 7 on the survey. Question six is "How would you categorize your understanding of big data?" Question 7 was answered using a Likert scale with values starting with "Strongly Disagree" going to "Strongly Agree." The statement was: "I believe that big data is a mature information technology framework."

Based upon survey responses the respondents were divided into five groups determined by their response question number six assessing their understanding of big data solutions. The One-Way Analysis of Variance had a p-value of .251, which is greater than the established significance level of .05. Based on these findings, the null is not rejected. The data produced insufficient evidence to conclude that an individual's assessment of big data being a mature information technology framework is based on their level of big data understanding.

Table 12: One-Way Analysis of Variance – Hypothesis Five

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	4.36	4	1.09	1.37	.251
Within Groups	56.27	71	.79		
Total	60.63	75			

Table 13: Big Data Understanding by Assessment of the Maturity of Big Data - Raw Data

		Maturity of Big Data ²					
Big Data Understanding ¹		SD	D	N	A	SA	Total
1	Count	.00	.00	3.00	1.00	.00	4.00
	Row %	.00%	.00%	75.00%	25.00%	.00%	100.00%
	Column %	.00%	.00%	11.11%	5.88%	.00%	5.26%
	Total %	.00%	.00%	3.95%	1.32%	.00%	5.26%
2	Count	.00	4.00	3.00	2.00	.00	9.00
	Row %	.00%	44.44%	33.33%	22.22%	.00%	100.00%
	Column %	.00%	14.81%	11.11%	11.76%	.00%	11.84%
	Total %	.00%	5.26%	3.95%	2.63%	.00%	11.84%
3	Count	1.00	14.00	7.00	4.00	.00	26.00
	Row %	3.85%	53.85%	26.92%	15.38%	.00%	100.00%
	Column %	25.00%	51.85%	25.93%	23.53%	.00%	34.21%
	Total %	1.32%	18.42%	9.21%	5.26%	.00%	34.21%
4	Count	1.00	5.00	12.00	8.00	.00	26.00
	Row %	3.85%	19.23%	46.15%	30.77%	.00%	100.00%
	Column %	25.00%	18.52%	44.44%	47.06%	.00%	34.21%
	Total %	1.32%	6.58%	15.79%	10.53%	.00%	34.21%
5	Count	2.00	4.00	2.00	2.00	1.00	11.00
	Row %	18.18%	36.36%	18.18%	18.18%	9.09%	100.00%
	Column %	50.00%	14.81%	7.41%	11.76%	100.00%	14.47%
	Total %	2.63%	5.26%	2.63%	2.63%	1.32%	14.47%
Total	Count	4.00	27.00	27.00	17.00	1.00	76.00
	Row %	5.26%	35.53%	35.53%	22.37%	1.32%	100.00%
	Column %	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	Total %	5.26%	35.53%	35.53%	22.37%	1.32%	100.00%

¹ Big Data Understanding: 1-No Understanding, 2-Basic Understanding, 3-Familiarity, 4-Firm Understanding, 5-Understand Completely

² Maturity of Big Data: SD-Strongly Disagree, D-Disagree, N-Neutral, A-Agree, SA-Strongly Agree

SUMMARY AND CONCLUSIONS

The study of big data related to its utilization in management contexts is a relatively new phenomenon since the creation data analysis related to big data has only been around for 10 – 15 years. As the technologies related to big data continue to evolve organically and from other existing technologies there will be specific methods to apply big data solutions to business problems. As such any research, which helps to guide decision-making in regards to identifying valid use cases and training for staff, will prove to be very beneficial.

Conclusions

The results from various statistical tests supported rejecting two of the five null hypotheses. Two nulls were rejected based on a One-Way Analysis of Variance. The first null rejected was for Hypothesis H3: An information technology professional's expectation of beneficial future development in the area of big data technologies is independent of his / her understanding of big data solutions. The second null rejected was for Hypothesis H4: An information technology professional's perception of hype in regards to the market recognition of big data technologies is independent of his / her understanding of big data solutions.

Hypothesis H₃ scored at .001 on the One-Way Analysis of Variance test. This result was well below the threshold of .05 which indicates a strong connection between big data understanding and expectation of future development in big data technologies. Follow-on use of the Tukey test confirmed this finding and identified the greatest differences occurring between the lowest level of big data understanding (1) and two highest levels of big data understanding (4 and 5).

Hypothesis H₄ scored at .017 on the One-Way Analysis of Variance test. This result placed it below the threshold of .05 which indicates a strong connection between big data understanding and recognition of hype related to big data technologies. Follow-on use of the Tukey test confirmed this finding and identified the greatest differences occurring between those responding with “Familiarity” and “Firm Understanding” as a characterization of their level of big data understanding.

Suggestions for Further Research

The findings of this study indicate that IT professionals are still becoming familiar with big data and related technologies. The study produced evidence that the more an individual knows about big data, the more they expect greater future developments and enhancements with the technology. With IT professionals expecting improvements in big data there is great optimism for the future of big data. The study also indicated a lot of future efforts are focused on big data.

Future research should focus more closely on the question of the maturity of big data solutions in an in-depth manner. Such a focused study could pinpoint if any issues exist with the tools used to build big data solutions or if there is an issue with the tools used to consume analytics derived from big data stores.

Another area of future inquiry could focus on the specific aspects of big data solutions that seem to generate the best return on investment. Enterprises could gain value by targeting efforts on big data solutions focusing on the key qualities identified in the study such as items like “gaining competitive advantage”, “customer retention”, and “product development.”

In terms of a technology-oriented study, updated research should be undertaken to see how many of the on-premise solutions identified by respondents moved to the cloud.

Finally, a research effort could be undertaken to examine the manner and methods by which big data acceptance and growth occurs in organizations. For instance, attention could be paid to the evolution of who fills the prime visionary role or what methods and techniques those individuals use to promote big data within their corresponding organizations.

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The Architectural Network for Protein Secondary Structure Prediction

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ABSTRACT

Over the past 25 years, the accuracy of proteins secondary structure prediction has improved substantially. Recently evolutionary information taken from the deviation of proteins in some structural family have again enhance prediction accuracy for all these residues predicted correctly is in one of the three sates helix, strands and others . The new methods developed over the past few years may be interesting in context of improvements which is achieved through combination of the existing methods. Evolutionary divergences profile posses' adequate information to improve protein secondary structure prediction accuracy. These profiles can also able to correctly predict long stretches of identical residues in other secondary structure. This sequence structure relationship may help to help to developed tool which can efficiently predict the protein secondary structure from its amino acid sequence.

KEYWORDS: Secondary structure, Evolution, Algorithm, Tool, programme

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Secondary structure is significantly determined by the hydrogen bonds made by biopolymers. That biopolymer was resolved by an atomic resolution structure. The building blocks of the secondary structure predicted from the information present into the amino acids sequences and analyzed through molecular modeling simulation. Proteins performed the major key role in almost all biometabolic process and their functional properties depend upon their structural folds (Yen-Ru Chen et al. 2008). Protein secondary structure prediction helps to determine a meaningful analysis of biological function. The linear sequence of amino acid means the primary structure is the basic information of a protein from which four state secondary structures can be predicted. Genome sequencing technologies now a day's widely used because it is relatively chief accurate and fast comparison with protein structure. Prediction from genome sequencing data linear amino acid chain can be determine by using various computational tools(Adams PD et al. 2013).Most accurate protein secondary structure prediction is a necessary step for improve modeling of a protein fold (Pirovano W and Heringa J. 2010) and determination of its biological function also (Sleator RD. 2012) for the prediction of three dimensional design (Das R. and Baker D.2008) and enzymatic function(Kiss G et al. 2013) as well as in drug design with development, we should model the secondary structure of a protein (Winter C et al. 2012). Linus Pauling accurately assumed the structural configuration of helixes and strands (Pauling L., and Corey R. B. 1951; Pauling L. et al. 1951).The theoretical concept of Pauling was verified with the first Xray structure published (Kendrew J.C. et al. 1960; Perutz M.F. et al. 1960). The Ramachandran angles present in the polypeptide chain and the rotation of the polypeptide backbone phi and psi bonds are described, which is present around the polypeptide. To determine the distribution of the R Ramachandran or torsion angles of a protein Ramachandran Plot is very much useful (Ramachandran G.N. et. al. 1963). Szent and his group already designed a method for the prediction secondary structure from a primary sequences (Szent-Gyorgyi A.G. and Cohen C. 1957) based on each twenty amino acids propensity values, The first generation productive method became very popular later the segment of amino acids residues are taken to calculate from the previously used propensity values (Rost B. and Sander C. 2000). Although the accuracy level reached just above 60% due to the imaginable algorithm applied to calculate the percentage of residue present in a protein which is helix strand and others. The result of

three state how partially some error due to some restriction of local information. So we should introduce some global informatics parameter into the local ones (Dickerson R.E et al. 1976). Multiple sequence alignment information can improve the secondary structure prediction level (Zvelebil M. J, 1987). The third generation method for this prediction is designed from this multiple sequence alignment information and this concept is applied into an automatic prediction method increases the accuracy level upto 70% but this alignment method require a large number of dataset with more advance time management algorithm (Rost B. and Sander C. 2000 and 1993). The evolutionary significant data are the key component of the data set which is used in this new method. Sequence contain more than 35% pairwise identical residues with more than hundred align residues have similar structure isolated from natural source (Rost B. 1999). The natural mutational process shows sequence divergence increases the stability against the environmental hazards. Most of the mutations result in proteins that will not protect against environment only by the formation of globular structure. Substitution with lower number of residues shows adaptation against the extreme condition of environment. Exchange of amino acids shows specificity means position specific profiling gives important and crucial information about structure. This evolutionary divergence data set was the major informative key password for the prediction of secondary structure of protein in third generation. The most successful logic applies for secondary structure prediction apply machine learning algorithm which maximize the relationship between the primary sequence between the protein and their corresponding secondary structure (Kabsch W and Sander C. 1983). The DSSP programme successfully predict and improve the accuracy level above 80% but it depends upon the sample of protein sequences and their coordinate data set (Rost B. 2001). The coordinate data set of few proteins was stored into protein data bank and their corresponding secondary structure prediction began. In 1980 the first deposited protein structure in protein data bank data base was in membrane protein, which contain membrane helix as well as β strand (Westbrook J.D. et al. 2003; Engelman DM et al. 1986). Later another way became very popular name homology modeling which can precisely predict both secondary and tertiary structure (Jones D.T. et al. 1992). Homology modeling accurately predicts the fold of corresponding structure by comparing closely related sequential data set deposited into the protein data bank (Sutcliffe M.J. 1987). Later in the 1990 the concept of

neural network and hidden Markov models were designed to improve the accuracy level of secondary structure predicted by homology modeling. Later it can be concluded that homology modeling based on the logical and theoretical concept neural network and hidden Markov models (Rost B. 1997; Rost B. 2001; Eyrich V A. 2001). Partially solving the protein fold gradually increases the accuracy level of secondary structure prediction are most important in protein chemistry. The prediction accuracy directly or indirectly affect on how protein are to be analyzed and annotated to specify proteome analysis (Cozzetto D et al. 2005; Rost B et al. 2004). Critical assessment of structure prediction (CASP) method which shows more accuracy than the other structure prediction model which directly can predict secondary structure from primary sequences (Westbrook JD et al. 2003). The structural information of secondary structure helps to predict three dimensional model as well as many protein represent numerous important information, these information of amino acids chain to determine their corresponding three dimensional structure. The explosive growth of sequence structural relationship information results the numerous growth of denovo prediction from sequence (Anfinsen C.B. 1973 and 1962). To determine secondary structure of a protein the de novo folding based approaches has been taken called state-of-the-art. Which is based on the sequence structural similarity present in to the structural data base and the similar fragments are assembled by using empirical intermolecular force fields. Such logical approaches have worked favorably in cases for smaller peptides (Bradley P et al. 2005; Raman S. et al. 2010; Lange O F. et al 2012). Our present effort for the better structural prediction enabled us for a clear assumption about the proteins' structure-function relationship. We have generated some software tools which more efficiently predict the stress withstanding abilities in a protein form its amino acid sequence. We also made an extensive effort to develop software for the secondary structure prediction from the sequence of a protein. Conclusively, studies on proteins structure can generate a strong base of understanding the organismal behavior/existence and speciation/species proliferation on course of long evolutionary period and even for the course of the coming period.

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**Instructional Leadership Practices
In Secondary Schools of Assosa Zone, Ethiopia**

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ABSTRACT

The purpose of the study was to investigate instructional leadership practices in secondary schools of Assosa zone, Ethiopia. In order to address the objectives of the study, a descriptive survey method was employed. The population of the study were 266 teachers and 12 principals. From this number of population, 141 teachers and 12 principals were used as a sample using simple random and comprehensive sampling techniques respectively. Data collected from these respondents was analyzed and interpreted using Percentage, one sample t-test, weighted mean and mean ranking. The finding revealed that, among instructional leadership functions, instructional leaders' role in communicating school goals, supervision and evaluation of instruction, monitoring of school progress, protection of instructional time, maintaining high visibility, are promoting professional development seemed at a level near to average. Whereas, coordination of the curriculum, providing incentive for teachers, and incentive for students were significantly low performed. Based on findings it is concluded that, instructional leadership practices in the zone seem to be poor. On top of the findings, recommendations are forwarded to address the challenges the principals' faced in their instructional leadership activities mainly focusing on empowering both principals and schools to foster instructional leadership practices in the secondary schools of the zone.

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KEYWORDS: Instructional dimension, Instructional function, Instructional leader, Instructional leadership, principal, professional development

1. INTRODUCTION

In line with the attention given to the quality education, the importance of instructional leadership is considered as a major vehicle for the change and educational development (Musaazi, 1988). With the increased value put on instructional leadership, what comes to vision is the school as an environment to change the productivity which depends mainly on the ability of instructional leaders to analyze existing conditions and future challenges, and implement strategies for attaining the goals (Ubben & Larry, 1997). On top of this, principals should be well qualified, competent, and experienced in performing instructional leadership functions; framing and communicating school goals, supervising and evaluating of instruction, coordinating of the curriculum, monitoring of student progress, protecting of instructional time, maintaining high visibility, providing incentive for teachers, promoting professional development, and providing incentive for learning (Hallinger & Murphy, 1987; Schiefelbein, 1990).

However, in implementing the above instructional activities and in bringing changes in the school systems as effective as possible, school principals may face many challenges; the divergent challenges and needs that evolved from discontinuous environmental changes including globalization introduce new trends of instruction in schools. This in turn will create challenging burden upon the effectiveness of school leaders, teachers, and students.

In this regard, to overcome the bottleneck challenges faced by principals and improve instructional leadership, there might be strategies used by principals. Instructional leaders to improve instructional leadership should do the following: design or establish completely accepted goals, able to keep and use a definitive records of progress of the school, disseminate leadership through the school members, develop sense of responsibility to the group, develop habit and skill of critical and self evaluation, and understand group process and awareness of values and skills in achieving them (Faunce, 1955).

Due to the fact, the government of Ethiopia has prepared a guide line which incorporate instructional leadership functions and criteria for recruitment and selection of competent principals at secondary schools with higher standard in academic readiness(post graduate), five year experiences in instructional activities and commitment aspects of teachers to be school principal (MoE, 2000).

In Ethiopia, although an attempt has been made to make the instructional leadership decentralized and professional, still a lot remains to be done in training and professionalizing principal ship. Owing to this fact, principals failed to play their pivotal instructional leadership role (MoE, 2013).

With regard to Assosa Zone, a substantial expansion of secondary education took place under ESDP II & III. Nevertheless, quality of secondary education in the zone is yet requiring much to be done. Thus, to improve this, school principals need to be well competent and effective in performing instructional leadership activities. Consequently, the preceding attempts would indicate that the conditions of secondary schools invite for appropriate instructional leadership which in turn calls for scientific study of major problems of secondary schools principals in instructional leadership.

Therefore, the study attempts to measure instructional leadership practices and challenges related to three dimensions of instructional leadership described in Hallinger and Murphy model's of instructional leadership: defining the mission, managing instructional program, and promoting school climate; and functions within dimension; framing and communicating school goals, supervising and evaluating instruction, coordinating curriculum, monitoring student progress, protecting instructional time, promoting professional development, maintaining high visibility, providing incentive for teachers, and providing incentive for students. Besides, the study identifies challenges affecting principals' instructional leadership practices and strategies used by principals to improve instructional leadership practices.

2. STATEMENT OF THE PROBLEM

Instructional leadership has a particular importance in educational administration because of its far reaching effects on the accomplishment of school programs, objectives, and educational

goals. In light of this, secondary school principals are expected to perform well with instructional leadership activities (MoE, 1994).

However, in implementing the instructional leadership to bringing changes in the school systems as effective as possible, school principals may face many challenges; the divergent challenges and needs that evolved from discontinuous environmental changes including globalization introduce new trends of instruction in schools. This in turn, will create challenging burden upon the effectiveness of school leaders, teachers, and students. To strengthen this idea, Morphet (1982) stated that principals in secondary schools face many challenges due to their position; their position is vulnerable to many types of challenges. For example, pressure from their super ordinates to meet the goals of the organization, from the teachers to meet their personal needs, and from the environments both internal and external. Similarly, McEwan (2003) also described five challenges affecting the effectiveness of instructional leadership. These are: lack of skill and training for principals, lack of teachers' cooperation, lack of time to perform instructional activities, lack of support from superintendents, and lack of vision, will or courage from principals toward instructional activities.

Research findings show that majority of school principals in Ethiopia, were trained in subject area, they have not been trained in professional disciplines that make principals in secondary schools face many challenges in performing instructional leadership activities as expected of them. For example, pressure from their super ordinates to meet the goals of the organization on the one hand and from the teachers to meet their personal need on the other (UNESCO, 2006).

Similarly, another local research indicated that most of secondary school principals did not have the required qualification for secondary school principal ship and they did not get educational leadership training which make them adequate in instructional leadership practice (Feseha, 2005). Further, Fekadu (2009), in his study indicated that principals were challenged by internal challenges such as lack of cooperation of teachers, shortage of instructional resources, lack of principals experiences in principal ship, and heavy work load, and external challenges like interference in principals' decision making process by superintendents, and

lack of technical support from the superintendent in performing instructional leadership practices.

Hence, as Assosa zone is one of the zones in Ethiopia is not free from lack of effective and efficient instructional leadership in secondary schools. This is found to be weakness in instructional supervision and implementation capacity of school principals (BGREB, 2013).

Though, from the above notions one may depict that the existing situation could affect the quality and practices of instructional leadership in secondary schools, until now there are not enough studies that can show the status of instructional leadership practices in Assosa zone.

Therefore, this study attempts to make an assessment on practices of instructional leadership in secondary schools of Assosa Zone, Benishangul Gumuz Region with the following basic questions:

1. To what extent are principals performing the functions of instructional leadership activities?
2. To what dimension of instructional leadership are principals giving more priority in instructional leadership practices?
3. What are the major challenges affecting principals in performing instructional leadership?
4. What are the strategies being used by school principals to improve instructional leadership practices?

3. OBJECTIVE OF THE STUDY

The general objective of this study is to assess the practice of instructional in secondary schools of Assosa zone, Benishangul Gumuz Regional state, Ethiopia. It also, intended to indicate strategies used by principals to improve instructional leadership practice at secondary school level.

Furthermore, the study has the following specific objectives:

1. To explore the extent to which principals are performing the functions of instructional leadership activities;

2. To identify dimension of instructional leadership principals are giving more priority in instructional leadership practices.
3. To identify the challenges affecting principals in performing instructional leadership activities and
4. To find out the strategies being used by school principals to improve instructional leadership practices.

4. REVIEW OF RELATED LITERATURE

Meaning instructional leadership

Different scholars' defines instructional leadership in different manner. Instructional leadership is a model of leadership which focuses on students learning and achievement through development of others, and also invests in capacity building by developing social and academic capital for students and all intellectual, professional capital for teachers (Harris et al, 2005; Leithood et al, in Dimmock, 1993). It is also a leadership that directly related to the process of instruction where teachers, learners, and the curriculum (Acheson & Smith in McEwan, 2003). To strengthen this idea sister Catherine Wingert in McEwan (2003) also sighted as: "instructional leadership is the creation of climate where the principal, faculty, students, parents, and school board are able to work together to accomplish the task of education". From the thoughts of scholars, one could deduce that instructional leaders (principals) should have to play instructional role to make the school effective. To do so, the principal should provide or arrange programs for teachers' professional development programs and must be knowledgeable about learning theories, effective instruction, and curriculum with the goal of improving teaching and learning activities to be performed effectively.

Model of instructional leadership

Hallinger and Murphy's Model

Hallinger and Murphy developed the instructional leadership model from examining the instructional leadership behaviours of school principals through collecting information from principals, school staffs and central administration supervisors, via a common questionnaire

and other school data to supplement instructional leadership behaviours. From the synthesis of questionnaire and the organizational information, Hallinger and Murphy (1987) created a framework of instructional management with three dimensions and eleven job descriptors. These dimensions and functions of instructional leadership are the dimension of defining the school mission includes the principal job descriptors of framing school goals and communicating school goals, dimension of managing the instructional program which involves working directly with teachers in areas related to curriculum and instruction, and dimension of Promoting a positive school learning climate that encompasses principal behaviours that protect instructional time, promote professional development, maintain high visibility, provide incentives for teachers, develop and enforce academic standards, and provide incentives for students (Hallinger & Murphy, 1987; Hallinger & Murphy in Miechelle, 2003).

3. Challenges for effective instructional leadership practices

Barriers or challenges that may hinder the effectiveness of instructional leadership might be associated with followers, leader, communication and other situational factors (Tilaye, 2009). Similarly, McEwan (2003) also described five challenges to the effectiveness of instructional leadership. These are: lack of skill and training; lack of teacher cooperation; lack of time; lack of support from superintendents, school board and community; and lack of vision, will or courage. Thus, there will be challenges; associated within the control of instructional leaders environment (Internal challenges) and beyond the control of instructional leaders environments (external challenges) to challenge the effectiveness of instructional leadership. Therefore, every challenge to the effectiveness of instructional leadership could not be beyond internal and external categories

4. Strategies to improve the effectiveness of instructional leadership

There might be different strategies in order to improve the effectiveness of instructional leadership. These are design or establish completely accepted goal; able to keep and use a definitive records of progress; disseminate Leadership throughout the school members; develop sense of responsibility to the group; develop habit and skill of critical and self-

evaluation, and understand group process and awareness of values and skill in achieving them (Faunce, 1955). Details are empowerment, professional development, delegation, effective communication, evaluation based management, and motivation.

5. RESEARCH DESIGN AND METHODOLOGY

To study the existing practices of instructional leadership in secondary schools of sampled woredas of Assosa zone, descriptive survey method was employed. This method is selected because it enables the researcher to describe what sort of relationship that would exist among different variables related to the topic under the study and it is also convenient to gather data from a relatively large scale of respondents at a particular time to arrive at better generalization of the existing situation. Strengthens this assumption Seyoum and Ayalew (1989) expressed that: “the descriptive survey method of research is more appropriate to gather several kinds of data of broad size”. 266 teachers and 12 principals of secondary schools of the seven woredas of the zone were the population of the research. From these 141 teachers and 12 principals were selected through random and comprehensive sampling techniques respectively as a sample.

The study was conducted by giving due attention on Hallinger and Murphy models of instructional leadership. In this study the dimension of instructional leadership in Hallinger and Murphy model's of instructional leadership: defining the mission, managing instructional programs, and promoting school climate. Functions within the dimensions: framing school goals, communicating school goals, supervising and evaluating instruction, coordinating curriculum, monitoring student progress, protecting instructional time, promoting professional development, maintaining high visibility, providing incentives for teachers, and providing incentives for students were measured. To measure this dimensions principal instructional management rating scale (five likert scale) which is formulated by Dr. Philip Hallinger was adapted. In addition, the challenges of instructional leadership and strategies to improve instructional leadership also addressed per the instruments developed by researcher per review of related literature for teachers and principals respectively.

Furthermore, though the instructional management rating scale regarding instructional leadership practice was tested by the author, pilot instrument composed of 63 items including

questions regarding challenges and strategies was asked to 25 teachers and 3 principals to indicate their observation in five likert scale and open ended items.

Besides to the questionnaire, a structured open ended 7 items was used for interview guide to collect data from woreda experts. Interview was selected to give an opportunity to the researcher and respondents' in securing wide range of information to support data collected through questionnaire. Statistical analysis like SPSS was used to analyse the collected data. Therefore, percentage for general background of the respondents', one sample t-test using weighted mean to indicate the extent principals are performing the functions of instructional leadership activities, and to show the dimensions of instructional leadership principals are giving more priority, and mean ranking to show the major challenges affecting principals instructional leadership in secondary schools of the zone.

6. PRESENTATION AND ANALYSIS OF RESULTS

The general objective of the study was to assess instructional leadership practice in secondary schools of Assosa Zone, Benishangul-Gumuz regional state, Ethiopia. Within this general objective, the first objective of this study was to investigate the extent principals are performing the functions of instructional leadership activities. To testify this, one sample t-test was employed and the results presented in table 1 and 2 blow:-

TABLE 1 - The Functions of Instructional Leadership Activities Performed By Principals As Viewed by Principals

Functions	N	Mean	SD	Std. Error Mean	T	df	Sig. (2-tailed)	Mean Difference
Framing school goal	12	19.2500*	4.15878	1.20054	3.540	11	.005	4.25000
Communicating school goal	12	18.5000*	3.84944	1.11124	3.150	11	.009	3.50000
Supervision and evaluation of instruction	12	18.7500*	2.98861	.86274	4.347	11	.001	3.75000
Coordination of the curriculum	12	17.7500*	4.07040	1.17502	2.340	11	.039	2.75000
Monitoring of student progress	12	17.0000*	3.01511	.87039	2.298	11	.042	2.00000
Protection of instructional time	12	17.0833	3.84846	1.11095	1.875	11	.088	2.08333
Maintaining high visibility	12	17.2500	3.64629	1.05259	2.138	11	.056	2.25000

Providing incentive for teachers	12	13.4167	3.72847	1.07632	-1.471	11	.169	-1.58333
Promote professional development	12	17.0833	4.54189	1.31113	1.589	11	.140	2.08333
Provide incentive for students	12	16.1667	5.30580	1.53165	.762	11	.462	1.16667

As can be seen the principals mean value in Table 1, the results of one sample t-test exhibited that principals demonstrated significantly relative higher mean scores in activities of instructional leadership functions such as framing school goals (19.25), communicating school goals (18.5), supervising and evaluating instruction (18.75), coordinating the curriculum (17.75), and monitoring of school progress (17.0) than the mean test value which was 15. This may show that principals were performing the functions of instructional leadership relatively at higher level mainly on framing school goals, communicating school goals, supervising and evaluating instruction, coordinating the curriculum, and monitoring of school progress functions significantly($p < .05$).

On the other hand, the results of one sample t-test demonstrated that principals were found at relatively average mean scores as mean test value in functions of instructional leadership activities such as protecting instructional time (17.08), maintaining high visibility (17.23), promoting professional development (17.08), and providing incentives for students (16.16). This may imply that, these functions were found to be performed at an average level which was not significant ($p > 0.05$). Where as providing incentives for teachers (13.41) performed at lower level.

Similarly, the extent principals are performing the functions of instructional leadership activities in secondary schools as viewed by teachers was examined using one sample t-test and the results are presented in Table 2 below.

TABLE 2 - The Functions of Instructional leadership Activities Performed By Principals As Viewed By Teachers

Functions	N	Mean	Std. Deviation	Std. Error Mean	T	Df	Sig .(2-tailed)	Mean Difference
Framing school goals	141	16.4681*	3.77123	.31760	4.623	140	.000	1.46809
Communicating school goals	141	15.0567	3.79619	.31970	.177	140	.859	.05674
Supervision and evaluation of instruction	141	14.7305	3.31852	.27947	-.964	140	.337	-.26950
Coordination of the curriculum	141	14.1702*	4.22739	.35601	-2.331	140	.021	-.82979
Monitoring of students progress	141	14.7730	4.55501	.38360	-.592	140	.555	-.22695
Protection of instructional time	141	14.8369	3.94357	.33211	-.491	140	.624	-.16312
Maintaining high visibility	141	15.0496	3.55232	.29916	.166	140	.868	.04965
Providing incentive for teachers	141	11.7943*	4.30368	.36244	-8.845	140	.000	-3.20567
Promote professional development	141	14.6525	4.09352	.34474	-1.008	140	.315	-.34752
Provide incentive for learning	141	12.9858*	4.28450	.36082	-5.582	140	.000	-2.01418

As indicated in Table 2, the results of one sample t-test shows teachers' ratings of framing school goals function mean score(16.46) was significantly higher than the mean test value (15). This may indicates that teachers are witnessing that principals were performing framing school goals function better than all instructional leadership functions they are supposed to do. On the contrary, teachers' ratings of coordinating of the curriculum (14.77), providing incentives for teachers (11.79) and providing incentives for students (12.98) mean score were significantly lower than the mean test value (15). This may indicates that teachers are witnessing that principals were performing coordinating the curriculum, providing incentives for teachers, and providing incentives for students of instructional leadership functions significantly at lower level among all instructional leadership activities they are supposed to do($P<.05$). On the other hand, teachers' mean

scores of instructional leadership functions such as communicating school goals (15.05), supervising and evaluating instruction (14.73), monitoring school progress (14.77), protecting instructional time (14.83), maintaining high visibility (15.04), and promoting professional development (14.65), are similar to that of the mean test value (15).

This might entail that teachers' observation of principals in the aforementioned functions of instructional leadership activities found nearly average or normal level. Therefore, the above results from both teachers and principals showed that principals' performance in Framing school goals and communicating school goal is better and it is above average. Whereas, principals performance in coordinating curriculum, providing incentive for students and providing incentive for students' is significantly low. Communicating school goals, supervision and evaluation, coordination of the curriculum, and monitoring progress seems inadequate. Principals' performance in communicating school goal, supervision and evaluation of curriculum, monitoring school progress, protecting instructional time, maintaining visibility, and promoting professional development is at average level.

The second purpose of this study was to investigate the dimension of instructional leadership given more priority in practice by principals of secondary schools in Assosa Zone. To testify this t-test using weighted mean was employed per the views of principal, teachers, and both in table 3 and 4 respectively below

TABLE 3- Dimensions of Instructional Leadership Practiced by Principals as Viewed by Principals

Dimensions	N	Mean	Weighted Mean	SD	Std. Error Mean	T	Df	Sig. (2-tailed)	Mean Difference
Defines the Mission	12	37.75	3.78*	7.387	2.13245	3.634	11	.004	7.750
Manages Instructional Program	12	53.50	3.57*	9.357	2.70101	3.634	11	.004	7.750
Promotes School Climate	12	81.00	3.24	14.973	4.32225	1.388	11	.193	6.000

As indicated in Table 3, the mean and weighted mean for each dimension was calculated. The results of one sample t-test demonstrate that defining the mission (3.78, $p = 0.004$), and managing instructional programs (3.57, $p = 0.004$) were given more priority in a significant manner respectively. Nonetheless, promoting school climate (3.24, $p = 0.193$) is the dimension of instructional leadership which was given least priority by principal in the zone as perceived by principals. Similarly, the dimension of instructional leadership given more priority in practice by principals as viewed by teachers was examined by one sample t-test using weighted mean and the result is presented as follows.

TABLE 4 - Dimension of Instructional Leadership Practiced by Secondary School Principals as Viewed by Teachers

Dimensions	N	Mean	Weighted mean	SD	Std. Error Mean	T	Df	Sig. (2-tailed)	Mean Difference
Define Mission	141	31.5248	3.15*	6.61878	.55740	2.736	140	.007	1.52482
Manage Instructional Program	141	43.6738	2.91	10.71547	.90241	-1.470	140	.144	-1.32624
Promoting School Climate	141	69.3191	2.77	14.14836	1.19151	-4.768	140	.000	-5.68085

As indicated in Table 4 the mean and weighted mean value for each dimension was calculated. The results of one sample t-test portray that the dimension of instructional leadership school principals giving more priority found to be defining the mission (3.15, $p=.007$) significantly at a level not far from expected average followed by managing instructional program (2.91, $p=.144$) at nearly an average level but not significant, and promoting school climate (2.77, $p=.000$) significantly at lower level below expected average in Assosa Zone. The results of the scores entail that both principals and teachers were corroborating that instructional leadership dimension principals were relatively giving priority in Assosa Zone was defining the mission

followed by managing instructional programs. Whereas, attention towards promoting school climate is significantly low.

TABLE 5 - Challenges Affecting Principals Instructional Leadership Practice as Viewed by Principals

Challenges	N	Mean	Ranks
Heavy work load on instructional leaders	12	4.3433	1
Lack of instructional materials	12	4.3333	2
Poor communication with superintendents	12	4.1000	3
Insufficient utilization of available instructional materials	12	4.0000	4
Shortage of time to perform instructional activities	12	3.8333	5
Unsatisfactory communication with staffs within the school	12	3.7500	6
Lack of in-service training in the area of instruction	12	3.6767	7
Inconsistent operation of instructional activities	12	3.6667	8
Interference by superintendents in decision making process	12	3.5833	9
Lack of courage and commitment by instructional leader to perform instructional activities	12	3.4167	10
Lack of cooperation of teachers	12	3.2500	11

As indicated in Table 5 the results of principals mean ranking of major challenges that affect principals instructional leadership practices exhibited that heavy work load (4.3433), lack of instructional material (4.3333), poor communication with superintendent (4.1000), insufficient utilization of available instructional materials (4.0000), and shortage of time to perform instructional activities (3.8333) were major challenges identified by principals that affect principals roles of instructional leadership activities. On the other hand, lack of cooperation of teachers (3.2500), lack of courage and commitment to perform instructional activities (3.4167), and interference by superintendent in decision making processes (3.5833) were the least challenges identified by principals in their instructional leadership practices. Similarly, teachers were asked to provide their testimony of major challenges that affect principals' instructional leadership practices.

TABLE 6 - Challenges that Affect Principals Instructional Leadership Practice as Viewed by Teachers

Challenges	N	Mean	Ranks
Lack of instructional materials	141	3.8298	1
Insufficient utilization of available instructional materials	141	3.8227	2
Poor communication with superintendent	141	3.5603	3
Lack of in-service training in the area of instruction	141	3.5319	4
Lack of courage and commitment by instructional leader to perform instructional activities	141	3.4468	5
Interference by superintendents in decision making process	141	3.3688	6
Inconsistence operation of instructional activities	141	3.2908	7
lack of cooperation of teachers	141	3.1986	8
Unsatisfactory communication with staffs within the school	141	3.0142	9
Heavy work load on instructional leaders	141	2.7730	10
Shortage of time to perform instructional activities	141	2.5957	11

As indicated in Table 6 the results of mean raking of major challenges that affect principals instructional leadership practice as perceived by teachers indicated that lack of instructional materials (3.8298), insufficient utilization of available instructional materials (3.8227), poor communication with superintendents (3.5603), lack of in-service training (3.5319), and lack of courage and commitment (3.4468) were major challenges identified by teachers that affect principals instructional leadership practice.

On the other hand, shortage of time to perform instructional activities (2.5957), heavy work load on instructional leaders (2.7730), and unsatisfactory communication with staffs within the school (3.0142) were the least challenges identified by teachers which affect principals' instructional leadership practices. The result suggest that both principals and teachers are corroborating that lack of instructional materials, insufficient utilization of available instructional materials , and poor communication with superintendents were major challenges affecting principals instructional leadership practices.

In addition, teachers and principals were asked to list if there are any more challenges related to instructional leadership that affect principals' instructional leadership practices in the secondary schools through open- ended questions. Respondents listed the challenges as lack of timely open discussion between teachers and principal, hesitation between teachers and principal, lack of required experience and qualification of principals for leadership position, high teachers turnover, mist behaviour of students, lack of separation of responsibilities

between principals and teachers, low community participation in instructional activities, schools structural problems: the schools consists three and four cycles in one compound, intervention of local political leaders in the instructional leadership activities, lack of experience sharing among schools, schools were not empowered to make decisions like hiring and firing of staffs, poor immediate feedback from superintendents, large class size, shifting of teachers from one school to other school by woreda without permission of schools, and almost all sampled schools were not equipped with plasma television.

Furthermore, woreda experts were asked about challenges affecting instructional leadership practices in secondary schools of the woreda, and responded that challenges affecting secondary school principals were different teachers' needs, high conflict among teachers, shortage of school budget, lack of principals' commitment on instructional activities, problem of principals time allocation on instructional and administrative activities, conflict between teachers and principal, lack of principals capacity and experience, heavy work load on principals, lack of teachers cooperation, large class size, interference of woreda, zone and regional offices in transferring teachers from school to school, high teachers turnover, shortage of instructional materials. The above results may show that the major challenges affecting instructional leadership practice in secondary schools of the zone were lack of instructional materials, principals poor communication with superintendents and teachers, insufficient utilization of available instructional materials, lack of training for principals, lack of required qualification and experience of principals for principal ship, school structural problem, lack of principals commitment and courage on instructional activities, interference of superintendents in principals decision especially in transferring teachers from schools, large class size, and principals heavy work load.

The last purpose of the study was to indentify the strategies used by secondary school principals to improve instructional leadership practices. To do this, open-ended question and interview guide were used. The result portrayed that principals used the strategies like discussion with teachers, students, and parents on instructional concerns, inviting concerned bodies to deal in the school problems and opportunities, using check list to see the progress of the students on the subject matter, teaching students using shift to solve class size problem, assigning diploma teachers at secondary school level until degree teachers were assigned by

woreda, and counselling and guiding students to improve instructional leadership practice in secondary schools of Assosa zone.

Summary, Conclusion and Recommendations

Summary of the Study

1. Results from respondents about the current practices of instructional leadership functions: framing school goals and communicating school goal and, protecting instructional time, maintain high visibility, supervision and evaluation curriculum, and promoting professional development were among instructional leadership functions performed by principals at a better and average level respectively. Whereas providing incentive for teachers and students was performed at lower level by principals.
2. Regarding the instructional leadership dimensions, the result indicates secondary school principals were practicing defining school mission at a level not far from expected average, followed by managing instructional program nearly at average level, and promoting school climate at lower level below expected average.
3. Per the result of mean ranking of challenges hindering principals' instructional leadership practices, lack of instructional materials, poor communication with superintendents and subordinates, lack and insufficient utilization of available instructional materials, lack of training in instructional areas, and lack of courage and commitment from both teachers and principals were found challenges faced by principals to accomplish instructional leadership roles. Moreover, large class size, hesitations between teachers and principal, lack of experiences by principals for principalship, high teachers turn over, school structure problem, poor immediate feedback from superintendents, and interference by superintendents in principals decision making were other challenges affecting principals in performing instructional leadership activities.
4. Finally, results from respondents demonstrate that secondary school principals used discussion with teachers, students, and parent, promoting education to public, inviting concerned bodies to deal with the school problems and opportunities, using checklist to see the progress of the students on the subject matter, teaching students using shift,

making students use available instructional materials properly, reinforcing students through different awards and assigning diploma teachers instead of degree until hired by the woreda education office as strategies to improve instructional leadership practices.

Conclusion

School principals as instructional leaders should accomplish instructional functions within the three major dimensions of instructional leadership; defining mission, managing instructional program, and promoting school climate in integrated manner for the very establishment of the school. In this regard, defining mission and framing school goal and which was not sufficiently communicated were among the dimensions and function of instructional leadership given more priority in practice respectively. Promoting school climate with their instructional functions were found overlooked dimension of instructional leadership by principals in the zone. Managing instructional program dimension with its functions seems performed at average level. Therefore, one may conclude that principals were found to be inadequate in performing instructional leadership practices by integrating functions in the three dimensions.

Had it been the practice in place, principals tried to employ strategies: shifting method of teaching, assigning diploma teachers, and preparing checklist to monitor student progress to reduce the impact of the major challenges; interference of superintendents in decision making process, large class size, heavy work load, poor inter and intra school communication, and lack of and insufficient utilization of instructional materials which may not add assort of value toward the improvement of instructional leadership practices in the school. This may show that principals were seemed unable to link the dimensions of instructional leadership and functions for the better expected outcome of the schools in the zone.

Recommendations

1. Success and failure of the schools depends on how principals perform the dimensions of instructional leadership; defining the mission, managing instructional program, and promoting school climate, and functions within the dimensions as effective as possible. In order to promote the existing practices of the cumulative dimension and functions within the dimension, woreda education office, zone and regional education bureau should

empower their subordinates (schools, principals, teachers, and students). This can be realized through designing sustainable and need based continuous professional development programs at woreda or/and zone level with special attention at school based and school focused principals professional development programs. This may enable principals to develop empirical and basic instructional leadership skills to perform instructional role effectively. Besides, community, woreda education office, zone education and capacity office, and regional education bureau should search for an opportunity to acquaint secondary schools with required level and standards of human and material resources to perform instructional practice adequately.

2. Regular monitoring and evaluation of instructional activities, and monitoring school progress are among the vital functions of instructional leadership. This may help to improve communication between and among school communities so as to foster the overall progress of school. To this end, principals, woreda education office, zone education and capacity building office, regional education bureau should establish a regular monitoring and evaluation system of the school system to follow and provide feedback for the success of school progress in the zone.

Rewards and incentives are among the strategies to implement organizational goal through shaping individuals and group behaviour. This should be done at a regular frequency based on the level of achievements of shared and communicated goal of school. Thus, woreda education office, zone education and capacity building office, regional education bureau, and secondary school principals should design appropriate motivation system to their immediate subordinates. This may lead to maintain progressive effectiveness of principals in performing instructional activities in courageous and commitment manner. This in turn may contribute to the very success of the school system at large.

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