

Educational Research and Reviews

Volume 11 Number 18 23 September, 2016

ISSN 1990-3839



ABOUT ERR

Educational Research and Reviews (ISSN 1990-3839) is published bi-monthly (one volume per year) by Academic Journals.

Educational Research and Reviews (ERR) is an open access journal that publishes high-quality solicited and unsolicited articles, in English, in all areas of education including education policies and management such as Educational experiences and mental health, the effect of land tenure system on resource management, Visualization skills and their incorporation into school curriculum, Gender, education and child labour etc. All articles published in ERR are peer-reviewed.

Contact Us

Editorial Office: err@academicjournals.org

Help Desk: helpdesk@academicjournals.org

Website: <http://www.academicjournals.org/journal/ERR>

Submit manuscript online <http://ms.academicjournals.me/>.

Editors

Dr. Peter W. Wong
Southern Cross University
Australia.

Associate Editors

Dr. Melissa Vick
School Of Education
James Cook University
Townsville,
Australia.

Dr. Maniam Kaliannan
Faculty of Administrative Science & Policy Studies
Universiti Teknologi MARA (UiTM)
Selangor,
Malaysia.

Dr. Tavis D. Jules
Cultural and Educational Policy Studies
School of Education
Loyola University Chicago
Chicago,
USA.

Dr. Adams Onuka
Centre for Peace and Conflict Studies (CEPACS)
University of Ibadan
Nigeria.

Dr. Yambo John M. Onyango
University of Eastern Africa
Kamagambo Adventist College Campus
Baraton,
Kenya.

Dr. Tolga Gök
Torbali Vocational School of Higher Education
Dokuz Eylül University
Izmir,
Turkey.

Assoc. Prof. Manjula Vithanapathirana
Faculty of Education
University of Colombo
Colombo,
Sri Lanka.

Dr. Ahmet Basal
Yıldız Technical University
Education Faculty
Foreign Languages Education Department
İstanbul,
Turkey.

Prof. Lazarus Ndiku Makewa
University of Eastern Africa
Baraton,
Kenya.

Prof. Ogunsakin R. Ebenezer
Department of Statistics
Ekiti State University
Ado Ekiti,
Nigeria.

Dr. A. Kadir Maskan
Dicle University
Ziya Gokalp Education Faculty
Department of Physics Education
Diyarbakir,
Turkey.

Dr. Mohd Akhtar Siddiqui
Institute of Advanced Studies in Education
Faculty of Education
Jamia Millia Islamia Central University
New Delhi,
India.

Editorial Board

Prof. García Mayo, María del Pilar

*Departamento de Filología Inglesa y Alemana y de Traducción e Interpretación
Universidad del País Vasco (UPV/EHU)
Paseo de la Universidad 5
Vitoria,
Spain.*

Prof. Frank Witlox

*Ghent University
Department of Geography
Gent,
Belgium.*

Prof. Georgios D. Sideridis

*University of Crete
Department of Psychology
Rethimno,
Greece.*

Prof. Andreas Veglis

*Department of Journalism and Mass Media
Aristotle University of Thessaloniki
Thessaloniki,
Greece.*

Prof. Mutendwahothe Walter Lumadi

*Curriculum & Instructional Studies
College of Education
UNISA,
South Africa.*

Dr. Miriam McMullan

*Faculty of Health and Social Work
University of Plymouth
Plymouth,
UK.*

Prof. Moshe Barak

*Graduate Program for Science and Technology Education
Ben-Gurion University of the Negev,
Beer Sheva,
Israel.*

Dr. Hiam Zein

*Psychology and Education
Lebanese American University
Chouran-Beirut,
Lebanon.*

Dr. Joel O. Eriba

*Faculty of Education
Benue State University
Makurdi,
Nigeria.*

Prof. Bingjun Yang

*School of Foreign Languages
Southwest University
Chongqing,
China.*

Dr. Ernest W. Brewer

*The University of Tennessee
Educational Administration and Supervision
Tennessee,
USA.*

Prof. Gail Derrick

*Regent University
School of Education
Virginia Beach,
USA.*

Dr. Evridiki Zachopoulou

*Department of Early Childhood Care and Education
Thessaloniki,
Greece.*

Dr. Francesco Pastore

*Seconda Università di Napoli
Italy,*

Dr. Syed Iftikhar Hussain Shah

*Technical Education and Vocation
TEVTA Secretariat
Lahore,
Pakistan.*

Dr. Ravi Kant

*College of Teacher Education
Maulana Azad National Urdu University
Darbhanga,
India.*

Dr. Dibakar Sarangi

*Directorate of Teacher Education and State Council for
Educational Research and Training
(DTE & SCERT)
Odisha,
India.*

Dr. Elisa Backer

*Faculty of Business
Federation University Australia
Australia.*

Dr. Ahmad Alkhaldeh

*Department of Curriculum and instruction
University of Jordan
Jordan.*

Educational Research and Reviews

Table of Contents: Volume 11 Number 18 23 September, 2016

ARTICLES

- Development and validity testing of belief measurement model in Buddhism for junior high school students at Chiang Rai Buddhist Scripture School: An application for Multitrait-Multimethod analysis** 1731
Thirachai Chaidi and Sunthorapot Damrongpanich
- Determination of the footballers' anger expression styles in terms of some variable at different universities and high schools in Turkey** 1741
Kazım NAS
- Factors hindering the deployment of female teachers to headship positions in public primary schools in Nambale Sub-County, Kenya** 1749
Joseph, O. Mukolwe, Okwara Michael and Ajowi, O. Jack
- The use of engineering design concept for computer programming course: A model of blended learning environment** 1757
Kasame Tritrakan, Pachoen Kidrakarn and Manit Asanok
- Effect of most-to-least prompting procedure on dressing skill of students with Autism**
- Galibiye ÇETREZ İŞCAN*, Elçin NURÇİN and Yeşim FAZLIOĞLU** 1766
Galibiye ÇETREZ İŞCAN, Elçin NURÇİN and Yeşim FAZLIOĞLU
- Pupils' error on the concept of reversibility in solving arithmetic problems** 1775
Syarifatul Maf'ulah, Dwi Juniati and Tatag Yuli Eko Siswono
- Elementary school leaders' perceptions of their roles in managing school curriculum: A case study** 1785
Azuraida Shahadan and Ron Oliver

Full Length Research Paper

Development and validity testing of belief measurement model in Buddhism for junior high school students at Chiang Rai Buddhist Scripture School: An application for Multitrait-Multimethod analysis

Thirachai Chaidi and Sunthorapot Damrongpanich*

Educational Research and Evaluation Department, Faculty of Education, Chiang Mai University, Thailand.

Received 1 August, 2016; Accepted 13 September, 2016

The purposes of this study were to develop a model to measure the belief in Buddhism of junior high school students at Chiang Rai Buddhist Scripture School, and to determine construct validity of the model for measuring the belief in Buddhism by using Multitrait-Multimethod analysis. The samples were 590 junior high school students at Buddhist Scripture School who selected using the multi-stage random sampling. Three-Choice Situational Buddhist Belief Test (Sbbd) and Five-Scale Buddhist Belief Test (Rbbd) were used for data collection. Data were analyzed by descriptive statistics, CFA, and MTMM. The findings showed that 1) the results of the second order confirmatory factor analysis for measuring the belief in Buddhism were correlated with the empirical data at a good level (Sbbd: $\chi^2/df = 1.141$, p-value = 0.146 and Rbbd: $\chi^2/df = 1.071$, p-value = 0.287), and 2) multitrait-multimethod analysis had construct validity at a good level ($\chi^2 = 33.664$, df = 26, p-value = 0.144, CFI = 0.999, TLI = 0.998, RMSEA = 0.022, SRMR = 0.032, $\chi^2/df = 1.294$). Both types of tests used for measuring the belief in Buddhism had convergent validity at a high level, discriminative validity at a moderate level, and reliability at a high level.

Key words: Belief in Buddhism, construct validity, second order confirmatory factor analysis, multitrait-multimethod analysis.

INTRODUCTION

The Belief in Buddhism has been a factor significantly influencing the peace of the society. In other words,

Buddhism has been associated with the life of the people for a long time. Although the society has been greatly

*Corresponding author. E-mail: suntonrapot.d@cmu.ac.th. Tel: +66780-8612.

developed in recent years, Buddhism still has an influence on the peace of the society (Glock, 1973). At individual level, Buddhism teaches people to love peace by developing their mental strength, viewing the world based on cause and effect, treating others with kindness, and being a mental refuge in order to face sufferings in life with courage, and these teachings lead to a peaceful life. At organizational level, Buddhism has laid concept foundation, good ideology, and control of people to behave according to the norms of society in order to build the unity to be able to live together in peace (Dowling, 2006; Hirota, 2004). When people have a strong belief in Buddhism, they will behave according to the teachings strictly. As a result, the belief in Buddhism is, in indeed, a factor that has an effect on peace in the society (Bronkhorst, 2000).

Measuring the belief in Buddhism is a study on the scope of the behavioral sciences since measuring on such belief is related to ideas and individual behavior (Pargament, 1995; Fukuyama, 1961). The results of previous studies indicated that measuring religious belief faces a lack of external validity. This is mainly because religious belief is a behavioral variable that has a wide scope, and easy to result in measurement errors due to a combination of several latent variables making the composition and behavioral indicators unclear. In the past, researchers measured several components by using only one method of measurement—rating scale (Hadaway and Penny, 2005). Although this research instrument is convenient and economical to collect the data, it is easy to be biased, and may not be appropriate for some features or indicators of certain elements. Measurement tools created are relatively specific since the research directions aim at specific groups. As a result, they cannot be used in conjunction with those of other groups, which have different qualifications, seniority or social contexts. Most importantly, the development of previous measurement tools for measuring a religious belief relied merely on examining content validity, and therefore cannot ensure whether the measurement results were fully met with the characteristic components of the religious belief (Siobhan and Voas, 2011; Dowling, 2006). This challenges many researchers to solve such problems by using the techniques of advanced statistical analyses to analyze the development results and test the validity of wide-scoped behavioral variable measurement tools (Jacobs and Roodenburg, 2014; Simsek et al., 2012; Mitte and Kampfe, 2008)

In order to develop the behavioral sciences measurement tools to meet standard, measurement validity is a factor that has a direct variation with other qualities of measurement tools. Consequently, validity quality is important for research measurement tools (Fraenkel and Wallen, 2006). To obtain the instruments developed for measuring wide-scope behavioral sciences variables, researchers can determine it through statistical

analysis in two ways. First, a confirmatory factor analysis (CFA) which is a technique that can provide evidence of measuring variables in behavioral sciences with various elements that are fully conformed to the theory or are appropriate with the samples by considering consistency of the empirical data (Sunthud et al., 2014; Marsh et al., 2013). In addition, the importance of the elements and indicators developed can also be confirmed through the weight of the components (Hull and Beaujean, 2011). Second, Multitrait-Multimethod Analysis (MTMM) is a technique for analyzing various matrix features and ways to measure through confirmatory factor analysis, which is a measurement that provides precise analytical results. This shows if the instruments can be measured according to the traits or not. It can also indicate if the variance of scores is a result of the measuring instrument or traits, by considering convergent validity. The results can also indicate if each feature can respond or suit the type of measurement regarding the comparison of the weight of elements. Moreover, this can also indicate which measurement can better classify the traits in each category by considering the discriminant validity and R^2 value to consider the reliability of the traits. It can be seen that MTMM analysis is a statistical method that could solve the problem in the past; it could fully measure wide-scope behavioral sciences variables with the highest efficiency (Christian et al., 2015; Byrne, 2012; Brian and Frederick, 2007).

Therefore, developing and testing the accuracy of the model to measure the belief in Buddhism by applying MTMM analysis should be concretely investigated in order to provide information for the development and promotion of the religious faith of the people in the society, and for the peace of the society in the future, especially for junior high school students at Buddhist Scripture School who would become leaders of Buddhist community in the future.

Objectives

Regarding the review of related literature, the purposes of this study are to

- 1) develop a model to measure junior high school students at Buddhist Scripture School, Chiang Rai province, belief in Buddhism since the elements and indicators of related literature are mostly specific.
- 2) to determine a constructive validity of the model for measuring the belief in Buddhism of junior high school students at Buddhist Scripture School in Chiang Rai province by using MTMM analysis.

Hypothesis

- 1) Model to Validation of belief to Buddhism

Measurement Model is in the harmony with of non-statistical significance of fit indices.

2) Model to Validation of belief to Buddhism Measurement Model of the construct validity by the convergent validity in weight coefficients the composition features. The higher the coefficient of weight composition measurement and discriminant validity in the correlation coefficient between the feature and correlation is low.

MATERIALS AND METHODS

Belief in Buddhism

Belief in Buddhism refers to the confidence of the people towards the Triple Gem, and the Law of Karma. As a result, people behave based on their belief such as performing good deeds, keeping the precepts, and practicing mindfulness meditation (Dowling, 2006). The Buddhist belief of the people in the society can be explained by the theory of the religiosity of Glock (1973), which explains the five factors that make humans religious: 1) intention to provide themselves with a better life, 2) the ideological steadfastness towards religion, 3) joining religious ceremonies, 4) receiving religious information, and 5) having values as a result of the above reasons. In addition, the increasing level of faith in Buddhism of the society, according to Hirota (2004), describes the causal relationship of the increasing level of Buddhist faith in four reasons: 1) adherence (satisfaction in look, praise, way of life, and consistency with the original concept); 2) receiving religious information; 3) consideration with wisdom; and 4) trials to prove these religious teachings. These mechanisms result in societal belief in Buddhism.

The survey findings of previous research on religious faith showed a variety of measuring elements both of the differences and similarities. For example, Hayes and Pittelkow (1993) measured the religious belief of 500 elderly Australian Christians on five elements. This includes the belief in God, life after death, devil, hell, and heaven using a rating scale. Meanwhile Hadaway and Penny (2005) measured the public's faith in Christianity in the United States on three elements—the belief in God, church and charity using a rating scale. Also, Siobhan and Voas (2011) measured the public's faith in Christianity of 1,600 people in England and Wales on three elements: the belief in God, life after death, and practices according to the teachings, using a five-point rating scale. It can be concluded that a measurement of faith in religion is a study of the uniqueness of each religion. It is the measurement on the dimension of faith, and practice on the principles of the religion. As a result, the elements of the study has no clarity on measuring elements since the religious belief is a wide-scope behavioral science variable. However, the synthesis results of previous Buddhist research can summarize the elements of measuring the belief in Buddhism into six components for conducting the research framework: the concept of confidence in the triple gem; the concept of Buddhist karma; adherence to Buddhist concepts/precepts; training to avoid passions; commitment on training mindfulness; and perseverance in the pursuit of knowledge.

All these findings revealed that previous research had not examined the quality of the research measurement tools in terms of construct validity which was especially important for measuring wide-scope behaviors. This made it impossible to know if measuring results fully met the traits required. Furthermore, the religious belief contains many features, and each feature is relatively different. However, previous research used only one form

of measurement rating scale. Although this form of measurement is convenient, economical, can collect large data, uses fewer data collectors, and the respondents are free to choose the answer, the measurement tool could be biased and may not be suitable for the traits of certain elements. If we add a situational measurement tool that has better ability to prevent biased answers from the respondents, this will result in a suitable measurement tool that can fit certain features. Consequently, if there is a review of the traits and behavior indicators regarding the belief in Buddhism in terms of measurement model, it will provide clarity, a variety of instruments to measure the Buddhist faith in a more tangible way, and serve as information for related personnel to use with policy planning. This will help to promote people's belief in Buddhism.

Multitrait-multimethod analysis (MTMM)

The findings of previous studies showed that many researchers attempted to solve validity problems of wide-scope behavioral science variables measuring results, and different latent variables by using advanced statistic techniques to analyze the development and validity testing of MTMM measurement tools (Jacobs and Roodenburg, 2014; Simsek et al., 2012; Mitte and Kampfe, 2008).

The confirmatory factor analysis technique for MTMM analysis is a way to test the construct validity of the invention in order to eliminate problems or limitations of traditional analysis of correlation. This is done by using confirmatory factor analysis to determine the results of the traits and elements of measuring methods to test the model in order to know how important it is for theoretical elements. In other words, it is a way to test construct validity by analyzing linear structure relationship for testing the characteristic variability and measuring methods or other unique traits aimed while studying. The analysis of MTMM can be divided into three parts: 1) to ensure the consistency between the measurement model and eight empirical data, statistical values, chi-square (χ^2), degree of freedom (df), statistical significance (p-value), comparative fit index (CFI), Tucker Lewis index (TLI), root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), and relative chi-square (χ^2/df) which provides information for determining the validity, clarity, and appropriateness between the measurement model and theories or traits (Steiger, 2007); 2) to verify convergent validity from the comparison between the weight of the elements (β) on traits and the measurement method. This indicates that the variability of the measurement scores obtained determines the result of the traits or the methods used to measure; and 3) to determine discriminant validity by comparing the matrix correlation coefficients and traits measured by the similar pattern. Regarding both considerations on validity, they provide the information on how to select appropriate and effective measurement for each component feature and individual components. In addition, MTMM analysis shows R^2 value of each element which is the reliability of the measurement traits (Christian et al., 2015; Byrne, 2012; Nussbeck et al., 2009; Brian and Frederick, 2007; Millsap, 1995).

The findings of previous studies shows that MTMM analysis is a wide-scope behavioral science validity testing which provides a detailed, precise, and effective analysis results. For example, Anthea et al. (2004) applied MTMM analysis to develop and test the model of optimistic attitude measuring instruments. It was found that MTMM analysis provides the information that shows validity of measurement tools, as well as the appropriateness of measurement tool model towards the traits, and this study is consistent with Simsek et al. (2012) who used MTMM analysis to test the validity of multiple personality measuring model of students in Germany and Turkey. The MTMM analysis provided the

Table 1. Discrimination and instrument reliability used for data collection.

Model	Traits	Item	No.	t-value	α
Situation Test (Sbbd)	Confidence in the Triple Gem	9	1-9	2.611 - 6.802	0.708
	Belief in the Law of Karma	9	10-18	2.514 - 13.759	0.825
	Adherence to Buddhist Concepts	16	19-34	3.013 - 8.138	0.792
	Training to Avoid Passions	10	35-44	2.913 - 12.209	0.781
	Commitment on Training Mindfulness	6	45-50	3.227 - 4.892	0.690
	Perseverance in the Pursuit of Knowledge	10	51-60	2.355 - 6.791	0.745
Total		60	1-60	2.335-13.759	0.937
Rating Scale Test (Rbbd)	Confidence in the Triple Gem	9	1-9	3.715 - 6.326	0.877
	Belief in the Law of Karma	9	10-18	2.677 - 4.762	0.770
	Adherence to Buddhist Concepts	16	19-34	3.395 - 11.011	0.857
	Training to Avoid Passions	10	35-44	4.236 - 8.759	0.873
	Commitment on Training Mindfulness	6	45-50	8.785 - 11.793	0.866
	Perseverance in the Pursuit of Knowledge	10	51-60	5.668 - 10.222	0.932
Total		60	1-60	2.677-11.793	0.963

$t_{(0.05, 58)} = 1.671$.

information on the measurement model in details, and indicated the priority of each feature of the model. Also, Samuel et al. (2013) used MTMM analysis to solve selection problems of complexed behavior instruments. It was found that MTMM analysis provided information to select the instruments suitable for complexed traits or large structures. Jacobs and Roodenburg (2014) used MTMM analysis to test the validity of the model to measure self-efficacy. It was found that MTMM analysis provided detailed information and was quick for determining construct validity of the measurement model. Using MTMM analysis provides advanced analytics in details and is more effective than any other methods to develop and test behavioral science variable measurement of a model. As a result, if MTMM analysis is used to develop and test the validity of the belief in Buddhism model. This will provide clarity in Buddhist belief study more concretely. This will also be used as data for the development and promotion of Buddhist faith of the people in order to promote peace of the society in the future.

Sample

The data providers of this study were the first to third year students of academic year 2015, at Buddhist Scripture School, under the Division of General Education, The Office of National Buddhism in Chiang Rai province. The sample size of this study was approximately ten times the estimated parameters in the model (Hair et al., 2010). There were 58 factor loadings needed for parameter estimation in the assumption model, and they were verified for content validity by experts in Buddhism. As a result, the minimum number of the sample would be 580 monks (58×10). In this study, a sample size of 590 monks was used in this study selected by multi-stage random sampling. The school and classroom level were used as unit sampling. It was found that most of the samples were 201 first year students, (34.07%), followed by 196 second year students (33.22%) and 193 third year students (32.71%).

Instruments

The research instruments included two Buddhist belief tests for

junior high school students at Buddhist Scripture School. The first test included 60 items of a three-choice situational Buddhist belief test (and a measure of faith in Buddhism; the respondents have to evaluate themselves, and the discrimination was relatively high and the t-value was between 2.514 to 13.759) and the reliability of the entire test (Alpha cronbach s alphas: α) was 0.937. The second test comprised 60 items of a five-scale Buddhist belief test. The respondents had to evaluate themselves which led to a relatively high discrimination (the t-value was between 2.000 to 11.793) and the reliability of the entire test (Alpha Cronbach's alphas: α) was 0.963. Details of the instruments used to collect the data are shown in Table 1.

Data collection and analysis

Data were collected from 590 high school students by cooperating with Buddhist Scripture School where sample were taken manually throughout a one-month period. The data were tested for answer integrity prior to the data analysis.

The data analysis to determine the development of the measurement model employed a second order confirmatory factor analysis using Mplus 7.4 program. The consistency between the developed measurement model and empirical data was considered by using relative chi-square (χ^2/df) that does not exceed 2 of the p-value, CFI, TLI that was greater than 0.950, RMSEA, and SRMR that was less than 0.050 (Steiger, 2007). It can be considered that a model consisting of indicators and elements having structural relationship could explain traits of the belief in Buddhism the junior high school students at Buddhist Scripture School. After that, the validity of the model was tested using Mplus 7.4 program. The consistency of empirical data and convergent validity was studied by comparing the weight of the components (β) between features and the measurement method. The weight of the feature was higher than the weight on the measurement method. This indicates that the variability of the measurement results is not a result based on the methods used to measure, but as a result of the features. The discriminant validity was studied by comparing matrix correlation coefficient of the features, which should be low, and has no statistical significance (Byrne, 2012). It can be considered that

the developed model has construct validity, and can explain the belief in Buddhism of the students at Buddhist Scripture School.

RESULTS

The key findings are summarized as follows:

1. The development of a model to measure the belief in Buddhism of junior high school students at Buddhist Scripture School.

When considering the consistency of the measurement model with empirical data, and from the statistics used to determine the validity of the model, the findings showed that the measurement results on the belief in Buddhism measured by 60 items of situational Buddhist belief test had Chi-Square (χ^2), 128.881; degree of freedom (df), 113; and p-value, 0.146. This indicated that the chi-square had no statistical significance, so this Buddhist belief measurement model using situational measurement was consistent with the empirical data. When the index was compared to the level of Comparative Fit Index (CFI), it was equal to 0.997, and Tucker-Lewis Index (TLI) was equal to 0.997. Both values were and close to one. In addition, RMSEA was equal to 0.015; SRMR was 0.029, which was less than 0.050; and relative chi - square (χ^2/df) was 1.141, which was less than two.

Regarding the analysis results of the Buddhist belief measurement model measured by rating scale, it was found that the chi - square (χ^2) was equal to 120.987, degree of freedom (df) was equal to 113, and a p-value was 0.287. It showed that the chi - square had no statistical significance which indicated that the model was consistent with the empirical data. CFI was equal to 0.999, TLI was 0.999, both values were high, and close to one. In addition, RMSEA was equal to 0.011, SRMR was equal to 0.021, which was less than 0.050, relative chi - square (χ^2/df) was equal to 1.071, which was less than two.

From above analysis results, both Buddhist belief measurement model were consistent with the empirical data based on fit index of the model in all respects (Steiger, 2007). This indicates that the hypotheses of the research were correct, and this feature shows a linear relationship from data analysis as shown in Figure 1.

2. The findings of the construct validity model of Buddhist belief measurement model of junior high school students at Buddhist Scripture School by analyzing MTMM.

When considering the consistency of the model with the empirical data using statistics to determine the validity of the model which included $\chi^2 = 33.664$, $df = 26$, $p\text{-value} = 0.144$ CFI = 0.999, TLI = 0.998, RMSEA = 0.022,

SRMR=0.032 and $\chi^2/df = 1.295$, the findings showed that χ^2 had no statistical significance. Also, when considering CFI and TLI, they were equal to is one, while RMSEA and the SRMR were lower than 0.050 which were according to the criteria of fit model (Steiger, 2007). It can be said that the model was fit to the empirical data at a good level.

Regarding the analysis of convergent validity, when considering the standard weight coefficients on traits of six variables measured by the Buddhism belief test, the situation type was between 0.837 to 0.987 with a statistical significance level of 0.010 ($p\text{-value} = 0.000$), and all variables had higher standard component weight coefficient on traits than on method of measurement ranging from 0.105 to 0.494. This was in accordance with the variables measured by the Buddhism belief test of six variables rating scale at standard component weight coefficients on traits between 0.728 to 0.863, and all variables also had higher standard component weight coefficients on traits than on the measurement method ranging from 0.455 to 0.627. It can be said that the two types of measurement had convergent validity at a high level since the variability of 12 variables measured by situational Buddhism belief test, and rating scale types result from the variability of the measurement traits than method of measurement (Christian et al., 2015). When comparing the standard component weight coefficients on traits measured by situational test (M1) with rating scale test (M2), it was found that all variables measured by situational test had higher scores than those measured by rating scale test. In conclusion, the situational Buddhism belief test had higher convergent validity than rating scale test. Detailed results are shown in Table 2.

Regarding the analysis of discriminant validity, when considering the relationship between the traits measured by calculating the same model, it was found that both Buddhism belief tests had discriminant validity at a moderate level. The correlation coefficients between traits of 15 pairs of the six traits measured by situational test (M1) were mostly related at a moderate level, ranging from 0.428 to 0.761. For the traits measured by rating scale (M2), it was found that all six traits, 15 pairs, were mostly related between moderate to relatively high level ranging from 0.549 to 0.815. When comparing the correlation coefficients between situational and rating scale test, it was found that all traits measured by situational test were lower than those measured by rating scale test. This indicated that situational test had lower correlation coefficients than those measured by rating scale (Christian et al., 2015). In conclusion, it can be summarized that situational test had higher discriminant validity than rating scale test.

When considering R^2 which represents the ability to explain the variability of latent variables in Buddhism belief that were coefficients of reliability of the traits

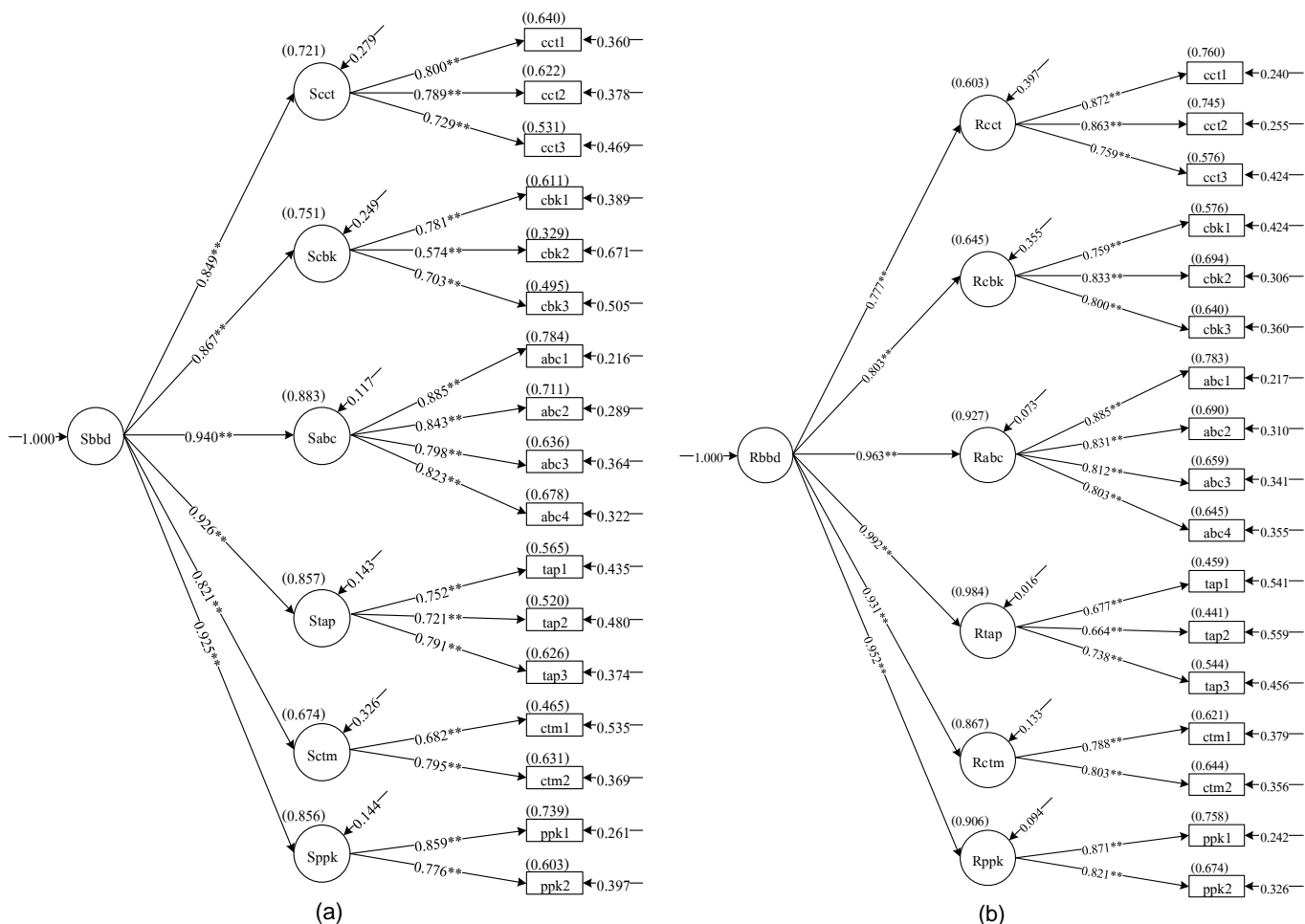


Figure 1. Second-Step Confirmatory Factor Analysis Model a) Situation Test b) Rating Scale Test. 1) ** refers to a p-value < 0.010 2) The number in parenthesis () refers to reliability 3) The values shown in the diagram is the STDYX standardization.

Table 2. Standard component weight coefficient (β) reliability (R2) and variability for considering convergent validity.

Characteristic factors	Traits						Method of measurement		R ²	Residual	
	CCT	CBK	ABC	TAP	CTM	PPK	M1	M2			
M1	Scct	0.918						0.309		0.939	0.610
	Scbk		0.837					0.494		0.945	0.055
	Sabc			0.960				0.105		0.933	0.067
	Stap				0.987			0.116		0.988	0.012
	Sctm					0.855		0.125		0.747	0.253
	Sppk						0.931	0.302		0.958	0.042
M2	Rcct	0.863							0.455	0.952	0.048
	Rcbk		0.876						0.467	0.985	0.015
	Rabc			0.739					0.627	0.940	0.060
	Rtap				0.742				0.563	0.868	0.132
	Rctm					0.728			0.570	0.855	0.145
	Rppk						0.760		0.589	0.925	0.075

$\chi^2 = 33.664, df = 26, \chi^2 / df = 1.295, p\text{-value} = 0.144, CFI = 0.999, TLI = 0.998, RMSEA = 0.022, SRMR = 0.032.$

Table 3. Reliability coefficient (R^2) and correlation coefficient for considering discriminant validity and reliability.

Characteristic factors	Traits					
	CCT	CBK	ABC	TAP	CTM	PPK
Reliability Coefficient R^2						
M1 (Sbbd)	0.939	0.945	0.933	0.988	0.747	0.958
M2 (Rbbd)	0.952	0.985	0.940	0.868	0.855	0.925
Correlation Coefficient						
Scct	1.00					
Scbk	0.761	1.00				
Sabc	0.636	0.569	1.00			
Stap	0.592	0.543	0.718	1.00		
Sctm	0.489	0.428	0.619	0.612	1.00	
Sppk	0.610	0.605	0.690	0.706	0.616	1.00
Rcct	1.00					
Rcbk	0.815	1.00				
Rabc	0.680	0.694	1.00			
Rtap	0.612	0.626	0.751	1.00		
Rctm	0.555	0.549	0.731	0.693	1.00	
Rppk	0.651	0.638	0.754	0.726	0.748	1.00

measured by both tests of Buddhism belief, it was discovered that these traits could explain the variability in the latent variables of the belief in Buddhism at a high level. R^2 was based on the features of the measure with a degree of negative situations ranging from 0.747 to 0.988. In other words, these variables could explain the unevenness in latent variables of approximately 75 to 99 percent, which is less than the traits measured by rating scale that could explain the variability in the variables of 85 percent to 99 percent. When comparing the reliability coefficients between the variables measured by situational test with those measured by rating scale, it was found that the situational test had R^2 in the Concept of Buddhist Karma (CBK), and the Perseverance in the Pursuit of Knowledge (PPK) was higher than the variables measured by the rating scale test. However, the Concept of Confidence in the Triple Gem (CCT), Adherence to Buddhist Concepts/Precepts (ABC), and Training to Avoid Passions (TAP) and the Commitment on Training Mindfulness (CTM) were lower. It can be concluded that rating scale test for measuring the belief in Buddhism had higher reliability than the situational test.

In summary, both tests on the belief in Buddhism had high construct validity. The convergent validity was at a high level. The discriminant validity was at a moderate level, and reliability at a high level. Detailed results are shown in Table 3 and Figure 2.

DISCUSSION

The results of the analysis of consistency between the

belief in Buddhism model and empirical data using Second Order CFA Model came out as predicted and the model was consistent with the empirical data. The situational and rating scale tests were consistent with the empirical data at a high level based on the criteria for determining the consistency of model and the empirical data (Steiger, 2007). The important factors may result from the collection of adequate and appropriate data to test the fit of the measurement model in the context of junior high school students at Buddhist Scripture School, which were consistent with the findings studied by Marsh et al. (2013). The model was fit to measure the context of the population or sample that affects the consistency between the measurement model and empirical data.

The standard component weight coefficients (β) of 17 observed variables measured by both tests showed that the results confirmed the importance of observed variables in latent variables. There were five consistent latent variables except for two variables in the law of karma that yielded different results. The results were inconsistent just as other variables in the measurement of the belief in Buddhism. The second latent variable concerning the Concept of Buddhist Karma (CBK) may be caused by the factors on different level of understanding related to the essence of karma in Buddhism of the students at the Buddhist Scripture School (Dowling, 2006; Hirota, 2004) and they may have experienced a biased situation, as well as choices on the situational test (McAllister and Guidice, 2012). In that situation, the choice of latent variables concerning karma may be too confusing or beyond the level of students' competence. For example, a student asked an abbot "I

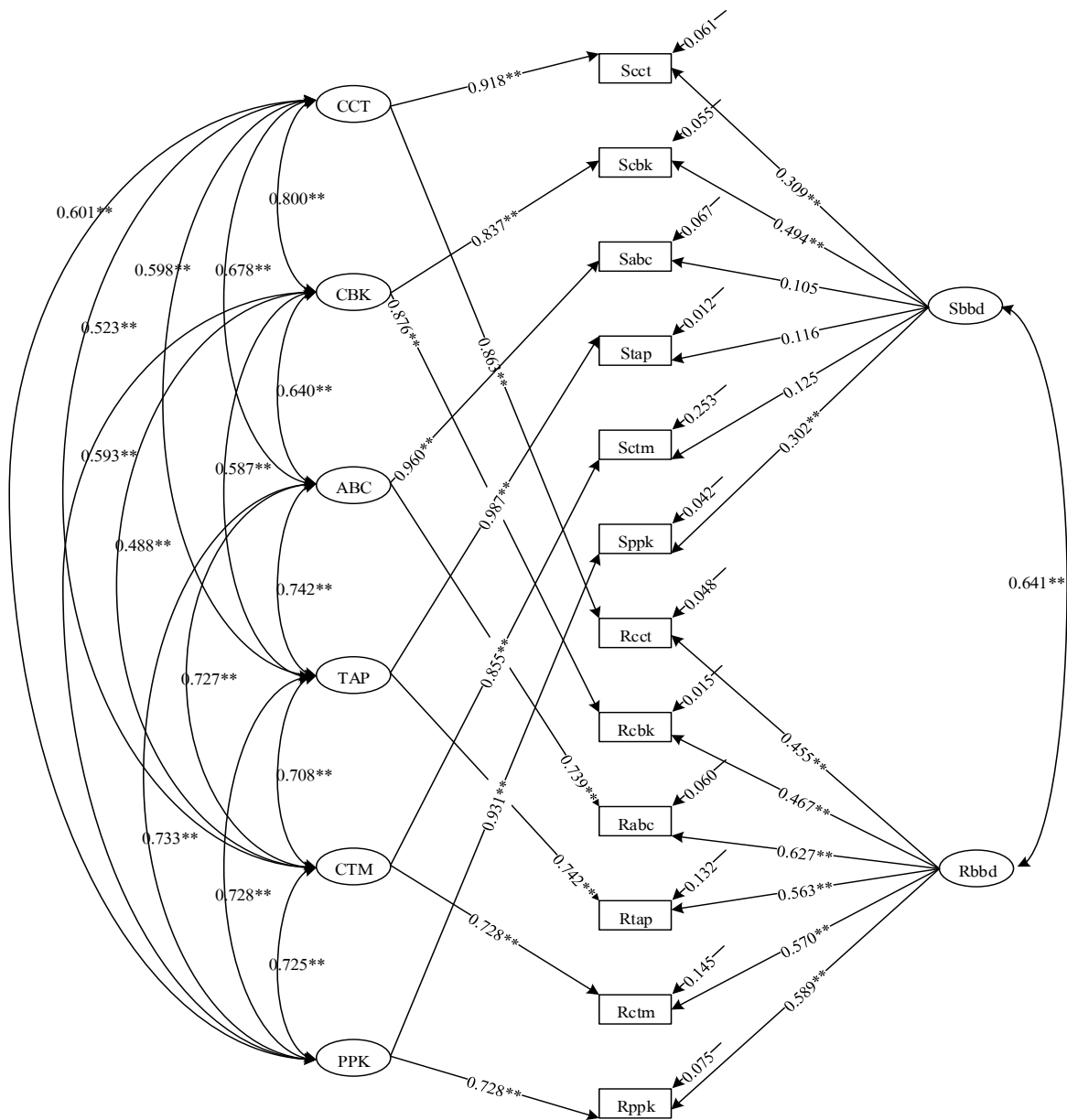


Figure 2. Multitrait-Multimethod analysis model. 1) ** refers to a p-value < 0.010 2) The values shown in the picture is the STDYX Standardization.

hired a gunman to intimidate my enemy, but the gunman missed the shot, and made my enemy's brother die. Would all the incidents happen to my family and that mistaken action make me a sinner? "

In addition, the standard component weight coefficients of latent variables on the belief in Buddhism in the confirmatory factor analysis of the second stage of the six variables measured by two tests confirms the importance of different variables. This may be because of the level of different standard component weight coefficients of

observed variables in each instrument. This may differently confirm the analysis results of the elements at the second stage (Sunthud et al., 2014).

The analysis of construct validity using MTMM analysis came out as predicted. The convergent validity and reliability were at a high level while discriminant validity was moderate. The high-level convergent validity resulted from the variability of scores from the Buddhism belief measurement. It was a result of the variability of latent variables in the model and not from measurement

methods (Byrne, 2012; Nussbeck et al., 2009). The moderate-level discriminant validity may result, principally from few traits and methods. The number of traits and appropriate minimum measurement methods for confirmatory factor analysis of MTMM include three features and three methods. On the other hand, there should be at least four traits and four methods and the percentage of correct analysis should increase. When the number of traits and measurement method increases the MTMM design would be large (6T x 6M, 7T x 4M, etc.) This model is a measurement of the belief in Buddhism. This study included only two methods of measurement. Indicators of the components or latent variables that may cause the above were partly a result of inappropriate element indicators elements leading to the likelihood of accurate analysis results. Each trait should consist of at least three indicators. Certain traits in the model of measuring the belief in Buddhism in this study included only two indicators, and this may be a factor resulting in moderate-level discriminant validity (Millsap, 1995).

CONCLUSION AND IMPLEMENTATIONS

The results of this study are suggested to be implemented on measuring the belief in Buddhism of junior high school students at Buddhist Scripture School, which consists of six traits and 17 observed variables, and they were consistent with the empirical data at a high level. Therefore, it is appropriate to use this model to measure and assess the belief in Buddhism of students at Buddhist Scripture School alone. If applying to other groups which may have a different context, the consistency with the empirical data should be checked every time prior to the use of the model in order to obtain an accurate information as possible which contributes to policy planning for the development and promotion of the belief in Buddhism in the society sustainably. In using these two types of tests, users should emphasize that test takers must use correct information to answer the questions as possible. They should stipulate the benefits of using true information such as selecting honest people to receive a scholarship. Another important aspect is the time management of taking both tests. They should be taken separately for at least one to two days so that the test takers would not be bored or stressed, and the conditions for the return of the tests should be placed. For example, if the test time does not exceed 30 minutes, they cannot submit the test. If conditions are not established, the test takers may not pay attention which would lead to incorrect information at a high level.

Moreover, if those involved in developing and promoting the belief in Buddhism of junior high students at Buddhist Scripture School need to measure the belief to serve as a guideline in planning to improve and promote the faith among such students who would be

leading in the future, they should use situational test as an instrument. However, if they need more detailed information, they should measure five traits of the belief in Buddhism: the concept of confidence in the triple gem, adherence to Buddhist concepts/precepts, training to avoid passions, commitment on training mindfulness, and perseverance in the pursuit of knowledge with situational and trait test. On the other hand, rating scale measurement is suitable for measuring the concept of Buddhist karma.

For future studies, this research is beginning to develop and test the reliability of the model in measuring the belief in Buddhism using Multitrait-Multimethod Analysis (MTMM). If there is a need for results analysis or more detailed information, the construct validity should be examined by the second or third order of MTMM, which would provide details of the moderating effects to contribute to further development of other factors that have influence on the belief in Buddhism and a variety of methods should be added to reduce the factors that cause errors in the analysis model, such as carrying out peers or teachers evaluation. Other forms may also be used, such as CTCU which is a MTMM model since the model has strength and resistance toward analysis errors more than CFA-CTCM model which was used in this study.

Conflict of Interests

The authors have not declared any conflict of interests.

ACKNOWLEDGEMENTS

The authors would like to thank the Buddhist Scripture School administrators in Chiang Rai province for their assistance in collecting the research data. They would also like to thank Asst. Prof Dr. Waraporn Erawan, Mahasarakham University, for providing helpful guidelines in solving certain issues in this study.

REFERENCES

- Anthea KH, David RF, John M (2004). Multitrait-multimethod confirmatory factor analysis of the attributional style questionnaire. *Personality and Individual Differences* 37(7):1483-1491.
- Bronkhorst J (2000). Karma and Teleology: A Problem and its Solutions in Indian Philosophy. *The International Institute for Buddhist Studies of the International College for Advanced Buddhist Studies (Tokyo)*.
- Brian AN, Frederick LS (2007). A Multitrait-Multimethod Validation of the Implicit Association Test. *Experimental Psychology*. 54:14-29.
- Byrne BM (2012). *Structural Equation Modeling With Mplus: Basic Concepts, Applications and Programming*. New Jersey: Lawrence Erlbaum Associates. pp. 285-311.
- Christian G, Jacob B, Ginger L (2015). Collapsing factors in multitrait-multimethod model: examining consequences of a mismatch between measurement design and model. *Front Psychol*. 6:946.

- Dowling TL (2006). Karma Doctrine and Sectarian Development, in Narain, A.K., Studies in Pali and Buddhism: A Memorial Volume in Honour of Bhikku Jagdish Kashyap. B.R. Publishing Corporation.
- Fukuyama (1961). The major dimens of chrch membership Review of Religious Reseach. *Torrance*. 2:154-161.
- Glock CY (1973). Religion in Sociological Perspective. Belmont. CA: Wadsworth.
- Hadaway CK, Penny LM (2005). How many Americans Attend Worship Each Week? An Alternative Approach to Measurement. *Journal for the Scientific Study of Religion*. 44(3):307-322.
- Hair JF, Black WC, Babin BJ, Anderson RE. (2010). Multivariate data analysis: A global perspective. (7th ed). New Jersey: Pearson Education Inc.
- Hirota D (2004). Karman: Buddhist concepts. in Jones. Lindsay. Encyclopedia of Religion. Second edition. Macmillan Reference USA.
- Hull DM, Beaujean AA (2011). Higher order factors of personality in Jamaican young adults. *Personality and Individual Differences*. 50(6):878–882.
- Jacobs KE, Roodenburg J (2014). The development and validation of the Self-Report Measure of Cognitive Abilities: A multitrait–multimethod study. *Intelligence* 42:5-21.
- Jacobs K E, Roodenburg J (2014). The development and validation of the Self-Report Measure of Cognitive Abilities: A multitrait–multimethod study. *J. Res. Personality* 42:5-20.
- Marsh HW, Lüdtke O, Nagengast B, Morin J S, Von Davier M (2013). Why item parcels are (almost) never appropriate: Two wrongs do not make a right, Camouflaging misspecification with item parcels in CFA model. *Psychological Methods* 18:257-284.
- McAllister D, Guidice RM (2012). This is only a test: A machine-graded improvement to the multiple-choice and true-false examination. *Teaching in Higher Education* 17(2):193-207.
- Millsap RE (1995). The statistical analysis of multiltrait–multimethod data: A Review. In *Personality research, method, and theory*. P.E. Shrout and S.T. Fiske. New Jersey: Lawrence Erlbaum Associates pp. 93-109.
- Nussbeck FW, Eid M, Geiser C, Courvoisier DS, Lischetzke T (2009). A CTC (M-1) model for different types of raters. *Methodology*. 5:88–98.
- Pargament (1995). The many meanings of religiousness: A policy-capturing approach. *J. Personality* 63:953-983.
- Samuel G, Andreas F, Sascha W, Philipp S, Martin, B, Romain M (2013). A multitrait–multimethod study of assessment instruments for complex problem solving. *J. Res. Personality* 41:579-596.
- Siobhan M, David V (2011). MEASURING RELIGIOSITY USING SURVEYS. Au Survey Question Bank: Topic Overview 4. UK Data Service.
- Simsek OF, Koydemir S, Schutz A (2012). A multigroup multitrait–multimethod study in two countries supports the validity of a two-factor higher order model of personality. *J. Res. Personality* 46(4):442-449.
- Steiger JH (2007). Understanding the limitations of global fit assessment in structural equation modeling. *Personality and Individual Differences*. 42(5):893-898.
- Sunthud P, Jaehoon L, Kristopher JP (2014). Ignoring Clustering in Confirmatory Factor Analysis: Some Consequences for Model Fit and Standardized Parameter Estimates. *Multivariate Behavioral Research*. 49:518-543.

Full Length Research Paper

Determination of the footballers' anger expression styles in terms of some variable at different universities and high schools in Turkey

Kazım NAS

Karamanoglu Mehmetbey University, Physical Education and Sports High School, Karaman, Turkey.

Received 16 June, 2016; Accepted 16 September, 2016

This research aims at revealing whether or not footballers' anger expression styles show an alteration in terms of different variables. The descriptive method which is one of the quantitative research methods was adopted as the research model. Research group consists of 154 footballers who play in 8 teams from 12 teams in fifth-group in the regional amateur league. "Personal Information Form" which was developed by researcher in order to determine personal characteristic of the footballers and "The State-Trait Anger Scale (STAS)", were used as data collection tools. Unique sample Kolmogorov Smirnov Test was used in order to see whether measurements were proper for normal dispersion. T-test and Anova (one way variance analysis) were used to analyze and interpret the data as it was a normal dispersion and tukey test was used in order to determine the differences among groups and meaningfulness was determined as $P > 0.05$. SPSS (Statistical package for social sciences) packet programme was used to evaluate the data and find the calculated values. It can be said that the trait anger point average of the footballers who participated in the research with (Mean=21.43), internalized anger point average (Mean=17.18), sub dimension of anger locution, and externalized anger point average (Mean=17,25) were low, but their controlled anger point average was mid-level with (Ort.=20.45). Meaningful difference was found in terms of personal characteristic on trait anger and anger types of participants' education status, Beginning Age of the Sports, Years of the playing football and Place of Residence variables ($P < 0.05$), whereas significant difference was not found on age, marital status, teams, father's job status, mother's job status, How many teams he played on and position at which they play variables ($P > 0.05$).

Key words: Anger, sports, football.

INTRODUCTION

Football, known as soccer in some parts of the world, is one of the most popular team sports, played by circa 300 million people all over the world. It also has the highest global television audience in sports. In football, there is

no direct relationship between the number of goals scored and the points earned along a match, in the end, it is just necessary to score one goal more than the opposing team to win a match (earning 3 points) or to

E-mail: veyselltemel@gmail.com, veyselltemel@kmu.edu.tr. Tel: +90.534.6661111, +90.338.226 219.

Authors agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

score the same number of goals for a draw (earning 1 point each). However, in most cases, scoring many goals make possible secures the win, and therefore, this is a major aim for each team. Of course, the opposing team that pauses its own objectives, will try to neutralize these efforts at the same time. This competition, this struggle, is the beauty of the game (Villa and Lozano, 2016). People, due to the pressure of the developing world, are confronted with a lot of emotions daily; in different situations such as fear, joy, sorrow, etc. One of them is anger (Baygöl, 1997). Anger is a natural emotion for human (Ustun et al., 1995). Anger which is important for human life, usually reveals the problems in the family, work, and health. Anger is a negative sense that is related to perception that shows variability in terms of severity and continuity, exposure to a sensual rise and a faulty behavior (Yavuzer, 1992).

Aggression is a multiply determined behavior deliberately chosen for the sake of destroying or damaging other persons or things and influenced by a range of biological, psychosocial, and contextual factors (Donnelly and Ward, 2015). Aggressive behaviors among athletes have increased especially in recent years, and this increase has affected schools that are a part of the community (Malhiwt al., 2014). Human aggression as any form of behaviour directed toward the goal of harming or injuring another living being who is motivated to avoid such treatment. The use of this definition in sport is problematic because behaviours that are integral to competitive success would be described as harmful or injurious (e.g. rendering an opponent unconscious in boxing) (Baron and Richardson, 1994). Using derisive words to others; insulting a person directly or indirectly, and expressing anger both with spoken words and body language (Köknel, 1986). In order to overcome anger, it is essential to determine not to suppress or hide it. It creates a lifelong loyalty with a major sense of dependency and belonging due to its competitive nature, and surprising outcome. For these reasons, football has become a passion for people through the ages as a sport branch that represents our impulses (Cengiz, 2014). The aim of this study is to show the importance of football in Turkey due to the deep interest of millions of people in it and its ability to unite different kinds of people. Violent and aggressive behavior in football is examined in this study as these characters are displayed both in and outside the pitch. The result of the study will be revealed and recommendations will be made.

METHODS

Research model

The research is a descriptive study. Descriptive statistics are statistical transactions that provide gathering, describing and presenting numeric values (Büyükoztürk, 2010).

Research group

Research group consists of 154 active athletes playing in 8 of the 12 teams in the group of 5. regional amateur league in the 2015 to 2016 football season and also are students studying at different universities in Turkey.

Data gathering

Firstly, existing data related to the aim of research was gotten from the literature. Thus, a theoretical frame for the study was established. Secondly, The State Trait Anger Scale (STAS), developed by Spielberger (1938), was to measure participants anger in points (Trans et al., 1997).

Data gathering devices

Devices and methods of data are given below.

Personal Information Form

Ten questioned personal information form was prepared by researcher with the aim of forming independent variables of research subjects and with the aim of gathering data about personal features of 154 active athletes playing in 8 of the 12 teams in the group of 5, regional amateur league in the 2015 to 2016 football season.

State trait anger scale (STAS)

The State Trait Anger Scale (STAS) was developed by Spielberg (1983). The purpose is to measure sense of anger and the way it is expressed via words and its continuity. The scale can be applied to adolescents, adults, and groups. It consists of 40 items. However, trait anger sub test was not translated into Turkish (Trans et al., 1997). State Trait Anger Scale is comprised of four sub-factors. These are; trait anger, introvert anger, extrovert anger and controlled anger sub tests. Trait anger (first ten items) measures anger actions and anger expressions strategies when there was no situation which can cause anger, introvert anger test (13th, 15th, 16th, 20th, 23rd, 26th, 27th and 31st items) measures suppression of anger on situations which can cause anger, on the other hand; extrovert anger sub test (12th, 17th, 19th, 22nd, 24th, 29th, 32nd and 33rd items) measures anger display and tendency to show aggressive behaviours, and anger control sub test (11th, 14th, 18th, 21st, 25th, 28th, 30th and 34th items) measures the level of anger control. The scale was developed in quartet Likert type and participants were asked to choose suitable option from "No description" to "Total description". Thus, each sub test has its own point. High points mean high levels of anger tendency. (Trans et al., 1997). In this study, internal consistency index (Cronbach Alpha) of trait anger type was found at 0.74 and expression of angry word type internal consistency index (Cronbach Alpha) was found at 0.63.

Analyzing data

T-test and Anova tests were used to analyze and evaluate the data, and meaningfulness was obtained as $P > 0.05$. SPSS 21 (Statistical package for social sciences) package programme was used on evaluating data and finding calculated values.

Table 1. Age, Marital Status and Team Distribution of Participant Sample Group.

Variables		n	%
Age	16-18	16	10.3
	19-21	38	24.7
	22-24	41	26.6
	25-27	22	14.3
	28-30	14	9.1
	31 ve +	23	15.0
Marital Status	Married	34	22.0
	Single	120	78.0
Teams	68 Aksaray Sports	19	12.3
	Akşehir Sports	18	11.7
	Anamur Municipality Sports	18	11.7
	Ceyhan Municipality FK	20	13.0
	Erdemli Municipality Sports	20	13.0
	Karaman Municipality Sports	21	13.6
	Konya Ereğli Sports	20	13.0
	Seyhan Municipali Sports	18	11.7

Personal features of research group

Data related to demographic features of football players and their interpretations are given. In Table 1, It is seen after examining participants' education status that 62% of them graduated from high school and 38% of them graduated from University. 10.4% of the participants has lived in the metropolis, 60.4% of them in the city, 22.7% in the town and 6.5% of them in the village. They also stated that while 11.1% of their fathers are officers, 22.7% of them are workers, 11.7% of their fathers are trademen, 31.8% are retired men and 22.7% are self-employed. While 20.8% of their mothers are working, 79.2% are not working. 10.4% of the participants' sports beginning age is between 5 and 7, 41% are between 8 and 10, 34% are between 11 and 13 and 14.2% are between 14 to 16 years. For the years of the playing football, 18.8% are between 4 to 6 years, 26.6% are between 7 to 9 years, 22.7% are between 10 to 12 years, 12.4% between 13 to 15 years and 19.5% are 16 years and above. On the number of teams played on, 21.4% played on between 1 to 2 teams, 22.7% between 3 to 4 teams, 25.3% between 7 to 8 teams and 15.6% have played on 9 teams and more. For the position played, 13% are goalkeepers, 19.5% are back players, 16.2% are stoppers, 32.5% are midfielders and 18.8 are forward players Table 2.

One-sample kolmogorov-smirnov tests

In this part, One-Sample Kolmogorov-Smirnov test table

is shown which indicates normal or non-normal distribution for analysis that are related to anger trait and angry word types of participant football players. In Table 3, it is seen that anger trait, introvert anger, extrovert anger and controlled anger sub dimensions are $p > 0.05$. This shows us that the data are suitable for normal distribution.

In Table 4, anger trait, introverted anger, extroverted anger and controlled anger sub dimensions are analyzed. Treat anger points of participants is found as $X = 21.43$. Accordingly, when maximum and minimum values are considered, (minimum is 10 and maximum is 40), the treat anger points $X = 21.43$ is found to be lower than the mean. So, it can be said that participants trait anger point is low. Introverted anger points of participants is found as $X = 17.18$. Accordingly, when maximum and minimum values are considered (min is 8 and max. is 32), it is concluded that the introverted anger point is below the mean. Extroverted anger points of participants is found as $X = 17.25$. When maximum And minimum values are considered (min is 8 and max. is 32), it is concluded that the extroverted anger point is below the mean. Controlled anger points of participants is found as $X = 20.45$. Accordingly, when maximum and minimum values are considered (min is 8 and max. is 32), it is concluded that the controlled anger point is below the mean. In conclusion, it can be said that participants' anger trait, introverted anger, extroverted anger and controlled anger sub dimensions points are low. In Table 5, participants' treat anger and anger wording sub dimensions point means are analyzed by t-test in order to know whether

Table 2. The distribution of related demographic features of participant sample group.

Personal Features of Participants		n	%
Education status	High School	95	62.0
	University	59	38.0
	Metropolis	16	10.4
Place of residence	City	93	60.4
	Town	35	22.7
	Village	10	6.5
Father's job status	Officer	17	11.1
	Worker	35	22.7
	Trademan	18	11.7
	Retired	49	31.8
	Self-Employed	35	22.7
Mother's job status	Working	32	20.8
	No working	122	79.2
Begining age of the sports	5-7 Age	16	10.4
	8-10 Age	63	41.0
	11-13 Age	53	34.4
	14-16 Age	22	14.2
Years of the playing football	4-6 Year	29	18.8
	7-9 Year	41	26.6
	10-12 Year	35	22.7
	13-15 Year	19	12.4
	16 and + Year	30	19.5
How many teams he has played	1-2 Teams	33	21.4
	3-4 Teams	35	22.7
	5-6 Teams	39	25.3
	7-8 Teams	23	15.0
	9 and +	24	15.6
Position he plays	Goal Keeper	20	13.0
	Back	30	19.5
	Stopper	25	16.2
	Midfielder	50	32.5
	Forward	29	18.8

Table 3. One Sample Kolmogorov-Smirnov test that indicates trait anger and anger wording types of participants.

Parameters	Trait anger	Introvert anger	Extrovert anger	Controlled anger
n	154	154	154	154
Mean	21.43	17.18	17.25	20.45
Std. Deviation	4.79	3.62	4.04	4.42
Kolmogorov-Smirnov Z	1.07	0.87	1.06	1.20
p	0.19	0.43	0.21	0.10

Table 4. Participants' results related to anger trait, angry words types scale subdimensions with total point.

Parameter	n	Mean	Ss	Min	Max	Max. and Min. points
Anger trait	154	21.43	4.79	10.00	34.00	10-40
Introverted anger	154	17.18	3.62	10.00	27.00	8-32
Extroverted anger	154	17.25	4.04	9.00	36.00	8-32
Controlled anger	154	20.45	4.42	9.00	32.00	8-32

Table 5. T- test results of participants education status variable of trait anger anger wording types scale subdimensions.

Parameter	Participants	n	\bar{X}	Ss	Sd	F	P
Trait anger	High School	95	21.20	4.32	152	5.058	0.442
	University	59	21.81	5.48			
Introverted anger	High School	95	17.69	3.69	152	1.450	0.027*
	University	59	16.37	3.37			
Extroverted anger	High School	95	17.10	3.93	152	0.494	0.550
	University	59	17.50	4.25			
Controlled anger	High School	95	20.50	4.12	152	1.576	0.857
	University	59	20.37	4.90			

they are different in terms of educational variable. At the end of the analysis, introverted anger dimension point mean is $X = 17.69$ for high school graduate players and $X = 16.37$ for University graduate players.

While there is no meaningful difference for anger trait, extroverted anger and controlled anger, a meaningful difference for introvert anger is found in terms of introverted anger dimension as for education status variable ($F: 1.45$; $p > 0.05$). In Table 6, participants' anger trait and anger wording sub dimensions point means are analyzed by F-test (Anova) in order to know whether they are different in terms of place of residence variable. At the end of the analysis, extroverted anger sub dimension point mean is $X = 16.0$ for those who mostly lived in the metropol, is $X = 17.29$ for those who mostly lived in city, and is $X = 16.77$ for those who mostly lived in town and is $X = 20.70$ for whom mostly lived in the village. While there is no significant difference for trait anger, extroverted anger and controlled anger, a significant difference for introvert anger was found in terms of place of residence variable ($F: 2.57$; $p > 0.05$). In Table 7, participants' anger trait and angry words sub dimensions point means are analyzed by F-test (Oneway Anova) in order to know whether they differ in terms of sports beginning age variable. At the end of the analysis, anger trait sub dimension point mean is $X = 18.5$ for those who started playing sport between 5 and 7, are $X = 22.2$ for those who

started playing sport between 8 and 10, are $X = 21.92$ for those who started playing sport between 11 and 13 are $X = 20.13$ for those who started playing sport between 14 and 16. A significant difference was found in terms of anger trait dimension for sport starting age variable ($F: 3.328$; $p > 0.05$). In Table 8, participants' anger trait and angry words sub dimensions point means are analyzed by F-test (Oneway Anova) in order to know whether they differ in terms of years of playing football variable. At the end of the analysis, controlled anger sub-dimension point mean is $X = 18.65$ for those who have played for 4 to 6 years, is $X = 19.70$ for whom has played for 7 to 9 years, is $X = 20.80$ for whom has played for 10 to 12 years, is $X = 22.15$ for whom has played for 13 to 15 year and is $X = 21.73$ for whom has played for 15 and + years. A meaningful difference was found in terms of anger trait dimension as for years of the playing football variable ($F: 3.027$; $p < 0.05$).

RESULTS AND DISCUSSION

Anger trait and anger words of the participants' average scores of the subscales in the survey was found out. At the end of this evaluation, as the footballers' anger trait point mean is 21.43, introverted anger point mean, anger wording sub dimension, is 17.18, extroverted anger type

Table 6. F - Test results of participants' place of residence variable of trait anger anger wording types scale subdimesions.

Parameter	Participants	n	\bar{X}	Ss	Sd	F	P	Difference
Trait anger	Metropolis	16	19.68	3.02	150	2.573	0.056	No
	City	93	21.55	5.28				
	Town	35	20.94	4.12				
	Village	10	24.80	2.52				
Introverted anger	Metropolis	16	16.18	2.63	150	2.144	0.097	No
	City	93	17.59	3.80				
	Town	35	16.20	3.42				
	Village	10	18.50	3.10				
Extroverted anger	Metropolis	16	16.00	2.78	150	3.230	0.024	4-1
	City	93	17.29	4.29				
	Town	35	16.77	3.65				4-3
	Village	10	20.70	3.09				
Controlled anger	Metropolis	16	21.75	5.06	150	2.327	0.077	No
	City	93	20.29	4.16				
	Town	35	21.14	4.71				
	Village	10	17.50	3.77				

Table 7. F-test results of participants' sport beginning age variable of trait anger anger wording types scale sub-dimesions.

Parameter	Participants	n	\bar{X}	Ss	Sd	F	P	Difference
Trait anger	5-7 Age	16	18.56	4.68	154	3.328	0.021	1-2
	8-10 Age	63	22.20	5.19				
	11-13 Age	53	21.92	3.39				
	14-16 Age	22	20.13	5.74				
Introverted anger	5-7 Age	16	15.50	2.94	154	1.879	0.136	No
	8-10 Age	63	17.65	3.26				
	11-13 Age	53	17.43	3.34				
	14-16 Age	22	16.50	5.18				
Extroverted anger	5-7 Age	16	16.00	3.18	154	0.625	0.600	No
	8-10 Age	63	17.28	4.11				
	11-13 Age	53	17.43	3.39				
	14-16 Age	22	17.68	5.67				
Controlled anger	5-7 Age	16	22.87	4.30	154	2.225	0.088	No
	8-10 Age	63	20.55	4.44				
	11-13 Age	53	20.03	3.87				
	14-16 Age	22	19.40	5.27				

point mean is 17.25 and controlled anger type point mean is 20.45, it is understood that point means are low when

max. and min. values are considered. This study shows no parallelism with Temel's PhD thesis (2015) on

Table 8. F-test results of participants' years of the playing football variable of trait anger anger wording types scale sub-dimensions.

Parameter	Participants	n	\bar{X}	Ss	Sd	F	P	Difference
Trait anger	4-6	29	22.75	4.39	154	1.376	0.245	No
	7-9	41	21.82	4.24				
	10-12	35	20.17	4.08				
	13-15	19	21.78	5.18				
	15 +	30	20.86	6.08				
Introverted anger	4-6	29	16.93	4.23	154	2.397	0.053	No
	7-9	41	18.39	3.45				
	10-12	35	15.94	3.85				
	13-15	19	16.78	2.67				
	15 +	30	17.50	3.05				
Extroverted anger	4-6	29	18.55	4.74	154	2.149	0.078	No
	7-9	41	17.75	3.38				
	10-12	35	15.97	3.43				
	13-15	19	16.26	3.66				
	15 +	30	17.46	4.69				
Controlled anger	4-6	29	18.65	4.02	154	3.027	0.020	2-3
	7-9	41	19.70	3.81				
	10-12	35	20.80	3.73				
	13-15	19	22.15	5.25				
	15 +	30	21.73	5.13				

physical education teachers for their anger point average which is at mid level, however, it is concluded that this study shows parallelism in that controlled anger and extroverted anger sub dimension point scale is low. In another study done by Temel et al. (2015), it shows no parallelism with this study in that participant teachers' anger trait point mean and controlled anger point mean, one of the anger trait and angry words sub dimension, are at mid level but it shows parallelism in that introverted and extroverted anger point means are low. When anger trait and angry words types were analyzed, significant difference can not be found on footballers' age, marital status, teams they played, Father's Job Status, Mother's Job Status, How many teams he has played and position he plays. But, according to the players' education status, it can be concluded that players who graduated from high school could not control their anger as well as players who graduated from university could not keep the anger inside. It can be said that education has an important effect on anger control.

The study done by Yıldız (2008), showed that no parallelism difference between footballers' education status and Introverted Anger were not found. On the other hand, it shows that there was significant difference between footballers' education status and trait anger,

controlled anger and extroverted anger. According to the footballers' place of residence, footballers living in the village displayed their anger more easily than the footballers living in the town. That's why there is an important effect of the social environment on anger. The study done by Yöndem et al (2008) shows that there is a meaningful difference between the point mean of students who live in cities and students' who live in the big cities. So, although there is no parallelism with this study about trait anger and extroverted anger, there is a parallelism between this study and introvert anger of Yöndem et al. study. According to the footballers' beginning age to the sports, Levels of the footballers' anger between 5 to 7 years are lower than footballers' between 8 to 10 years in terms of their anger levels. This is because they had just started, and the initial excitement was still at play. But it can be said that those who were neither too new nor too old, had higher anger levels (8 to 10 years), because they were adolescents; and their age influenced their anger management. The study done by Yıldız (2008) doesn't show parallelism with this study. Because there is no meaningful difference in terms of the footballers' anger trait, introverted anger, extroverted anger and controlled anger. Finally, according to the duration of the footballers playing, it can

be said that footballers having played for 7 to 9 years compared to footballers having played for 10 to 12 years can not control their anger in terms of controlled anger. According to Turker's study (2010), there were no significant difference between teachers whose mission time is different and trait anger, introverted and controlled anger. This result doesn't show parallelism with this study being done.

Conflict of Interests

The author has not declared any conflict of interests.

ACKNOWLEDGMENT

The author would like to thank Veysel Temel, Physical education and sports, for helping in the data acquisition.

REFERENCES

- Baron RA, Richardson DR (1994). *Human Aggression* (2nd ed.) Plenum Press, New York.
- Büyükoztürk S (2010). *data analysis handbook for social sciences*. Ankara: Pegem Academy Publications.
- Baygöl E (1997). *Investigation of Adolescent Anger Response*, Master, Bursa Uludag University.
- Cengiz D (2014). *Effect of the football and soccer supporter to social events; "Besiktas Fans Group: Bazaar"*. Master's Thesis. Bahçeşehir University. Istanbul.
- Donnelly PD, Ward CL (2015). *Oxford textbook of violence prevention epidemiology, evidence and policy*. Oxford, UK: Oxford University Press.
- Köknel O (1986). *Personoality from anxiety to the happiness*. Golden Books Publishing House, Istanbul.
- Malhi P, Bharti B, Sidhu M (2014). *Aggression in schools: psychosocial outcomes of bullying among Indian adolescents*. *Indian J. Pediatrics*, 81(11):1171-1176.
- Savaşır I, Şahin NH (1997). *Cognitive behavioral therapy and the assessment: Frequently used scales*. Ankara: Turkish Psychological Association Press.
- Temel V, Akpınar S, Birol SS, Nas K, Akpınar Ö (2015). *Determination of the Teachers' the level of anger and style in terms of some variables*. *Int. J. Soc. Res.* 40(8).
- Temel V (2015). *Problem solving skills, styles of making decision and anger types of physical education and sports teachers*. Published Doktrate Thesis, Karadeniz Technical University, Trabzon.
- Turker S (2010). *The determination of between conflict management strategies and anger and anger expression levels of the teachers*. Unpublished doctoral thesis, Sakarya University Social Science Institute, Ankara.
- Ustun B, Yavuzarslan F (1995). *The Power of Anger*, Hacettepe University School of Nursing Magazine, (2/2):42-46.
- Villa G, Lozano S (2016). *Assessing the scoring efficiency of a football match*. *European Journal of Operational Research* 255:559-569.
- Yavuzer H (1992). *Child Psychology*, Remzi Publishing House, Istanbul.
- Yıldız M (2008). *Determination of the footballers' in different leagues Trait anger-anger expression and the personality types*. Unpublished doctoral dissertation, Gazi University Health Sciences Institute, Ankara.
- Yöndem ZD, Bıçak B (2008). *Teachers' anger and anger I styles*. *Intl. J. Human Sci.* [Online]. 5: 2. Access: <http://www.insanbilimleri.co>.

Full Length Research Paper

Factors hindering the deployment of female teachers to headship positions in public primary schools in Nambale Sub-County, Kenya

Joseph, O. Mukolwe^{1*}, Okwara Michael² and Ajowi, O. Jack³

Jaramogi Oginga Odinga University of Science and Technology, Kenya.

Received 9 September, 2015; Accepted 22 December, 2015

Worldwide, women representation in management and leadership positions is marginal. Despite immense academic advancement by women, few of them do advance to management positions. In Kenya, women make up a critical portion of human resource base. However, they are grossly underrepresented at leadership positions. This situation is reflected in school leadership positions as well, including headship of schools. Unless the gender gaps in management and leadership positions are addressed, the talent of high skilled women would be underutilized and there might be a reproduction of gender inequality across generations. The purpose of this study was to examine the factors hindering the deployment of female teachers to headship positions in public primary schools. The main objective of this study was to establish the extent to which the two-thirds gender policy was being applied in deployment of female teachers to headship positions. This study was conducted in Nambale Sub-county. Descriptive survey design was used in this study. Out of a study population of 519 respondents comprising 45 head teachers, 45 deputy head teachers, 427 teachers drawn from 45 public primary schools in Nambale Sub-County, the District Education Officer (DEO) and District Quality Assurance and Standard Officer (DQASO), stratified sampling technique was employed to select 35 head teachers, 35 deputy head teachers and 196 teachers. Saturated sampling was used to select the DEO and the DQASO. Therefore, a sample size of 268 respondents, representing 52% of the study population was used in this study. Questionnaires, interview schedule guide and document analysis guide were used as instruments of data collection. Quantitative data were analyzed using frequency counts and percentages. Findings from the study revealed that the Ministry of Education provided for equal opportunities in terms of deployment but the two-thirds gender policy was not applied in deployment of teachers to school headship. Based on these findings, the study proposed that the Teachers Service Commission should come up with clear and precise deployment policies expressed in writing so that their compliance can easily be checked and the Ministry of Education should design a mechanism for implementing the two-thirds gender policy in deployment of teachers to headship positions.

Key words: Deployment to headship positions, female teachers, public primary schools.

INTRODUCTION

Globally, more women than ever are entering the labour force but majority of the top management positions in

almost all countries are primarily held by men. Female managers tend to be concentrated in lower management

positions and have less authority than men (Akpnr-posto, 2012; Australian Government, 2011; Barmao, 2013; Elborg-Woytek, 2013).

In spite of significant advances which women have made in many areas of public life in the last two decades in areas of education, they remain severely under-represented and are therefore still a long way from participating on the same footing as men in management and leadership of public educational institutions. In the year 2012, the global female labour force was estimated at 1.3 billion, about 39.9% of the total labour force, but greatly underrepresented in decision making and leadership in all areas. The consequence of this gender gap in leadership is that women do not participate fully in decisions that shape their lives, and therefore the countries are not capitalizing on full potential of almost one half of world's human resource available (ILO, 2012; Morley, 2013; World Bank, 2012).

World over, women have become the new majority in the highly qualified talent pool. In Europe and USA, women account for approximately six out of every ten University graduates and in the UK women represent almost half of the labour force (Davies, 2011). However, in U.S.A there is a paucity of women in executive roles (Elly et al., 2011; Kochanowski, 2010; Seliger and Shames, 2009). Although teaching profession in European countries is dominated by women, more so in public primary schools, their participation rate at senior management level is very low (Vassiliou, 2010).

In Uganda, women are still the minority as both heads and deputy head teachers despite the Ugandan constitution of 1995 stating that women shall have a right to equal treatment with men in regards to opportunities in political, economic and social activities. Although women have made important advances in upgrading their academic qualifications making them eligible for promotion to leadership positions, men still dominate administrative positions as both deputy and head teachers in public primary and secondary schools (Kagoda, 2011). The situation is not different in Nigeria where women marginally participate in governance and management of educational institutions and hence remain invisible in leadership positions. For example, in 2013, women held less than 14% of the total management positions in Nigerian Public sector (Oti, 2013).

In Kenya, women continue to be marginalized in many areas of society, especially in the sphere of leadership and decision making. According to a survey by the Ministry of Gender (2009), whilst only 30.9% of those employees in public service were women, 72% of these were in the lower cadres (Kamau, 2010). Moreover, the management of public primary and secondary schools,

including appointment of head teachers, deputy head teachers, senior teachers and heads of departments, shows a trend of general inequalities in gender representation in favour of men resulting in glaring gender gaps (Barmao, 2013; Onyango et al., 2011; Republic of Kenya, 2012a). Much as there is general recognition that there has been improvements in policy and legislative framework for gender equality in the world of work and enforcement of laws, the glaring gaps in top management positions still persist (Osumbah et al., 2011). For example, in Kenya, article 27(8) of the constitution obligates the state to implement the principle that not more than two thirds of members of elective or appointive bodies shall be of the same gender (Republic of Kenya, 2010a). However, of the 43 state corporative appointments so far made in Kenya, only 2 women had been appointed (Standard, 2014, January 18).

Women are grossly underrepresented in governance of public affairs in Kenya. In education, access of women to decision-making positions is minimal, so is representation of women. The Ministry of Education (MOE) in collaboration with its partners developed a gender policy in 2007 with an objective of addressing critical issues related to gender and education. The purpose of the policy was to provide a roadmap for MOE and stakeholders towards the achievement of gender parity in ensuring that both boys and girls, men and women, participate equally in learning and management of education at all levels (Republic of Kenya, 2007). Despite this gender policy, the management of both public primary and secondary schools in Kenya indicates a trend of male dominance (Parsaloi, 2012). Therefore, continued marginalization of women in top management positions is a paradox that merits systematic investigation. To this end, this study sought to establish the extent to which the two-thirds gender policy was being applied in deployment of female teachers to headship positions.

METHODOLOGY

This study adopted a descriptive survey design. The researcher adopted this design because a large population could be studied with only a portion of that population being used to provide the required data (Kothari, 2004). The study was conducted in Nambale Sub-county, Busia County, which at the time of study had two educational zones namely East North Zone with 27 public primary schools and Central Zone with 18 public primary schools giving a total of 45 public primary schools. Nambale sub-county was purposely sampled because female teachers were in the majority but underrepresented in headship positions.

The study population was composed of 45 head teachers, 45 deputy head teachers, 427 assistant teachers, drawn from 45 public primary schools in Nambale sub-county, the District Education

*Corresponding author. E-mail: josephmukolwe@gmail.com.

Table 1. Application of two-thirds gender policy in deployment of female teachers: Responses of male and female teachers.

Statement	Gender	SA		A		U		D		SD		Total	
		f	%	f	%	f	%	f	%	f	%	f	%
Deployment policy provides	M	29	33.9	21	35.6	0	0	17	28.8	1	1.7	59	100
Equal opportunities	F	29	26.9	24	22.2	7	6.5	24	22.2	24	22.2	108	100
Female teachers not benefiting	M	13	22	20	33.9	4	6.8	16	27.1	6	10.2	59	100
From equal opportunities	F	41	38	29	26.9	4	3.7	17	15.7	17	15.7	108	100
Female teachers discriminated	M	6	10.2	16	27.1	2	3.4	27	45.8	8	13.5	59	100
Compared to male teachers	F	4	38.9	36	33.3	6	5.6	15	13.9	9	8.3	108	100
Affirmative action policy	M	16	27.1	6	10.2	4	6.8	21	35.6	12	20.3	59	100
Ensures equal and fair evaluation	F	19	17.6	24	22.2	12	11.1	33	30.6	20	18.5	108	100

Key: F-Female, f-frequency, M-Male, SA-Strongly Agree, A-Agree, D-Disagree, SD-Strongly Disagree and U-Undecided.

Officer (DEO) (Nambale Sub-county) and District Quality Assurance and Standard Officer (Nambale Sub-county), giving a total population of 519 respondents. Stratified sampling technique was employed to select head teachers, deputy head teachers and assistant teachers. Saturated sampling was appropriate for selection of the DEO and the District Quality Assurance and Standard Officer (DQASO) because they are the only senior management officers who are directly concerned with policy implementation and deployment of head teachers at the Sub-County level. Questionnaires, interview schedule guides and document analysis guide were the instruments of data collection.

The instruments were validated by experts in the School of Education at Jaramogi Oginga Odinga University of Science and Technology. Two male head teachers and one female head teacher were used to pilot the interview schedule. The validity and reliability of the interview schedule was done through data triangulation. A pre-test was done through administration of questionnaires to 2 male head teachers, 1 female head teacher, 2 male deputy head teachers, 1 female deputy head teachers, 2 male teachers and 2 female teachers. Internal consistency reliability, a measure of consistency between different items of the same constructs to deliver reliable scores, was determined using Cronbach's Alpha Test. Data were analyzed by calculating frequencies and percentages.

RESULTS

The main objective of this study was to establish the extent to which the two-thirds gender policy was being applied in deployment of female teachers to headship positions. Respondents were asked to indicate their opinion on the extent to which the two-thirds gender policy was being applied in deployment of female teachers to headship positions using a five point Likert scale. Table 1 summarizes the responses of male and female teachers concerning the extent to which the two-thirds gender policy was applied in deployment of female teachers to headship positions.

The findings in the Table 1 show that 69.5% of the male teachers agreed that deployment policy provided equal opportunity while 30.5% disagreed with the statement. On the other hand, 49.1% of the female teachers agreed with the statement as 44.4% were in

disapproval. The findings suggested that the employment policy provided for equal opportunities as most, 50 (69.5%), of males and, 53 (49.1%), females agreed to this fact. These results were consistent with the gender policy in education of 2007 that stipulates gender equity and equality in recruitment, training, deployment and promotion, particularly in appointment of head teachers and deputy head teachers such that if the head teacher is male, the deputy is a female and vice versa (Republic of Kenya, 2007). The laws at present governing equal opportunities are enshrined in the constitution of Kenya-2010 but Osoro (2014) observed that women were not coming out to go for top leadership positions by taking advantage of the constitution that provided for equal space for everyone.

These indicated the need for formulation of equal opportunity policies that were distinct from those subsumed in the current constitution of Kenya. The absence of specific equal opportunity policies made it difficult to ensure equality of opportunity because there was no yardstick against which day to day practices could be measured. Moreover, respondents were asked to indicate whether female teachers were not benefiting from equal opportunity policy. 55.9% of male teachers agreed that female teachers were not benefiting from equal opportunity policy for deployment to headship positions as 37.3% objected that idea. As pertains to female teachers, 64.9% were in agreement as 31.4% were in disagreement with the statement. This implied that no deliberate effort was being made by the Teachers Service Commission (TSC) and the MOE to ensure gender sensitivity and practice of equal opportunity policy. These results confirmed that deployment policy provided for equal opportunities but female teachers were not benefiting from this policy.

Similar views were expressed in a study conducted by Moorosi (2010) on South African female Principals' career path who argued that the extent to which equal opportunity policy interventions for advancement of female teachers to principalship were put in place and

Table 2. Application of Two-thirds Gender Policy in Deployment of Female Teachers: Responses of Male and Female Deputy Head Teachers.

Statement	Gender	SA		A		U		D		SD		Total	
		f	%	f	%	f	%	f	%	f	%	f	%
Deployment policy provides	M	8	30.8	7	26.9	2	7.7	5	19.2	4	15.4	26	100
Equal opportunities	F	1	20	2	40	1	20	0	0	2	20	5	100
Female teachers not benefiting	M	5	19.2	11	42.2	3	11.6	4	15.4	3	11.3	26	100
From equal opportunities	F	3	60	1	20	0	0	1	20	0	0	5	100
Female teachers discriminated	M	6	23.1	2	7.7	1	13.8	16	61.6	1	3.8	26	100
Compared to male teachers	F	2	40	3	60	0	0	0	0	0	0	5	100
Affirmative action policy	M	1	3.8	3	11.5	2	27.7	12	46.2	8	30.8	26	100
ensures equal and fair evaluation	F	0	0	0	0	0	0	2	40	3	60	5	100

Key: F-Female, f-frequency, M-Male, SA-Strongly Agree, A-Agree, D-Disagree, SD-Strongly Disagree and U-Uncecided.

achieved were not explored. The findings revealed that equal opportunities policy was enshrined in the law but female teachers were not reaping the rewards of equal opportunity enactment. This could imply that policy makers were not aware of gender specific hindrances in accessing school headship positions so that they could come up with policies that were gender responsive. Even after formulating the policies there was need to put machinery in place for monitoring and evaluation to ensure that the right procedures were followed in selection and deployment to headship positions.

Female teachers who were discriminated as compared to their male counterparts in deployment to school headship was supported by 37.3% of the male teachers as 59.3% were opposed. On the other hand, 72.2% of the female teachers agreed with the statement as 22.2% were in disagreement. There was a sharp disagreement on this statement by male and female teachers. A study conducted by Tsikata (2009) became important in this disagreement of opinions between male and female participants in the study sample. Tsikata (2009) asserted that indirect discrimination against women could occur when laws, policies and programmes were based on seemingly neutral criteria which in the actual effect had a detrimental impact on women. Gender neutral laws, policies and programmes unintentionally could perpetuate the consequences of past discrimination. Tsikata (2009) added that they could have been inadvertently modeled on male lifestyles, and thus failed to take into account aspects of women's life experiences which could have been different from those of men.

Following the same line of argument, Kamau (2010) pointed out that women were not always targeted for discrimination but were sometimes overlooked or not encouraged, mentored or supported and hence discrimination could have been therefore by default rather than by design. It could also have been as a result of prejudice about women's qualifications. The findings could suggest that although there was no open discrimination in terms of deployment to school headship, there could

have been direct discrimination disguised in the requirements for deployment as there were no documented policies on equality of opportunity in deployment of teachers to headship positions by TSC. Therefore, TSC was not playing a proactive role in the goals of equality of opportunity in deployment of head teachers.

Male respondents who supported the idea of affirmative action policies ensuring equal and fair evaluation for deployment to headship positions formed 37.3% as 59.3% were not in support. Similarly, 39.8% of female teachers agreed with the statement as 49.1% were in disagreement. The findings from this data agreed with the general picture painted in the literature about the extent to which the two-thirds gender policy was being applied in advancement of women to leadership positions (Jane, 2014; Kagoda, 2011; Kaimenyi et al., 2013). This puts to doubt the effectiveness of the affirmative action policies in place. There could exist excellent policies on paper but they do little to advance qualified women into leadership. On leadership representation generally, the law was largely faithful to the principle of "no more than two thirds of one" gender in elective and appointive public positions. However, the affirmative action provisions have not helped female teachers to get leadership positions of public primary schools in the sub-county.

Table 2 presents a summary of the responses of male and female deputy head teachers concerning the extent to which the two-thirds gender policy was applied in deployment of female teachers to head ship positions. The findings in Table 2 showed that 57.7% of the male deputy head teachers perceived that deployment policy provided equal opportunities while 34.6% disagreed with the statement. On the other hand, 60% of female deputy head teachers agreed with the statement as 20% were in disapproval. The limited representation of women in school headship positions raised the questions about the effectiveness of equal opportunities policy and could have suggested its absence. The Chapter 27 of the constitution of Kenya-2010 provides for equality of rights and fundamental freedoms between men and women

including equal opportunities in political, economic, cultural and social spheres and outlaws discrimination on any grounds (Republic of Kenya, 2010a). Although Kenyan government has scored well on formulating measures to address gender imbalance in leadership positions, it has failed to implement them to address the gender disparities in leadership of public primary schools in Nambale sub-county. In education, the Gender Policy in Education of 2007 gave recognition to equal opportunities (Republic of Kenya, 2007). However, these two mainstream legal documents were general and largely gender neutral and made no specific reference to female teachers or any affirmative measures to increase female teachers in participation of leadership of public primary schools.

With reference to female teachers not benefiting from equal opportunity policy, 61.4% of male deputy head teachers supported it as 27% disagreed with it. As 80% of female deputy head teachers agreed with the statement, 20% disagreed with it. Although in theory the merit principle is used to guide the selection of head teachers by TSC, most positions are filled on basis of trust and rapport or patronage (Republic of Kenya, 2012b). Despite the fact that the legislation required to improve gender equality was enshrined in the constitution of Kenya-2010, female teachers in the sub-county were still not having equitable access to leadership positions. This tended to undermine the rights and privileges already granted to women within the constitution. It could therefore be concluded that in principle the government supports gender equality but in practice there were no structural framework to promote it. Equal opportunity laws have proved inadequate to ensure equality in leadership positions of public primary schools in the sub-county.

Female teachers discriminated against compared to their male counterparts was supported by 30.8% of male deputy head teachers as 65.4% disagreed with it. As 100% of female deputy head teachers agreed with the statement, none disagreed with it. Research findings by Coleman (2009) indicated that women can be undervalued and deprived of leadership opportunities because of unfair selection or promotion procedures. The study by Coleman further revealed that organizations tended to hire or promote those candidates who resembled themselves. Therefore, where positions of authority were male dominated, women were underrepresented in leadership. Selection process that often favoured men had been well studied (Coleman, 2009; Qiang et al., 2009). The findings of these studies revealed that the unfairness in selection process resulted from women being judged informally and subjectively on basis of their perceived suitability for the post or for promotion by criteria such as age, relevance of experience and ability to "fit in". All these prejudices and biases restricted women opportunities to access and advance their career, which in turn discouraged and demotivated them because they were afraid that a desire for something they believe

they "can never have" could lead to bitterness and unhappiness (Coleman, 2009; Qiang et al., 2009). This could be the situation with female teachers in Nambale sub-county because there was lack of anti-discriminatory enforcement structures.

The idea of affirmative action policy ensuring equal and fair evaluation was supported by 14.3% of male deputy head teachers whereas 77 and 100% of the male and female deputy head teachers respectively were in disagreement. It was evident from the finding that affirmative action did not provide for equal and fair evaluation of male and female teachers in deployment to head ship positions despite the constitution of Kenya 2010 stipulating that not more than two-thirds of elective and appointive posts should be of the same gender (Republic of Kenya, 2010a). These results showed that TSC had not taken specific measures within the existing constitutional policy provisions to provide equal rights between female and male teachers in participation of leadership of public primary schools. It could be deduced from the findings that other hindrances to female teachers' advancement to leadership positions compromised the principle of affirmative action. Participation of women in leadership and decision making bodies on equal terms with men is guaranteed in Kenya's constitution. Nevertheless, the presence of few female teachers in leadership positions of public primary schools in this sub-county defeated the equality implied in the constitution.

To investigate further the extent to which the two-thirds gender policy was being applied in deployment of female teachers to school headship positions in Nambale-Sub County, 29 male head teachers, 6 female head teachers, the DEO and the DQASO were interviewed by the researcher. Respondents were asked to explain how the Sub-county was implementing the two thirds gender policy in deployment of female teachers to headship positions. The responses to this question showed that the two-thirds gender policy in deployment of teachers to headship positions was a foreign concept in the Sub-county. According to the respondents two-thirds gender policy only existed in political realm. One of the female head teachers went further and pointed out that:

The two-thirds gender policy is focused on formal political representation aimed at increasing the number of female leaders and representatives. It is associated with reserved seats for women in politics but not leadership of public primary schools. Despite the progress made in regard to participation in political positions, we have not seen any effort made to make good of so called two-thirds gender policy when it comes to leadership of primary schools (Head Teacher 3).

This response showed that the validity of the two-thirds gender policy in deployment of teachers to headship position was questionable. Such responses were also noted by Winnie (2013) who commented that in spite of

the two-thirds gender policy measures, there appeared to be very little impact in practice. She observed that in Kenya, concern about gender disparities in education had strongly focused on differences in access at various levels of schooling, student performance, particularly in terms of under achievement of girls evoking policies around gender gaps in education outcome. However, the question of gender disparities in management structures of schools had received very little attention. These findings indicated that the government intervention in ensuring equal opportunities was evident in the legislation. However, there was no practice of the principles of equality in deployment to leadership of public primary schools.

In Kenya, the government introduced affirmative action policy that required a third of all positions in management in education to be held by women (Republic of Kenya, 2005). Therefore, it could be inferred from these findings that there was no application of policy guidelines on gender equality policy and legislation had not supported the increase of the number of female school heads. This finding was in congruence with the report by Republic of Kenya (2010b) which revealed that despite the existence of the policies, legislative reforms, plans and programmes, gender disparities persisted in legal, social, economic and political levels of decision making, as well as access to and control of resources, opportunities and benefits.

The report attributed the slow implementation process mainly to gaps in laws, slow enactment of gender related legislation and lack of comprehensiveness in content of some laws. The implication of these findings was that there was a wide gap between formal policies and actual practices concerning the gender imbalance at school headship positions.

The respondents were next asked to explain how the female teachers were benefiting from equal opportunity policy on deployment of teachers to headship position in the Sub- County. In response to this question, 23 (62%) of participants pointed out that the principle of equal opportunity had remained a marginal concern and a non-core issue in deployment of teachers to headship positions.

Responses to this question also indicated that the issue of equal opportunities did not arise in the deployment of teachers to headship position. The interview panels were expected to be fair and gender sensitive but no deliberate effort was made by the TSC to ensure gender sensitivity and equal opportunity. Such argument has been disputed by some scholars. For example, Tsikata (2009) lamented that gender neutral laws, policies and programmes unintentionally could perpetuate the consequences of past discrimination. Policy makers sometimes instituted affirmative policies but were unable to get them implemented. One female head teacher mentioned that:

Equal opportunities polices are not clearly defined and in most cases are flouted and bent to suit individuals (Head

Teacher 14).

Therefore, equal opportunity policy which was designed by the government of Kenya as gender policy in education-2007, to ensure that both men and women had equal access to management and leadership positions in educational institutions was a phenomenon that was not emphasized and practiced in deployment of teachers to headship positions in this sub-county. These findings implied that the implementation of constitutionally guaranteed affirmative action measures meant to rectify gender imbalance in leadership and managerial positions was not practiced. Female teachers were not given priority in deployment to school headship positions as a matter of policy that aimed to redress current imbalance.

The respondents were further asked to comment on the impact of affirmative action policies on deployment of female teachers to headship positions in the sub county. Most, 21 (57%), of interviewed participants pointed out rightly that affirmative action policies had no impact in practice. The views expressed by the respondents are shocking and surprising given that equal opportunity policies were enshrined in the constitution of Kenya-2010 which was the legal basis for affirmative action policies. These findings agreed with what had been found in Uganda (Kagoda, 2011) and South Sudan (Jane, 2014). Both the DEO and DQASO expressed concern that affirmative action policy was yet to be implemented despite the current level of gender sensitivity and the government demand for gender mainstreaming .They (DEO and DQASO) concurred that despite the fact that legislation to improve gender equality was enshrined in current Kenyan constitution-2010, there was a lot to be done in practice. The DEO noted that:

Women teachers increased participation in teaching force is not translating into increased numbers of women at headship positions.

The DQASO mentioned that,

Those equal opportunity policies have failed to respond to the real needs and expectations.

The responses of the DEO and DQASO showed that they did not seem to be prepared or capacitated to deal with issues related to enhancing female teachers' participation at headship positions. The same concern was echoed by a male head teacher who observed that:

...there were no deliberate efforts to implement affirmative action policy in education sector. Well-meaning laws and policies remain largely on paper. (Head Teacher 6).

This response demonstrated that the affirmative action policies used to address under representation of women in leadership position was either ignored or assumed

altogether because document analysis did not find any documented policy on deployment of female teachers to headship positions. The documented policy which were mainly general were the constitution of Kenya – 2010, the gender policy in education (2007) and the presidential directive of 2006 on 30% women representation at decision making levels in employment, appointment, recruitment, promotion and training.

Tsikata (2009) lamented that whereas there were success stories of affirmative action policies in political representation around the world, lack of public policy commitment had undermined action measures in the education sector. The affirmative action policy was solely limited to political participation. These research findings indicated that the two thirds gender affirmative action policy for women representation was not fully implemented at all levels of government, especially in deployment of teachers to headship positions. Hence legislative requirements and policies that committed institutions to equality had not facilitated female teachers' advancement in leadership of public primary schools in the Sub-county. Female teachers having same qualifications as male teachers should have been given equal opportunities not only in theory but in practice. This indicated the need for effective policy framework to facilitate enhancement of female teachers' participation and representation at school headship positions.

CONCLUSIONS

Despite the existence of government policies on gender equality and equity in leadership, it was not practiced in deployment of teachers to headship positions in Nambale Sub-county which results in the question of contradiction between policy and practice.

Although appointment process to headship provided for equal opportunities, the study revealed that there was lack of transparency. There are no clear deployment and documented policies in place. Therefore, the appointment criteria are not made clear to everybody. This practice gave rise to speculation and suspicions about the criteria used in deployment. This went against the spirit of openness and rules of fair play in deployment to school headship. This had resulted into a skewed deployment pattern in which female teachers are underrepresented in school headship positions.

RECOMMENDATIONS

1. The TSC should come up with clear and documented policies that ensure equal opportunity for both male and female teachers. All information on available vacancies and interview results should be made public. As far as possible, deployment policies should be expressed in writing, reviewed and revised regularly to keep them updated and relevant. This is because written policies

tend to be clear and precise and their compliance can easily be checked.

2. Machinery should be put in place for enforcement, monitoring and evaluation to see to it that the right procedures are followed in selection and deployment to headship position. This policy should be made to create a situation such that when the head teacher is male then the deputy head teacher should be female and vice versa.

Conflict of Interests

The authors have not declared any conflicts of interest.

REFERENCES

- Akpınar–posito C (2012). Career barriers for women executives and the glass ceiling syndrome: The case study comparison between French and Turkish women executives. Istanbul, Turkey: Elsevier Ltd.
- Australian Government (2011). Promoting opportunities for all: Gender equity and women's empowerment. Australian Aid :Unpublished manuscript.
- Barmao C (2013). Factors contributing to underrepresentation of female teachers in headship positions in primary schools in Kenya: A survey of Eldoret Municipality (Unpublished master's thesis). Moi University, Kenya.
- Coleman M (2009). Women in educational leadership in England: Women leading education across continents. Plymouth, UK: Romans & Littfield Education.
- Davies ME (2011). Women on boards. *Int. Res. Pract.* 3(2):23-40.
- Elborg-woytek K (2013). Women, work, and the economy: Macroeconomic gains from gender equity. Washington, DC: International Monetary Fund.
- Elly J, Ibarra H, Kolb D (2011). Taking gender into account: Theory and design for leadership development programs. *Acad. Manage. Learn. Educ.* 10(3):2-51.
- International Labour Organization (2012). Global employment trends for women. Geneva: ILO.
- Jane K (2014). As strategy for achieving gender equality in South Sudan: Special report. Juba: Sudd Institute of Gender Fellowship .Retrieved from www. Sudd Institute.org.
- Kamau N (2010). Women and political leadership in Kenya: Ten case Studies. Nairobi: Bollstiftung.
- Kagoda M (2011). Gender equality. Looking beyond parity: Assessing the effectiveness of affirmative action on women's leadership and participation in education sector in Uganda. Geneva: UNESCO.
- Kaimenyi C, Kinya C, Chege M (2013). An analysis of affirmative action: the two-thirds gender rule in Kenya. *Int. J. Bus. Humanities Technol.* 3(6):91-97.
- Kochanowski M (2010). Women in leadership: Persistent problem or progress. Marist College, USA: Forum on Public Policy.
- Kothari C (2004). Research methodology: Methods and techniques (2nd ed). New Delhi: New Age International (p) limited.
- Moorosi P (2010). South African female principals' career paths: Understanding gender gap in secondary school management. *Gender Analysis of Educational Management Policies.* 69:36-68.
- Morley L (2013). Women and higher education leadership: Absence and aspirations. London: Leadership Foundation for Higher Education.
- Onyango O, Simatwa W, Ondigi A (2011). Factors influencing participation of women in secondary school education management in Siaya District, Kenya: Analytical study. *Int. Res. J.* 2(9):1513-1527. Retrieved from <http://www.interestjournals.org/ER>
- Osoro M (2014, December 12). Women professionals urged to fight for key posts. Standard Media Group: P 35.
- Osumbah B (2011). Representation of women in top educational

- management and leadership positions in Kenya. *Advancing Women in Leadership*. 3157-68. Retrieved from <http://advancingwomen.com/aw/aw/-word>
- Oti A (2013). Psychosocial and organizational climate factors as predictors of female academic career growth and leadership positions in South-West Nigerian Universities (Unpublished doctoral dissertation). University of Ibadan, Nigeria.
- Parsaloi M (2012). Lived experiences of female head teachers in rural primary schools in Kenya (Unpublished master's thesis). University of South Africa, South Africa.
- Qiang H, Han J, Niu X (2009). Chinese women participation in educational leadership. A review and analysis of the current situation. Plymouth, UK: Rowman & Littlefield.
- Republic of Kenya (2005). Sessional paper No.1 of 2005. Policy framework for education, training and research. Nairobi: Government printer.
- Republic of Kenya (2007). Gender policy in education. Nairobi: Government Printer.
- Republic of Kenya (2010a). The constitution of Kenya. Nairobi: Government Printer.
- Republic of Kenya (2010b). Kenya's vision 2030. An audit from an income and gender inequalities perspectives. Nairobi: Society for International Development.
- Republic of Kenya (2012a). Ministry of Education and Ministry of Higher Education, Science and Technology. Sessional Paper No 14 of 2012. A policy framework for education and training .Reforming education and training in Kenya .Nairobi: Government printer.
- Republic of Kenya (2012b). Policy framework for education: Aligning education and training to the constitution of Kenya-2010 and the vision 2030 and beyond. Nairobi: Government printer.
- Seliger S, Shames L (2009). White house project: Benchmarking Women's leadership. Washington, DC: Xerox.
- Standard (2014, January 18). President ignored gender rule: Activists claim. Standard Media Group: pp. 1, 4.
- Vassiliou A (2010). Gender differences in educational outcomes: A study on the measures taken and the current Situation in Europe. Brussels: The Education, Audiovisual and Culture Executive Agency (EACEA) .[http://www. Unjdie, org.](http://www.Unjdie.org)
- World Bank (2012). World development report 2011: Gender equality and development. Washington DC: World Bank.

Full Length Research Paper

The use of engineering design concept for computer programming course: A model of blended learning environment

Kasame Tritrakan*, Pachoan Kidrakarn and Manit Asanok

Faculty of Education, Mahasarakham University, Thailand.

Received 28 July, 2016; Accepted 13 September, 2016

The aim of this research is to develop a learning model which blends factors from learning environment and engineering design concept for learning in computer programming course. The usage of the model was also analyzed. This study presents the design, implementation, and evaluation of the model. The research methodology is divided into three phases, they are: reviewing related literatures and surveying needs and problems in teaching computer programming in order to analyze and synthesize the elements of the model, developing a model which blends learning environment and learning activities based on engineering design processes, and evaluating the effects of using implemented environment on the learners' programming conceptual understanding, problem-solving using programming skills, program analytical skills, and attitude in learning programming. The samples in this study include 8 experts who examine the tentative model and 52 undergraduate students of computer science program in Bansomdejchaopraya Rajabhat University, Thailand, to evaluate the implemented model. The student samples were separated into two groups which are control and experiment group. The results of the comparison between pre-test and post-test scores showed that the programming conceptual understanding, problem-solving by using programming skills, and program analytical skills of the students were significantly increased. In addition, in comparing between control and experiment groups, the scores of problem-solving using programming skills and program analytical skills of the experiment group are significantly higher than that of the control group. However, there were no significant differences in the scores of programming conceptual understanding between those groups. It was also found that the students in experiment group have a high attitude in learning programming in high level.

Key words: Blended learning environment, engineering design concept, computer programming.

INTRODUCTION

It is generally accepted that computer programming is difficult for both the learner and teacher (Allison et al., 2002; Jenkins, 2002). This is because it requires more of

individual's skills than knowledge (Sarpong, 2013; Hadjerrouit, 2008; Miliszewska and Tan, 2007).

Currently, it is observed that there has not been much

*Corresponding author. E-mail: pui043@gmail.com.

success in teaching programming, as many programming students do not perform up to expectation, and as a result, many of them drop out in many countries (Denning and McGettrick, 2005) and also in Thailand (Sankas, 2010). Thus, it is of utmost importance to use different methods and technology to improve students' competence.

Generally in programming courses, learners are first introduced to the programming conceptual knowledge which is about the language features such as syntax, variables, control structures, and functions. Knowledge of the language features is necessary to use the programming language. However, only this knowledge is not sufficient to achieve competence in programming (Kwon et al., 2011).

After teaching language features, the lecturer shows examples of coded program to demonstrate how the instructions are coded and how they work. In order to understand how the programs work and what the output of running the programs is, the program analytical skills are needed to analyze the results of processes and relationship between each line of code. After acquiring the concept of programming, the students are given problems to solve.

In this phase, the learners have to use the problem-solving skills to create the solution and convert into program instruction codes. Lack of program analytical skills and problem-solving by using programming skills are viewed as the main cause of failure in programming learning (Jenkins, 2002; Ismail et al., 2010; Robins et al., 2003). Furthermore, it is also important for students to be highly motivated in order to be successful in learning programming (Jenkins, 2001).

Blended learning (BL)

Blended learning is an education model that combines different types of learning strategies (Bonk and Graham, 2006). In this study, it refers to a combination of online and traditional face-to-face learning. In this, students learn new concepts on their own through the internet and the teachers support individual students who need extra attention. As a result, in the classroom, the teachers can focus on giving instructions that help students improve their higher skills. This combination approach has been adopted in many university courses because it ensures an effective learning environment for students. It combines the advantages and disadvantage of traditional face-to-face education and e-learning. The learners can improve their skills and knowledge in the course (Alducin-Ochoa and Vazquez-Martinez, 2016; Ryberg and Dirckinck-Holmfeld, 2010). There are lots of researchers which aim to harness the efficiency of blended learning approach to computer programming course (Djenic et al.,

2011; Deperlioglu and Kose, 2010; Abbas et al., 2009; Hadjerrouit, 2008; Boylea et al., 2003). The results of those studies have shown that BL approach can efficiently improve the learners' programming competency. Furthermore, the Thai government has a policy B.E.2558 "Reduce instructional time, increase learning time", so the researchers considered that BL can answer this policy.

Engineering design concept (EDC)

Engineering design is the systematic and adaptable processes for an engineer in solving the problem (Dym et al., 2005). It contains many steps from defining to solve the problem which is expanded on the traditional role of Problem-Based Learning (PBL) (Strobel and Carr, 2011). The engineering design processes include (Asunda and Hill, 2007):

1. Identify the problem
2. Research the problem
3. Develop the possible solutions
4. Select the best solution
5. Construct the prototype
6. Test and evaluate the solution
7. Communicate the solution and
8. Redesign.

There are some researches which applied the engineering design concept to education especially STEM to create higher skills such as critical thinking skills and problem-solving skills (Evans et al., 2016; Dixon and Johnson, 2012; Strobel and Carr, 2011; Robert et al., 2009). With the earlier mentioned reasons, the researchers considered combining the engineering design concept with the blended learning to the model to enhance the analytical skills and problem-solving skills in programming.

Research aims

The purpose of this research was to develop blended learning environment model (BLE) using engineering design concept learning activities to computer programming courses. In addition, this research investigated the effects of using this developed model in programming conceptual understanding, problem-solving using programming skill, program analytical skill, and attitude towards learning programming.

METHODOLOGY

This research was conducted in three phases:

The 1st phase: To review related literature and to analyze and

synthesize the elements of the model. There were 3 steps included in this:

Step 1: Search and review the principles, theories, and previous research to analyze and synthesize the components of the model. In this step, the principles of a learning environment, blended learning, learning motivation, engineering design concept, learning computer programming, and desired characteristics of students for learning programming were studied.

Step 2: Survey the computer programming lecturers' challenges and needs. The 57 lecturers who taught computer programming courses in Rajabhat Universities of Thailand were selected to answer the questionnaire. The questions covered challenges and needs faced in learning environment and teaching. The responses were gathered and analyzed using mean and standard deviation.

Step 3: In-depth face-to-face interview 5 programming specialists through the programming learning environment, teaching methods and desire characteristics of learners in learning programming. The structured interview forms were adopted. The results were clustered, relation analyzed, and presented in descriptive format.

The 2nd phase: To develop the model of blended learning environment. There were 3 steps including:

Step 1: Synthesize and design the tentative model using information from the previous phase based on the conceptual framework of systematic development approach (von Bertalanffy, 1968) which includes input, process, output, and feedback.

Step 2: Evaluate appropriateness of the components and model confirmation. In this step, 8 experts who are skilled in programming teaching and educational technology were selected to assess the tentative model. The 1-5 rating scale was conducted and used to evaluate the tentative model.

Step 3: Develop the learning environment and teaching activities based on the developed model. Both offline and online learning environment were established. The teaching activities which use engineering design concept was also introduced in the form of course syllabus and teaching plan. After developing, 3 experienced programming lecturers were selected to investigate the suitability of developed learning environment and teaching method. In this step, the tools to investigate the desired characteristics of students for learning programming were also inspected and approved by IOC and try out.

The 3rd phase: Study the effect of using the implemented environment and teaching activities. There were 5 steps included:

Step 1: Assess the desired characteristics of the student before the course (pre-test).

Step 2: Setup the learning environment and teaching equipment. To study the effects of the designed model, a total of 52 students who attended Web Programming class in Computer Science at Bansomdejchaopraya Rajabhat University in Thailand took part in this study. The students were formed into 2 groups, 25 students in the experiment group and 27 students in the control group by random selection.

Step 3: Perform teaching and learning. The experiment group took the course via the developed model while the control group was taught with the traditional face-to-face teaching method.

Step 4: Assess the competence of the students after the course (post-test). After the course, both groups were examined by the same final examinations with inspecting tools.

Step 5: Evaluate the results. The results of examinations were analyzed using statistical methods including mean, standard deviation, t-test, and one-way MANOVA.

RESULTS

BLE-EDC Model

The blended learning environment model using engineering design concept, called BLE-EDC model, used the principles of blended learning environment and learning activities based on engineering design concept. In addition, the learning motivation factors were also added into the model to encourage positive learner behavior. The BLE-EDC model is shown in Figure 1. The model aims to develop the competence of programming students which are programming conceptual understanding, program analytical skills, and problem-solving using programming skills. The model consists of 4 types of environment: physical, mental, social, and information environment. The physical environment refers to learning environment that learners can perceive by the 5 senses (sight, hearing, touch, taste, and smell). It includes the environment in class/laboratory room such as computers, table, chair, learning equipment and stationary, temperature, light, and quietness.

1. The mental environment refers to learning environment that learners can perceive in their psyche which affects their impact enthusiasm, attitude, IQ, personality, and teaching method.
2. The social environment refers to the interaction between lecturer to students and students to students.
3. The information environment refers to the storage, retrieval, and transfer of information and knowledge.

Input: Consists of 3 components which are:

1. Blended learning environment which combines the offline and online environments. Offline environment is the environment inside and outside the class/lab room where face-to-face teaching and learning take place. It includes the learning equipment (that is, tables, chairs, whiteboard, books, stationery, audio system, computer PC, and internet connection) and atmosphere (that is, temperature, quietness, neatness, and room size). The online environment is the internet which composes of an online course, tests, news and announcements, consulting, scaffolding, additional resources, and learning management system (LMS).

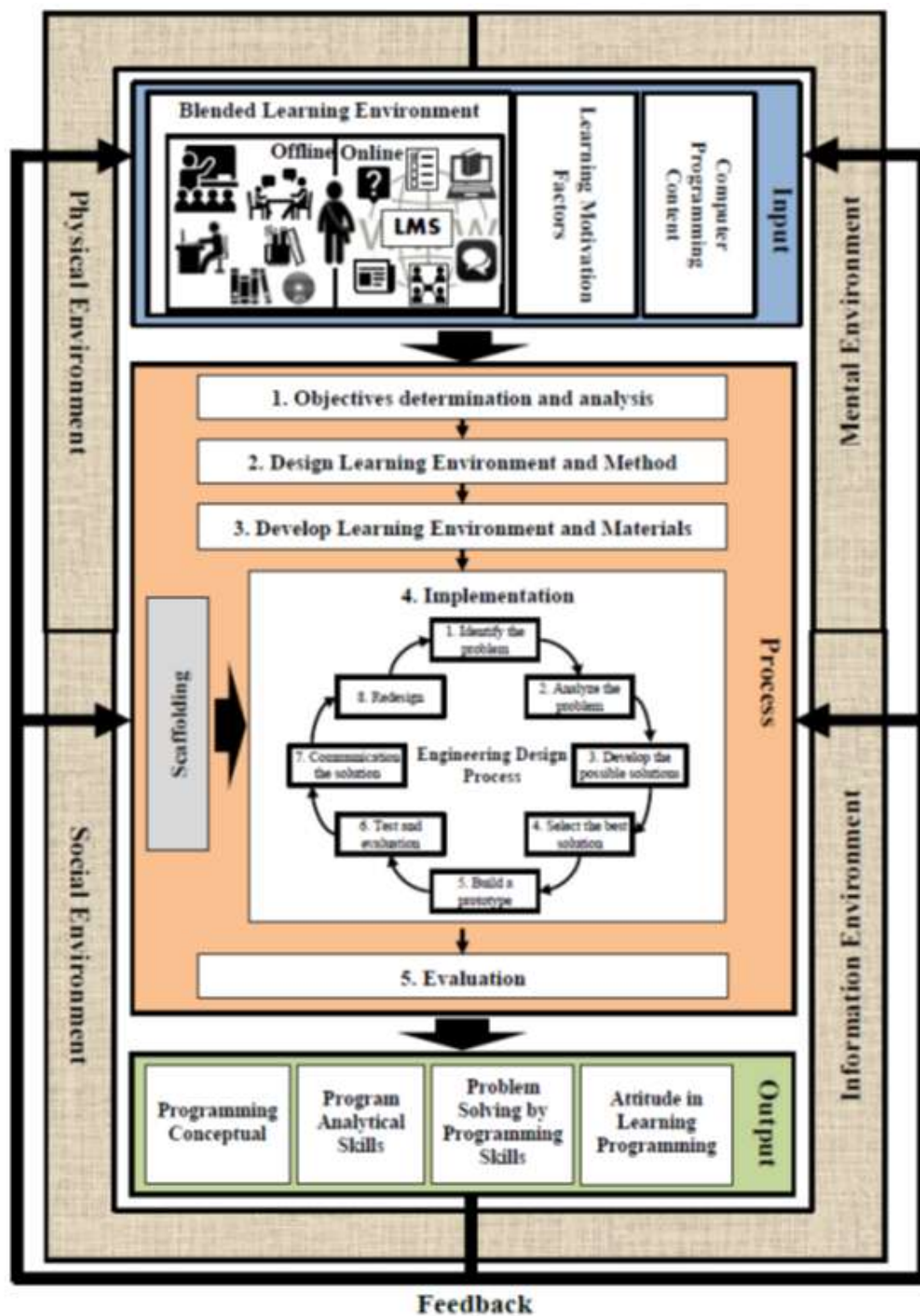


Figure 1. The blended learning environment model using engineering design concept: BLE-EDC model.

2. Learning motivation factors which are the forces which push the students to achieve their learning goals. It is one of the main factors for the accomplishment of

programming learning (Jenkins, 2001; Mohorovicic and Strcic, 2011). There are 3 types of motivation for programming learning based on Jenkins (2001). They are

intrinsic, extrinsic, and social motivation. The motivation is given both in face-to-face and online environment. In the online environment, the news on the benefits of being a programmer is present, while in the face-to-face environment, the teacher periodically motivates the students in the classroom.

3. Computer programming content which is the knowledge in fundamental programming and language's syntax and semantics containing the principle of computer programming, introduction to the language, data types, variables, operators, input and output, control structures, functions, and arrays.

Process: Consists of 5 steps which are:

1. Objectives determination and analysis: This step is to study and analyze the problems and needs assessment for determining the objectives and characteristics of designing learning environment.
2. Design learning environment and methods: This step is to plan and define the resources used to build the learning environment and activities.
3. Develop learning environment and materials: This step is to develop the blended learning environment, courseware, and teaching and learning activities. The assessment tools are also conducted in this step.
4. Implementation: In this step, the developed learning environment, program courseware, and its activities are used in computer programming course. The learning activities are based on engineering design processes (Ronald and Strobel, 2011; Robert et al., 2009) which are:

Step 1: Define clearly a specific problem and desired solution.

Step 2: Analyze the problem involved in the input and output variables. Their data types and structures are also assigned.

Step 3: Develop the possible solutions. In this step, possible algorithms are self-developed or searched from other resources.

Step 4: Select the best solution. Learners analyze the advantage/disadvantage of each algorithm and select the best one.

Step 5: Build a prototype program using the specific programming language.

Step 6: Test and evaluate the developed prototype to find bugs and fix them.

Step 7: Communicate and discuss the algorithm and its result with other groups.

Step 8: Improve the program.

5. Evaluation: This step is to evaluate the result of the usage of developed learning environment, courseware, and activities using the assessment tools.

Output: Consists of 4 outcomes which are:

1. Programming conceptual knowledge
2. Program analytical skills
3. Problem-solving by programming skills
4. Attitude in learning programming

Learning and teaching

There are two learning approach in the BLE-EDC model, face-to-face and online learning in 60:40 ratios. In online learning, the students learn the programming conceptual knowledge, which is the surface learning (Mohorovicic and Strcic, 2011), on their own using the online courses and tutorials. In addition, some program analytical skills are also developed by analyzing the example coded programs provided on the online tutorials and coaching by the lecturer. After students have understood the programming conceptual knowledge and have acquired program analytical skills, the next class is held face-to-face learning in the class/lab room. In the classroom, the students are focused on developing the higher skills, program analytical skills and problem-solving by using programming skills, by applying the engineering design concept to their activities to find the solutions to the given problems.

Model usage evaluation

Results of testing

Table 1 shows the scores of programming conceptual understanding, program analytical skills, and problem-solving by using programming skills. The results show that the average scores of post-test are higher than that of the pre-test in both control and experiment group. And all three average post-test scores in the experiment group are higher than the control group.

Comparing between pre-test and post-test

In order to determine that the BLE-EDC model can enhance students' competence in learning programming, the independent t-test analysis between pre-test and post-test are done. Table 2 shows the statistical results between pre-test and post-test of the experiment group. The results show that the average post-test scores of programming conceptual understanding, program analytical skills, and problem-solving by using programming skills are significantly higher than the pre-test scores. These indicate that the BLE-EDC model can improve the knowledge and required programming skills

Table 1 Mean score and standard deviation of programming conceptual understanding, program analytical skills, and problem-solving by using programming skills.

Dependent variable	Control group (N=27)				Experiment group (N=25)			
	Pre-test		Post-test		Pre-test		Post-test	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Programming conceptual understanding	18.11	5.15	65.15	14.10	18.68	4.49	68.60	13.93
Program analytical skills	6.93	3.20	37.48	13.63	6.52	2.82	48.48	13.60
Problem-solving by using programming skills	2.74	2.18	11.07	6.11	2.88	2.19	20.16	7.15

Table 2. t-test analysis between pre-test and post-test of the experiment group.

Dependent variable	Test	Mean	df	t	Sig.
Programming conceptual understanding	Pre-test	18.68	24	19.070	0.000*
	Post-test	68.80			
Program analytical skills	Pre-test	6.52	24	15.385	0.000*
	Post-test	48.48			
Problem-solving by using programming skills	Pre-test	2.88	24	12.224	0.000*
	Post-test	20.16			

*Correlation is significant at the .05 level.

Table 3. Comparison of the result between the experiment and control group.

Dependent variable	Group	Number of students	Mean	F	Sig.
Programming conceptual understanding	Experiment group	25	68.80	0.881	0.352
	Control group	27	65.15		
Program analytical skills	Experiment group	25	48.48	8.472	0.005*
	Control group	27	37.48		
Problem-solving by programming skills	Experiment group	25	20.16	24.408	0.000*
	Control group	27	11.07		

*Correlation is significant at the .05 level.

of the learners.

Comparing between control and experiment group

To answer the research questions, how the BLE-EDC model affects the students' acquisition of programming conceptual knowledge, program analytical skills, and problem-solving using programming skills, after the courses, both groups took the same final examinations. The examination included 3 parts to test programming

conceptual, program analytical skills and problem-solving using programming skills. Table 3 shows the one-way ANOVA results between the experiment and control group. As shown in Table 3, the programming conceptual average scores of the experiment and control group were not significantly different. Nonetheless, the program analytical skills and problem-solving using programming skills average scores of the experiment group were significantly higher than the control group. The experiment results show that the BLE-EDC model can improve the program analytical skills and problem-solving

Table 4. Attitude survey results.

Statement	Number of students giving response as:					Avg.
	1	2	3	4	5	
The computer programing is an interesting course	0	0	2	11	12	4.40
I feel active when in computer programming class	0	0	4	12	9	4.20
think that computer programming course can increase my chance of finding a job	0	0	2	5	18	4.64
Computer programming is an easy subject	0	6	10	9	0	3.12
Computer programming helps me to be accepted by friends, family and social	0	0	15	6	4	3.56
I think that computer programming is an important course	0	1	3	7	14	4.36
I encourage attending a computer programming class	1	0	16	8	0	3.24
I am happy when learning computer programming	0	0	6	12	7	4.04
I feel energetic when the computer programming class is coming	0	0	9	10	6	3.88
I think that computer programming is essential for country development	0	1	2	15	7	4.12
I am enthusiastic to learn computer programming	0	1	6	14	4	3.84
I intend to learn more beyond the class	0	0	10	12	3	3.72
I intend to do the assignment	0	0	7	13	5	3.92
I feel relaxed when in computer programming class	0	1	14	6	4	3.52
I pay attention when learning computer programming	0	1	4	12	8	4.08
	Average					3.91

using programming skills better than traditional learning. Meanwhile, it is effective in transferring programming conceptual knowledge the same way as the traditional learning.

Attitude study

In this study, the attitude in learning programming was also considered. The survey was done at the end of the course to find out the attitude of students in learning

computer programming after learning with BLE-EDC model. A list of 15 statements was examined. The 25 students in the experiment group were asked to express their opinion on the 1-5 Likert scale (1 = strongly disagree, 2 = disagree, 3 = not sure, 4 = agree, 5 = strongly agree). The survey results are shown in Table 4. According to the result in Table 4, the students had a good attitude towards learning computer programming. Mostly, they strongly agree that computer programming course can increase their chances of finding a job.

However, there are some of them who were not sure

that computer programming is an easy subject.

DISCUSSION

This study focused on the development of a model which blends learning environment using engineering design to learn computer programming course. For this purpose, the BLE-EDC model has been designed and developed to be used for the course. The model has been formed by combining traditional face-to-face and online learning. The important goals of the BLE-EDC model were to enhance 4 necessary outcomes for learning computer programming which are: programming conceptual knowledge, program analytical skills, problem-solving by programming skills, and attitude in learning programming. The online course aimed to make the students gain the programming conceptual knowledge and some program analytical skills. While face-to-face learning intended to enhance the program analytical skills and problem-solving using programming skills by applying the engineering design concept to the learning activities. In addition, the learning motivation was delivered to students both online and through face-to-face approach to achieve competence in learning programming and drive them to meet the goals of learning.

According to the results obtained from the usage, the post-test scores of programming conceptual, program analytical skills, and problem-solving using programming were significantly increased compared with the pre-test. This shows that the BLE-EDC model can enhance the knowledge and essential skills for learning programming. While comparing between control and experiment group, the experiment group post-test score of program analytical skills and problem-solving by programming were significantly higher than the control group. This revealed that the BLE-EDC model can develop these skills better than a traditional face-to-face learning environment, these results coincide with the findings by other researchers who used the engineering design concept to learning activities (Evans et al., 2016; Dixon and Johnson, 2012; Strobel and Carr, 2011; Robert et al., 2009). However, the programming conceptual knowledge scores of control and experiment groups are not significantly different. This showed that the BLE-EDC model can enhance learners knowledge as well as the traditional face-to-face. The reason that the students' achievement learned by BLE-EDC model was not different with traditional face-to-face learning may come from the less of students' self-regulation in online learning which causing the blended learning is not as successful as should be (Cigdem, 2015). It was also found that the learners in experiment group have a good attitude in learning programming after learning with the developed model. In accordance with Brooks (2009) who concluded

that a good blended learning environment affected the positive attitude of learners.

The BLE-EDC model uses a low cost to implement because it uses already existed tools and equipment. According to the Thai government policy B.E.2558 "Reduce instructional time, increase learning time", it allows the students to have more flexible time to study and understand the programming knowledge because the time to learn is not just limit to in the classroom. In addition, the lecturers can have more time to prepare the example codes and problems statement to enhance higher skills of the students. The BLE-EDC model also gives a good attitude in learning programming to the learners which are an important success factor to be a good programmer.

A problem found in this research is that there are some students who did not clearly understand will meet the problem in classroom activities. So the lecturers should announce that if they have any unclear contents, they should ask immediately.

CONCLUSION AND SUGGESTIONS

The findings suggest that the task should be improved as follow. Firstly, the way to motivate the students should be emphasize with showing the life quality of success programmers and the benefits of being a programmer. This is considered to be the best way to build the internal motivation of the students. Secondly, the lecturer should find the example codes from the expert programmers to let the learners absorb good coding styles. Thirdly, to enhance the problem-solving by programming skills, the learner must practice regularly so the lecturer should find a variety of problems for them. Finally, the BLE-EDC model conforms to the Thai government policy B.E.2558 "Reduce instructional time, increase learning time".

Conflict of Interests

The authors have not declared any conflict of interests.

ACKNOWLEDGEMENTS

This research was supported by Faculty of Education, Mahasarakham University and Faculty of Science, Bansomdejchaopraya Rajabhat University.

REFERENCES

- Abbas EZ, Tim L, Nigel B (2009). Blended Teaching and Learning of Computer Programming Skills in Engineering Curricula. *Adv. Eng. Educ.* 1(3):1-18.

- Alducin-Ochoa JM, Vazquez-Martinez AI (2016). Hybrid Learning: An Effective Resource in University Education? *Int. Educ. Stud.* 9(8):1-13.
- Allison I, Orton P, Powell H (2002). A virtual learning environment for introductory programming. *Proceedings of the 3rd Annual Conference of the LTSN Centre for Information and Computer Sciences*, Loughborough University, UK. pp. 48-52.
- Asunda PA, Hill RB (2007). Critical Features of Engineering Design in Technology Education. *J. Ind. Teacher Educ.* 44(1):25-48.
- Bonk CJ, Graham CR (2005). *The handbook of blended learning: Global perspective, local designs*. San Francisco, CA: Pfeiffer Publishing.
- Boylea T, Bradleya C, Chalkb P, Jonesb R, Pickardc P (2003). Using Blended Learning to Improve Student Success Rates in Learning to Program. *J. Educ. Media* 28(2-3):165-178.
- Cigdem H (2015). How Does Self-Regulation Affect Computer-Programming Achievement in a Blended Context? *Contemporary Educ. Technol.* 6(1):19-37
- Denning PJ, McGettrick A (2005). Recentering Computer Science. *Commun. ACM* 48(11):15-19.
- Deperlioglu O, Kose U (2013). The Effectiveness and Experiences of Blended Learning Approaches to Computer Programming Education. *Computer Appl. Eng. Educ.* 21(2):328-342.
- Dixon RA, Johnson SD (2012). The Use of Executive Control Processes in Engineering Design by Engineering Students and Professional Engineers. *J. Technol. Educ.* 24(1):73-89.
- Djelic S, Krneta R, Mitic J (2011). Blended Learning of Programming in the Internet Age. *IEEE Transact. Educ.* 54(2):247-254.
- Dym CL, Agogino AM, Eris O, Frey DD, Leifer LJ (2005). Engineering design thinking, teaching and learning. *J. Eng. Educ.* 103(1):103-120.
- Evans MA, Schnittka C, Jones BD, Brandt CB (2016). Studio STEM: A Model to Enhance Integrative STEM Literacy Through Engineering Design. *Contemp. Trends Issues Sci. Educ.* 44:107-137.
- Hadjerrouit S (2008). Toward a Blended Learning Model for Teaching and Learning Computer Programming: A Case Study. *Infor. Educ.* 7(2):181-210.
- Ismail MN, Ngah NA, Umar IN (2010). Instructional Strategy in the Teaching of Computer Programming: A Need Assessment Analyses. *Turk. Online J. Educ. Technol.* 9(2):125-131.
- Jenkins T (2001). The Motivation of Students of Programming. *Proceedings of Innovation and Technology in Computer Science Education*. Canterbury, UK, 53-56.
- Jenkins T (2002). On the Difficulty of Learning to Program. *Proceedings of the 3rd Annual HEA Conference for the ICS Learning and Teaching Support Network*. pp. 1-8.
- Kwon DY, Yoon IK, Lee WG (2011). Design of Programming Learning Process using Hybrid Programming Environment for Computing Education. *KSII Transactions on Internet Infor. Syst.* 5(10):1799-1812.
- Milliszewska I, Tan G (2007). Befriending Computer Programming: A Proposed Approach to Teaching Introductory Programming. *Infor. Sci. Infor. Technol.* 4:277-289.
- Mohorovicic S, Strcic V (2011). An Overview of Computer Programming Teaching Methods. *Proceedings of the 22nd Central European Conference on Information and Intelligent Systems*, Faculty of Organization and Informatics, Varazdin. pp. 47-52.
- Robert W, Phillip CS, Soo JK (2009). Essential Concepts of Engineering Design Curriculum in Secondary Technology Education. *J.f Technol. Educ.* 20(2):65-80.
- Robins A, Rountree J, Rountree N (2003). Learning and Teaching Programming: A Review and Discussion. *Comput. Sci. Educ.* 13(2):137-172.
- Ryberg T, Dirckinck-Holmfeld L (2010). Analysing digital literacy in action: A case study of a problem-oriented learning process. In R. Sharpe, H. Beetham & S. De Frietas, eds. *Rethinking Learning for a Digital Age: How Learners are Shaping their own Experiences*. Abingdon: Routledge. pp. 170-183.
- Sankas S (2010). Development of a Content and Activity Blended Learning Model for Computer Programming. Unpublished doctoral dissertation, King Mongkut's University of Technology North Bangkok, Bangkok, Thailand.
- Sarpong KA, Arthur JK, Owusu PY (2013). Causes of Failure of Students in Computer Programming Courses: The Teacher - Learner Perspective. *Int. J. Comput. Appl.* 77(12):27-32.
- Strobel J, Carr RL (2011). Integrating engineering design challenges into secondary STEM education. *1st Integrated STEM Education Conference (ISEC)*, 2 April 2011.
- Von Bertalanffy L (1968). *General System Theory: Foundations, Development, Application*. Newyork, NY: George Braziller.

Full Length Research Paper

Effect of most-to-least prompting procedure on dressing skill of students with Autism

Galibiye ÇETREZ İŞCAN*, Elçin NURÇİN and Yeşim FAZLIOĞLU

Department of Special Education, Faculty of Education, Trakya University, Turkey.

Department of Audiology and Speech Disorders, University of Trakya, Health Sciences Institute, Edirne, Turkey.

Department of Preschool, Education Faculty, University of Trakya, Edirne, Turkey.

Received 14 July, 2016; Accepted 13 September, 2016

Dressing skill is one of the necessary self-care skills that is taught to individuals with autism in order for them to be able to live independently. Typically, developing individuals can acquire dressing skill on their own; however, children with autism have difficulties in learning such skill without systematic teaching. Thus, teaching dressing skill should be one of the basic aims of educational service. To this end, this study investigated the effect of most-to-least prompting procedure on dressing skill of students with autism. Three students with autism aged 8, 10 and 11 participated in the study. Multiple probe design across subjects was used to assess the effects of most-to-least prompting on teaching the target dressing skill. The dependent variable of the research is the level of dressing coat with zip and the independent variable is the individual teaching program based on most-to-least-prompting method. First, in order to determine the target skill, skill check lists were prepared. Taking the chosen target skill into consideration, individual teaching programs were prepared. Measurement tool was prepared so that the beginning, teaching, observation and generalization of the data can be collected and related to chosen target skill of the students. During the instruction, full physical prompting, partial physical prompting, verbal prompting and independent performance techniques were used. The results of the study revealed that most-to-least prompting was effective on teaching dressing skill of students with autism and also generalized the skill for different places and people.

Key words: Students with autism, dressing skills, most-to-least prompting.

INTRODUCTION

Autism is defined as a common developmental disorder that begins at early ages and lasts for a lifetime, characterized by retardation or deviation in social relationships, communication and cognitive development. It is observed that children defined as "autistic" generally have difficulty in making contact with others and

particularly, their peers have certain obsessions, speak in an unusual way or not speak at all and have difficulty in daily life activities (Kırcaali-Iftar, 2012). Social hardship is one of the basic characteristics of children with autism and criteria for autism. The hard ship is grouped as deficiencies in non-verbal skill such as eye contact and

*Corresponding author. E-mail: galibiyecetis@hotmail.com.

facial expression, failure to make contact with peers, not sharing their interests, desires and success with others and lack of social and emotional reciprocity. Therefore, assessment of social and adaptive behaviors is necessary in scanning, diagnosing autistic children and designing intervention programs for these children (Sucuoglu, 2012). Adaptive behaviors are defined as conceptual, social and practical skills required for fulfillment of daily functions (www.aaid.org, 2008). Deficiencies in adaptive behaviors have negative impact on both daily life and reactions to environment and special occasions. Adaptive behaviors may also be defined as social responsibility and individual independence standards expected from people of the same age and culture group. Adaptive skills are named by various resources as independent life skills or daily life skills (Bozkurt, 2001; Cavkaytar, 1998; Özen, 1995). Independent life skills are the ones that an individual needs in order to live without independence on others (Bozkurt, 2001; Cavkaytar, 1999).

As individuals gain self-care skills which are one of the independent life skills, their dependency on parents and other people begins to disappear. Training individuals with autism on self-care skills is of primary importance as a) they are vital, b) frequently used in daily routine, c) help develop acceptance and positive attitude and d) enhance life quality and help take own life's responsibility (Tekin-İftar, 2002). Dressing skill is among self-care skills required for both autistic and other individuals to function independently. Dressing skill of children with autism is important for their social recognition, selection skill and enhancement of life quality. While normal developing children learn dressing skills by observing parents, siblings and friends and taking them as models without any educational program, autistic children have difficulty in learning these skills without receiving help or being taught (cited by: Yücesoy, 2007). Interviews with families indicate that teaching their children dressing skills is of primary importance to them (Farlow and Snell, 2003). Therefore, teaching autistic individuals dressing skills is one of the basic objectives of educational programs. Dressing skill includes wearing/putting on and removing underwear, jumper, trousers, skirt, sock, shoe, coat, gloves and hat. It also includes additional skills such as buttoning and unbuttoning, unsnapping, zipping, wearing belt, tying scarf, unlacing, choosing appropriate clothes, assess appearance and to be precise when necessary (Yücesoy, 2007). Dressing skill must be taught through daily activities to the possible extent. The best time to teach dressing skill is when children get up, go to toilet, have bath, go to school, play in the park, garden among others. Dressing skill must be ordered from the least to the most complicated one (Vuran, 2011). Like normal developing children, undressing skills are easier than dressing skills for children with autism. They are also relatively easier than unbuttoning, unlacing and

zipping. Therefore, undressing skills must be taught before dressing skills (Azrin, Schaeffer ve Wesolowski, 1976; Varol, 2011).

Dressing skill teaching must begin with clothes that are easy to put on and take off. Clothes must be one size bigger and flexible. Teaching must begin with heelless, pipe-shaped socks, V-collar jumpers, stretch pants and unlaced shoes. Clothes with bigger buttons, holes and zippers may be used for buttoning-unbuttoning, zipping-unzipping skills that require development of fine muscle skills (cited by: Vuran 2011). There have been studies in recent years in order to teach autistic children dressing skills effectively. It is observed that these studies give place to educational programs based on "Applied Behavior Analysis" and that this program is often based on principles of operant conditioning. In this model, the first step is detecting the child's current performance and which dressing skills are missing and then these steps are divided into small steps where they are placed into appropriate educational programs and the child's positive reactions are reinforced (Darica, Abidoğlu and Gümüşçü, 2005). One of the systematic teaching practices used in autistic child training is "Errorless Learning Methods" based on "Applied Behavior Analysis" (Kayaoğlu and Görür, 2008). Errorless learning is programming tools and materials related to the stimuli or target behavior (Cipani and Madigan, 1986). During Errorless learning, the student is more likely to give direct reaction through prompting, gains more reinforcement for the right reactions, which results in an education with fewer mistakes. Thus, a positive relationship develops between the student and practitioner (Weeks and Gaylard-Ross (1981) cited by Eren et al. (2013). Errorless Learning Methods are generally gathered under two groups. These are teaching methods that present reaction prompts and teaching methods that present stimuli prompts. Teaching through the most to least prompting is an effective method for teaching individuals with autism, developmental retardation or mental handicaps of various levels (Tekin-İftar and Kırcaali-İftar, 2012).

Most to least prompting is defined as beginning education with prompting that enables the individual to give right reactions and gradually decreasing and removing the prompting. Prompts are presented in a hierarchical order from the prompt that requires most control over the person's body/behavior to the one that requires least control and teaching continues with the next prompt after the person fulfills the target criteria. When it comes to the criteria for transition from one prompt to another, it is observed that a less controlling prompt is introduced when the person gives right reactions at a certain level or teaching is done at a prompt level for a certain amount of time (Tekin-İftar and Kırcaali-İftar, 2012). Withdrawal of prompting happens in three ways; by (a) only changing the genre of prompting, (b) only changing the amount of prompting or (c)

withdrawing both. The purpose is to enable student independence by withdrawing the genre, amount or both (Tekin-İftar and Kırcaali-İftar, 2012; Varol, 2011). Withdrawal of prompting is not based on spontaneous decisions but happens in a systematic way (Tekin-İftar and Kırcaali-İftar, 2012). Most studies employ the most to least prompting method. Vuran (1989) studied whether "Dressing Skills Teaching Material" designed for fifteen mentally disabled children who fail to realize independent dressing skills was effective in training them on wearing trousers, v-collared jumper and socks. Pretest-end test trial method was used in the study. Measurement tools designed by the author were applied on the sample before and after the practice. Dressing skills teaching materials were designed by the author. According to study findings, teaching through materials that are based on children's capabilities is effective in acquiring self-care skills. Özen (1995) investigated whether "Individualized eating skills, teaching material based on physical aid, modeling and verbal Instruction" was effective in realizing sub-goals of spoon-fork using skills by six mentally disabled children who displayed eating skills prerequisite behaviors. Therefore, the author developed "Individualized eating skills, teaching material based on physical aid, modeling and verbal Instruction" and "Individualized eating skills teaching material based on only verbal Instruction" and formed teaching units involving spoon and fork using skills. At the end of the study, it was found that "Individualized eating skills, teaching material based on physical aid, modeling and verbal Instruction" was more effective than "Individualized eating skills teaching material based on only verbal Instruction" in different students and teaching different eating skills.

Özen et al. (2003) investigated the effectiveness of most to least prompting method in teaching self-care skills to three mentally disabled children. At the implementation process of the study, most to least prompting method was presented through complete physical prompting, partial physical prompting, verbal prompting and independent performance. At the end of the study, it was found that skills were realized according to the target criteria except for tooth-brushing skill of a child. Aykut and Varol (2007), investigated the effectiveness of most to least prompting method in teaching a mentally handicapped child to wear stretch pants, cut an empty paper with scissors and water paint an empty sheet. The study carried out with inter-behavioral multi probe design showed that sub-goals of these skills were realized between 80 and 100% and children could generalize these skills to different settings, instruments and people. Aykut (2007) investigated the effectiveness and efficiency of systematic withdrawal of prompting and constant time delay procedure in teaching how to make stitch on folded cloth and cook ready-made soup. Study findings showed that constant time delay

procedure was more efficient than systematic withdrawal of prompting in terms of the number of educational processes and total amount of teaching time until the criteria is met while systematic withdrawal of prompting was more efficient than constant time delay procedure in terms of the number of false reactions until the criteria is met. Aykut and Varol (2010) investigated whether there was any difference between constant time delay procedure and systematic withdrawal of prompting and which was more effective in teaching daily life skills to children exposed to mental deficiency. Study pattern was adaptive alternate practice model. Study findings showed that there was no difference between the effectiveness of these two procedures in teaching skills; however, constant time delay procedure was more efficient in terms of the number of educational processes and total amount of teaching time until the criteria is met while systematic withdrawal of prompting was more efficient than constant time delay procedure in terms of the number of false reactions until the criteria is met. There was no difference between two procedures in terms of sustainability and generalization.

Aykut (2012) investigated whether there was any difference between effectiveness of constant time delay procedure and systematic withdrawal of prompting and also, which was more efficient in teaching daily life skills to two children with mental disability. Study pattern was adaptive alternate practice model. Study findings showed that there was no difference between the effectiveness of these two procedures in teaching skills; however, systematic withdrawal of prompting was more efficient than constant time delay procedure in terms of the number of educational processes, number of false reactions and total amount of teaching time. No difference was observed between two procedures in terms of sustainability and generalization. Eren et al. (2013) investigated the effectiveness of embedding teaching with most to least method in music activities designed according to Orff approach in teaching concepts to 3 autistic children between the ages of 3 and 6. Inter-sample multi probe model was used for the study. Study findings showed that embedding teaching with most to least teaching method in music activities prepared according to Orff approach was effective in teaching concepts to autistic children. Day and Horner (1986) compared single sample and multi sample teaching methods in teaching dressing skills to 6 boys aged 8 to 23 and with advanced level of mental deficiency. Most to least prompting was used and correct reactions were reinforced. While none of the boys were able to develop jumper wearing skill before teaching, 4 of the 6 boys were able to learn how to wear at least one type of jumper at the end of teaching sessions with single sample and all the boys were able to learn how to wear 7 or 8 types of jumper at the end of teaching with multi sample (cited by: Yücesoy, 2007). Sisson and Dixon

(1986) investigated the effects of physical aid, modeling, verbal prompting and social reinforcements in teaching and sustaining eating skills (chewing with closed mouth, using spoon-fork properly and using handkerchief) to six seriously disabled individuals. Inter-behavioral multi initiation level pattern was used. Study findings showed that the teaching method was effective in using the specified skills. Mc Donnell Ferguson (1989) compared the effectiveness and efficiency of systematic withdrawal of prompting and constant time delay procedure in teaching how to use ATM and cash a check. Although, the study results showed that both methods were effective, systematic withdrawal of prompting was more efficient than constant time delay procedure in terms of the number of teaching sessions, percentage of mistakes and total amount of teaching time.

Miller and Test (1989) compared the effectiveness and efficiency of systematic withdrawal of prompting and constant time delay procedure in teaching cloth washing. Although, the study results showed that both methods were effective, constant time delay procedure was more effective than systematic withdrawal of prompting in terms of percentage of mistakes by the sample and fewer teaching sessions. Denny et al.(2000) investigated the effectiveness of a parent-supported program in teaching a mentally disabled child to eat and roll a ball and sustaining these skills. Inter-behavioral multi initiation level pattern was the study design.

In the study, goals for both skills were designed according to whole skill approach and the method involved systematic withdrawal of physical prompting. The study findings showed that the participant acquired and sustained (cited by: Özen et al., 2003). Libby, Weiss, Bancroft and Ahearn (2008) compared most to least prompting and least to most prompting with 5 autistic children in playing toy blocks. All participants learned to construct things with toy blocks when teachers used most to least prompting and made fewer mistakes than least to most prompting method. Literature review showed that studies with most to least prompting method are restricted to Vuran (1989), Özen (1995), Aykut and Varol (2007), Aykut (2007), Aykut (2012), Özen et al. (2003), Aykut and Varol (2010), Eren et al. (2013), Day and Horner (1986), Libby et al. (2008) Sisson and Dixon (1986), Mc Donnell and Ferguson (1989), Miller and Test (1989), Denny et al. (2000). This study was planned as a result of this restriction and its goal was to teach autistic children dressing skills with most to least prompting method. Therefore, answers to the following questions were sought: a) Is implementing individualized teaching program based on most to least teaching method effective in teaching autistic children to wear a coat with zipper? B) Is individualized teaching program based on most to least teaching method effective in sustaining coat wearing skill after it is learned and generalizing it to different people and settings?

METHODS

This section involved information about study model, dependent-independent variable, sample, setting and instruments, implementation of individualized teaching program, implementation process, data collection and data analysis.

Study model

In this study, effectiveness of most to least prompting method was assessed with inter-sample multi probe model, which is one of the single sample study models. In multi probe model, beginning level data was collected until at least three consecutive stable data points are obtained in all cases. After stable data was obtained, implementation begins at the first case. While only data was collected for the first case, probe data was collected at previously determined (for example, every 3 to 5 days) time intervals. If a difference was observed between beginning stage and implementation process of the first case in terms of frequency, duration, percentage, intensity etc. and a difference is observed implementation stage of the first case and probe stages of other cases, it means a relation has been found between dependent and independent variable. Meanwhile, if it was observed that the criterion is about to be achieved in the first case, probe data was collected in other cases. When the criterion was met in the B stage of first case, they pass onto the B stage of the second case. If findings in second case were similar to those in the first case, cause-effect relationship was revealed. If they get close to the criteria in the second case, probe data was collected in the third case. After the implementation was ended in the second case, implementation was started in the third case. Meanwhile, permanence effect of the implementation may be checked by collecting probe data occasionally in cases that have been implemented (Tekin-İftar and Kircaali-İftar, 2012).

Dependent and independent variable

Dependent variable of this study is students' zippered coat wearing skill learning level. Independent variable is the usage of individualized teaching program based on most to least prompting method.

Sample

Study sample includes target students, implementer and observers.

Target students

Classroom teachers were asked for help in selecting target skills. Therefore, classroom teachers were first given skill checklists and asked to state which of these skills their students needed and order them in terms of importance. Thus, zippered coat wearing skill was specified as the primary skill. Individualized teaching programs were prepared according to the target skill. Study sample comprised three autistic students aged 8, 10, 11 who attended a private education school in Edirne. Their parents granted written permission for the children to participate in the study. Interviews with classroom teachers revealed all the students need to be taught the target skill. Students in the study were expected to have several prerequisite skills. These skills were a) imitating the model by modeling the prompts, b) receiving and performing verbal instructions (e.g., hold, take, give, sit etc.), c) choosing a reinforcer

and d) not having received education with most to least teaching method.

Implementers

Three implementer carried out the study. Implementation process was realized by two implementer. The other researcher took part in writing process of the study. One of the implementer who implemented the study has bachelor's degree in private education, post graduate degree in education of mentally disabled individuals and 11 years of teaching experience and still works as an instructor at private education department. The other implementer has bachelor's degree in private education department and is currently studying to get a post graduate degree at Audiology and Speech Disorders department.

Observers

In the study, reliability data related to dependent and independent variable were collected. Inter-observer reliability and application reliability data of the study were collected by an instructor with post graduate degree and a private education teacher. Before collecting reliability data, observers of the study were given information about a) goals of the study, b) target skill and behaviors related to target skill, c) most to least prompting method, d) teaching sessions, e) probe sessions, f) generalization sessions, g) correct or false interpretation of the skill behaviors by the student and h) reactions expected from the observed in case of correct and false reactions.

Setting and instruments

Implementation of the study was realized in an empty classroom inside the institution that the sample attended. The classroom was a place with few stimuli that distracted attention and contained the instruments required for the implementation. There was a hanger on the wall and students' coats in the classroom to practice coat wearing skill. Students' beginning, probe, implementation and monitoring data were all collected at the same setting. Data related to generalization were collected in different classroom with different hangers in the school that children attended.

Preparation of individualized education program

An individualized teaching plan was designed for each student according to the specified target skill. Most to least prompting method was used in the individualized teaching plan. Tekin-İftar and Kircaali-İftar listed the behaviors required for efficient implementation of most to least prompting method: a) skill analysis must be developed, b) it must be decided whether skill analysis steps will be taught in forward chaining or backwards chaining, c) it must be decided what the criterion for passage from one prompting level to another will be, d) it must be decided what the criterion for passage into the next step listed in skill analysis will be, e) it must be decided what reaction will be given against false reactions of the individual. Teaching materials in this study were prepared by following this process. On the other hand, measurement tools were designed to collect beginning level, teaching, monitoring and generalization data of every student. Measurement tools consisted of three parts; which are "notifications, criteria and measurement tool instruction". In measurement tools, skill analysis of the target skill was made first. Analysis of target skills was formed by writing each skill step.

Implementation process

Beginning level and probe sessions

Beginning, probe, teaching, monitoring and generalization data were collected with the data collection tools. Moreover; beginning, probe, teaching, monitoring and generalization sessions were recorded on video and data of these sessions were collected and recorded on measurement tools by implementers. Single chance method was used for data collection in beginning level and implementation sessions. The following process was followed in specifying performance level with data collection tools:

1. Attention of target student was enabled for realization of the skill.
2. Once enabled, attention of target student was reinforced by reinforcers (very well, very nice, well done etc.).
3. Skill instruction was given for the target student to realize the skill "Wear your coat".
4. After skill instruction was given, they waited for 4 s for the target student to give reaction.
5. If target student does the first step successfully in the first step of skill analysis, "+" is marked on the data collection chart and they observed whether the student began to do the next step of the skill analysis in 4 s.
6. If target student does not realize the second step of skill analysis successfully, "-" is marked on data collection chart.
7. Single chance method was used in probe sessions and "-" was marked for the skills under the skill that student could not realize.
8. Beginning and probe data were collected until stability was achieved.
9. Steps that target student could realize successfully were divided into steps in the skill analysis and multiplied by 100, so they obtained percentage of correct steps of the sample and recorded it on the chart.

Teaching sessions

Teaching session started with the first step of the skill for each student and continued until the criteria were met. Forward chaining method, was used while teaching skills to students. All teaching sessions were recorded on camera and data of these sessions were collected by implementers who watched these sessions. As in beginning level and probe sessions, teaching sessions began by drawing target student's attention. When target student focused his attention, verbal reinforcers were used. Then skill instruction was given. They waited for 4 seconds for target student to realize the skill. When he could not realize the skill, prompts were given. Based on most to least teaching method, prompts were presented in the following order.

In the first five sessions, physical prompting (over the sample's hand) and verbal prompting (now we are putting on the coat) were used.

1. Implementer gave the instruction "put on your coat".
2. After the skill instruction, implementer gave full physical prompting and verbal prompting together to enable the student to complete the first step of skill analysis.
3. If the student realized the first step of skill analysis with physical prompting, applicator gave verbal reinforcer. Then, they passed onto the second step of skill analysis.
4. If the student did not give a correct reaction with full physical prompting, implementer returned to teaching this skill.

At the end of five sessions, partial physical prompting (touching the

sample's elbow gently) was used.

1. Implementer gave the instruction "put on your coat".
2. After the skill instruction, implementer gave full physical prompting and verbal prompting together to enable the student to complete the first step of skill analysis.
3. If the student realized the first step of skill analysis with partial physical prompting, implementer gave verbal reinforcer. Then, they passed onto the second step of skill analysis.
4. If the student could not realize this step with partial physical prompting, implementer presented full physical prompting in order to prevent the student from making mistakes and gave verbal reinforcer. Then, they passed onto the next step of skill analysis.
5. They passed onto the verbal prompting if the student passed each step of skill analysis with only partial physical prompting and verbal prompting in three consecutive sessions.

Verbal prompting was used for three sessions:

1. Right after skill instruction, implementer enabled the student to complete the first step of skill analysis with verbal prompting. For example, he gave the instruction "put on your coat" and waited for the student to do it.
2. After the student completed the first step of skill analysis successfully with verbal prompting, implementer gave verbal reinforcer. "Well done. You've put on your coat". Then they passed onto the second step.
3. If the student could not realize this step with verbal prompting, implementer presented partial physical prompting in order to prevent the student from making mistakes and gave verbal reinforcer. Then, they passed onto the next step of skill analysis with verbal prompting.
4. If the student could not realize this step with partial physical prompting, implementer presented full physical prompting in order to prevent the student from making mistakes and gave verbal reinforcer. Then, they passed onto the next step of skill analysis with verbal prompting.
5. implementer reinforced by giving the student food only when the student completed each step of skill analysis with only verbal prompting in three consecutive sessions. If he used full physical prompting or partial physical prompting in several steps of skill analysis, teaching program was revised and these steps were practiced again.

Skill was performed independently:

1. The student was expected to realize the first step after the skill analysis.
2. If the student realized the first step of skill analysis independently, implementer gave him verbal reinforcer. "Well done. You've put on your coat". Then they passed onto the second step.
3. If the student could not realize this step independently, implementer presented verbal prompting in order to prevent the student from making mistakes and gave verbal reinforcer. Then, they passed onto the next step of skill analysis to enable him to give independent reaction.
4. If the student could not realize this step with verbal prompting, implementer presented partial physical prompting in order to prevent the student from making mistakes and gave verbal reinforcer. Then, they passed onto the next step of skill analysis to enable him to give independent reaction.
5. Implementer gave full physical prompting when the student could not complete this step without partial physical prompting and gave verbal reinforcer. Then, they passed onto the next step of skill analysis to enable him to give independent reaction.
6. If the student realized the skill steps 100% independently in three

consecutive sessions, implementer collected probe data in the following week. If student performance fell below 100%, the program was revised and organized. Reinforcers were given until target students performed the required criteria. Food reinforcers and social reinforcers were given together for correct reactions. Nothing was done for false reactions and no reinforcer was given. When student performance reached 100% and all steps of skill performance were realized, verbal reinforcers were given.

Generalization sessions

Generalization sessions were held in order to understand whether students were able to generalize the target skill into different people and settings. Generalization data were collected in three consecutive weeks after all the students met the criteria. Students' classroom teacher was informed about the practice during generalization process. Generalization sessions were held at a time close to school end and a different classroom. The student was given the instruction "put on your coat" and implementer assessed whether he could do it. A different teacher of the school was asked for help in order to understand whether the student was able to realize the skill in the presence of different people, asking the student to put on the coat in his/her presence, recording the student's behavior and noting down the average as the generalization data of the target skill. Implementer reinforced the target students with verbal reinforcers for the target skills.

Monitoring sessions

Monitoring sessions were held in a way similar to beginning level sessions at the first, third and fourth weeks after teaching sessions.

Data collection

Three types of data were collected for the study; including effectiveness, inter-observer reliability and implementation reliability.

Collection of effectiveness data

All sessions were recorded on video and study data were collected after watching these records. While collecting effectiveness data, target students' correct and false behaviors in target skill were recorded and percentage of correct behavior was calculated. While assessing target skill, they collected data related to realizing skill steps of target skill. Implementers put a "+" on data collection form when students realized the steps correctly and "-" for other cases, calculating percentage of correct behavior and inserting these data on the chart.

Inter-observer reliability

Inter-observer reliability data of the study were collected by an instructor with doctorate degree at private education and a private education teacher who graduated from mentally handicapped teaching. Video records of the study at minimum 30% of beginning, application, probe, generalization and sustainability stages were watched by the observers and inter-observer reliability data were collected. Inter-observer reliability was calculated with [(unanimity)/(unanimity + divergence)] x 100 formula. Reliability percentage of both sample for beginning, application, probe, generalization

sessions was found 100% for the target skill.

Implementation reliability

Implementation reliability data was collected by the author with coat wearing skill teaching program application reliability data collection form. Before beginning to work on implementation reliability, the author was informed verbally about how the implementer would carry out the teaching process. While watching the video records related to implementation reliability, author marked "+" and "-" on the Implementation Reliability Form by deciding whether implementer had realized the items on Implementation Reliability Form. The formula for calculating implementation reliability was: "Observed Teacher Behavior/Planned Teacher Behavior x 100" for 50% specified with Unbiased Appointment Chart of the teaching sessions for each sample. Implementation reliability was found 100% according to study findings.

Data analysis

Data obtained as a result of the dressing skill teaching exercises were graphically analyzed. For data analysis, author used linear graphic, which is one of the graphical analysis techniques. Scores related to realization of the skill were shown at equal intervals between 0 and 100 over y axis as percentage, beginning, teaching, probe, monitoring and generalization data were numbered and shown at equal intervals on x axis.

RESULTS

This section involves findings on acquisition, sustainability findings related to coat wearing skill as well as data related to generalizing the skill into different people and settings. Decision to change the stage during implementation was made according to (100%) fulfillment of the criteria in target skills.

Findings related to acquiring, sustaining and generalizing level of coat wearing skill

Findings of each student related to acquiring, sustaining and generalizing level of target skill are shown in Figure 1.

Beginning Level (BL), Probe (P), Application (A), Monitoring (M) and Generalization (G) Session Data related to Teaching Coat Wearing Skill with Most to Least Prompting Method

As shown in Figure 1, it was observed that the first student Kürşat did not have the target skill at the beginning level stage. They passed onto target skill teaching as stable data was obtained at the three beginning level sessions. Percentage of correct reactions in target skill at teaching stage was found to be between 45 and 100%. Kürşat performed the target skill at

acceptable level of 100% in the 4th, 5th and 6th sessions during application stage. As this level was the required performance, the specified criteria were met and teaching stage of the skill was ended. It was observed, that second student Ogün did not have the target skill at beginning level and probe stage. Percentage of correct reactions in target skill at teaching stage was found to differ between 50 and 100%. Ogün performed the target skill at acceptable level of 100% in the 7th, 8th and 9th sessions during application stage. As this level was the required performance, the specified criteria were met and teaching stage of the skill was ended. It was observed that third student Burak did not have the target skill at beginning level and probe stage. Percentage of correct reactions in target skill at teaching stage was found to differ between 45 and 100%. Burak performed the target skill at acceptable level of 100% in the 7th, 8th and 9th sessions during application stage. As this level was the required performance, the specified criteria were met and teaching stage of the skill was ended.

As shown in Figure 1, all of three students (Kürşat, Ogün and Burak) performed the target skill at the acceptable level of 100% in monitoring sessions which were held one, three and four weeks after target skill teaching ended. Again as shown in Figure 1, correct reaction percentage of all three students (Kürşat, Ogün and Burak) in generalizing the target skill to different people and settings at generalization sessions was found 100%.

DISCUSSION AND SUGGESTIONS

This study investigated the effectiveness of most to least prompting method in teaching autistic children coat wearing skill. Study findings reveal that most to least prompting method is effective in teaching the target skill to autistic students. Moreover, it was found that students were able to sustain the skill after the implementation ended and generalize it to different settings and people. These findings are similar to the study of Aykut and Varol (2007) who tried to teach a mentally handicapped student to wear stretch pants, cut an empty paper with scissors and paint an empty paper, study of Özen et al. (2003) study where they taught self-care skills to three mentally disabled students, Eren et al. (2013) study where they investigated the effectiveness of embedded teaching carried out with most to least prompting method in musical activities based on Orff approach on teaching concepts to autistic children, Vuran's (1989) study related to teaching dressing skills, Day and Horner's (1986) study where they taught dressing skills to 6 mentally disabled boys, study of Libby et al. (2008) who compared gradual withdrawal of prompting and least to most prompting in playing game blocks with 5 autistic children, Sisson and Dixon's (1986) study where they taught

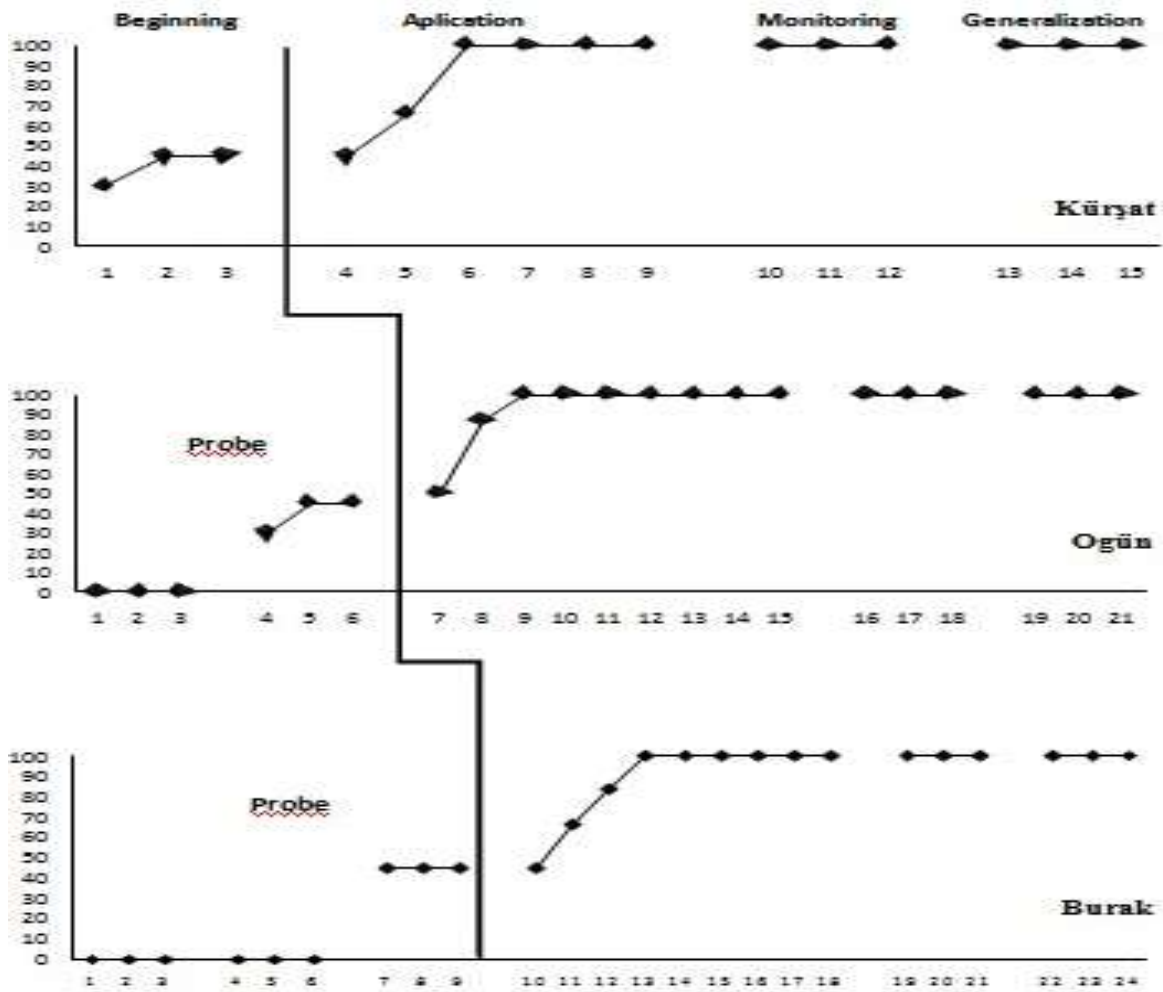


Figure 1. Acquiring, sustaining and generalizing level of target skill.

eating skills (chewing with closed mouth, using spoon, knife and handkerchief properly) to six mentally disabled children and finally the study of Denny et al. (2000) who taught eating and ball rolling skills to a mentally disabled child. Teaching with most to least prompting is commonly used as an effective method in teaching individuals with autism, developmental retardation or mental disability at various levels. It is seen that majority of studies with this method are carried out with individuals who have moderate or serious mental disability. Moreover, most to least prompting method is effective in teaching both single-step and chain behaviors to people of all age groups (Tekin-İftar and Kırcaali-İftar, 2012). These study findings support this view. At the end of this study, it was found that most to least prompting method is effective in teaching coat wearing skill to autistic students. Future studies may be repeated with students from different disability groups, different settings, different single-sample study models and errorless teaching methods.

Teachers working with students with special needs may be informed about how most to least prompting method is used in teaching so that they could use it effectively.

Conflict of Interests

The authors have not declared any conflict of interests.

REFERENCES

- Ayıkut Ç, Varol N (2007). Zincirleme Becerilerin Kazandırılmasında İpucunun Sistematik Olarak Azaltılması İşlem Süreci İle Yapılan Beceri Öğretiminin Etkisi. [The Effect Of Most To Least Prompt in Teaching Of Chained Tasks]. Gazi Üniversitesi Eğitim Fakültesi Dergisi, 27(3):221-238.
- Ayıkut Ç (2007). Zihinsel Yetersizlikten Etkilenmiş Öğrencilere Günlük Yaşam Becerilerinin Kazandırılmasında Sabit Bekleme Süreli Ve İpucunun Sistematik Olarak Geri Çekilmesi İşlem Süreci İle Yapılan Öğretimin Etkiliklerinin Ve Verimliliklerinin Karşılaştırılması.

- [Effectiveness and Efficiency of Constant-Time Delay and Most-to-least Prompt Procedures in Teaching Daily Living Skills to Children with Intellectual Disabilities] (Unpublished Doctoral Dissertation), Gazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Ankara.
- Aykut Ç, Varol N (2010). Zihinsel Yetersizlikten Etkilenmiş Öğrencilere Günlük Yaşam Becerilerinin Kazandırılmasında Sabit Bekleme Süreli Ve İpucunun Sistematik Olarak Geri Çekilmesi İşlem Süreci İle Yapılan Öğretimin Etkiliklerinin Ve Verimliliklerinin Karşılaştırılması. [Effectiveness and Efficiency of Constant-Time Delay and Most-to-least Prompt Procedures in Teaching Daily Living Skills to Children with Intellectual Disabilities] *Türk Eğitim Bilimleri Dergisi*, 8(1):227-261.
- Aykut Ç (2012). Zihinsel Yetersizlikten Etkilenmiş Öğrencilere Günlük Yaşam Becerilerinin Kazandırılmasında Sabit Bekleme Süreli ve İpucunun Sistematik Olarak Geri Çekilmesi Öğretim Yöntemlerinin Karşılaştırılması. [Effectiveness and Efficiency of Constant-Time Delay and Most-to-least Prompt Procedures in Teaching Daily Living Skills to Children with Intellectual Disabilities] *Kuram ve Uygulamada Eğitim Bilimleri [Educational Sciences: Theory & Practice]* 12(1):353-373.
- Bozkurt F (2001). Zihin Özürlü Çocuklara Aparentif Yiyecek-İçecek Hazırlama ve Servis Yapma Becerilerinin Öğretiminde Sabit Bekleme Süreli Öğretimin Etkilliliği. [The Effectiveness Of The Constant Time Delay Procedure On Teaching Snack And Drink Preparation Skills To Children with Mental Retardation] (Unpublished Master Dissertation) Anadolu Üniversitesi, Eskişehir.
- Cavkaytar A(1998). Özbakım ve Ev İçi Becerilerinin Öğretimi El Kitabı. [Manual Book Of Teaching Selfcare And Domestic Skills]. Eskişehir: Anadolu Üniversitesi.
- Cavkaytar A (1999). Zihin Engellilere Özbakım Ve Ev İçi Becerilerinin Öğretiminde Bir Aile Eğitimi Programının Etkilliliği. [The Effectiveness Of A Parent Training Program For Teaching Self-Care And Domestic Skills To Mentally Handicapped Children]. *Özel Eğitim Dergisi*, 2(3):40-50.
- Darca N, Abidoğlu Ü, Gümüşçü Ş (2002). Otizm ve Otistik Çocuklar.[Autism and Autistic Children] Ankara: Özgür Yayınları.
- Eren B, Deniz J, Düzkanar A (2013), Orff Yaklaşımına Göre Hazırlanan Müzik Etkinlikleri İçinde İpucunun Giderek Azaltılması Yöntemi ile Yapılan Gömülü Öğretimin Otistik Çocuklara Kavram Öğretmedeki Etkilliliği. [The Effectiveness of Embedded Teaching through the Most-to-Least Prompting Procedure in Concept Teaching to Children with Autism within Orff-based Music Activities]Kuram ve Uygulamada Eğitim Bilimleri, [Educational Sciences: Theory & Practice], 13(3):1863-1887. doi: 10.12738/estp.2013.3.1499.
- Farlow LJ, Snell ME (2003). Teaching Basic Self-Care Skills. M. Snell & F. Brown (Ed.) Instruction of Students with Severe Disabilities. (331-377). Ohio: Merrill Prentice Hall, Columbus.
- Kayaoğlu H, Görür Ö (2008). Otistik Çocuklar Nasıl Öğrenir?[How do Autistic Children Learn?] Ankara: Epos Yayınları.
- Kırcaali-İftar, G. (2012). Otizm Spektrum Bozukluğuna Genel Bakış. E. Tekin-İftar (Ed.)[Overview of Autism Spectrum Disorder]. Otizm Spektrum Bozukluğu Olan Çocuklar ve Eğitimleri. [Autism Spectrum Disorder Children and Training]. (s.17). Ankara: Vize Yayıncılık
- Libby ME, Weiss JS, Bancroft S, Ahearn WH (2008). A Comparison of Most-to-Least and Least-to-Most Prompting on the Acquisition of Solitary Play Skills, *Bağ*, pp. 37-43.
- Mcdonnell J, Ferguson B (1989). A Comparison Of Time-Delay Procedure And Decreasing Prompt Hierarchy Stragies in Teaching Banking Skills To Students With Moderate Handicaps. *J. Appl. Behav. Anal.* 22:85-91.
- Miller UC, Test DW (1989). A Comparison Of Constant Time-Delay And Most-To-Least Prompting In Teaching Laundry Skills To Students With Moderate Retardation. *Education And Training In The Mental Retardation*, 24:363-370.
- Özen A (1995). Zihin Engelli Çocuklara Yemek Yeme Becerilerinin Kazandırılmasında Fiziksel Yardıma, Model Olmaya ve Sözel Yönergeye Dayalı Bireyselleştirilmiş Öğretim Materyallerinin Etkilliliği.[The Effectiveness Of Teaching Plan For The Eating Skills Presented With The Method Of Physical Aid, Sampling And Verbal Instruction The Individualized by Mentally Retarded Children]. (Unpublished Master Dissertation), Anadolu Üniversitesi, Eskişehir.
- Özen A, Acar Ç, Tavlar Ö, Çetin Ö (2003). Özbakım Becerilerinin Öğretilmesinde İpucunun Giderek Azaltılmasıyla Öğretim Yönteminin Etkilliliği.[The Effectiveness of Most-To-Least Prompting on Teaching Self-Care Skills]. *Sosyal Bilimler Dergisi*.147-168.
- Sisson L, Dixon JM (1986). A Behavioral Approach To The Training And Assesment Of Feeding Skils In Multi-Handicapped Children. *Appl. Res. Mental Retardation*. 7:149-163.
- Sucuoğlu B (2012). Otizm Spektrum Bozukluğu Olan Çocukların Değerlendirilmesi. E. Tekin-İftar (Ed.). [Assesment of Autism Spectrum Disorder Children] Otizm Spektrum Bozukluğu Olan Çocuklar ve Eğitimleri. [Autism Spectrum Disorder Children and Training]. (s.69). Ankara: Vize Yayıncılık
- Tekin İftar E (2002). İleri Derecede Özürlü Öğrencilere Temel Becerilerin Öğretimi: Özbakım Becerilerinin Öğretimi.[Teaching of Selfcare Skills to Severe Disability Students] (Unpublished Doctoral Lessons Note), Anadolu Üniversitesi.
- Tekin-İftar E, Kırcaali-İftar G (2012). Özel Eğitimde Yanlıssız Öğretim Yöntemleri.[Errorless Teaching Methods in Special Education] Ankara: Nobel Yayın Dağıtım. pp. 269-272.
- Varol N (2011). Beceri Öğretimi ve Öz Bakım Becerilerinin Kazandırılması. [Teaching Skills and Gaining Selfcare Skills]. Ankara: Kök Yayıncılık.
- Vuran S (1989). Zihinsel Engelli Çocukların Giyinme Becerilerinin Öğretiminde Yapabildiklerine Dayalı Olarak Hazırlanan Öğretim Materyalinin Etkilliliği. [The Effectiveness of Teaching Material Prepared For Mental Retardation Children For Instruction of Dressing Skills Based on Own Performance],(Unpublished Master Dissertation), Anadolu Üniversitesi, Eskişehir
- Vuran S (2011). Özbakım Becerilerinin Gelişimi ve Öğretimi,[Developing and Teaching of Selfcare Skills], E.S. Batu.,(Ed.). 0-6 Yaş Arası Down Sendromlu Çocuklar ve Gelişimleri.[0-6 Age with Down Syndrome Children and Development] (s.211,213.214.216), Ankara: Kök Yayıncılık .
- www.aaid.org, 2008.
- Yücesoy Özkan Ş (2007).Yetersizlik Gösteren Bireylere Giyinme Becerilerinin Öğretimiyle İlgili Alan Yazın Taraması,[Review of the Literature Related to Teaching Dressing Skills to Individuals with Disabilities], Ankara Üniversitesi Eğitim Bilimleri Fakültesi Özel Eğitim Dergisi 8(1):61-77.

Full Length Research Paper

Pupils' error on the concept of reversibility in solving arithmetic problems

Syarifatul Maf'ulah^{1*}, Dwi Juniati² and Tatag Yuli Eko Siswono²

¹Mathematics Education, STKIP PGRI Jombang, Indonesia.

²Mathematics Education, Universitas Negeri Surabaya, Indonesia.

Received 16 June, 2016; Accepted 16 September, 2016

The fact that there is no much study on reversibility is one of reason this study was conducted. Others, the importance of reversibility is also being researcher's motivation for focusing pupils' reversibility. On the other hand, the concern on pupils' reversibility is a major concern. The objective of this research is to identify errors done by the pupils in solving arithmetic problems related to reversibility concept. The result of this study can inspire teachers to consider the problem-solving in minimizing errors which must be done by the pupils in solving other arithmetic errors. The result of this study can be used as a reference in designing further learning and tasks for student's reversibility development. This research is qualitative with descriptive approach. The subjects of this research are fifth grade pupils of three Elementary Schools in Jombang, Indonesia. Researcher gave arithmetic task related to reversibility concept to the research subject. The pupils' worksheet was analyzed by calculating a number of pupils who did error for each arithmetic item. Then, it was classified to groups which were based on the error types done by the pupils. Furthermore, the researcher described error types done by the pupils related to Roberts, namely wrong operation, obvious computation error, defective algorithm, and random response. This case proved that there are some elementary school pupils who are still having difficulty in solving arithmetic problems related to reversibility concept.

Key words: Pupil's error, concept of reversibility, solving, arithmetic problems.

INTRODUCTION

Piaget's theory (Inhelder and Piaget, 1958) explained the levels of individual's cognition growth from newborn to adult into 4 stages:

1. Sensory-motoric stage (from the newborn to 2 years old)
2. Pre-operational stage (from 2 years old to 7 years old)
3. Concrete-operational stage (from 7 years old to 11

years old), and

4. Formal-operasional stage (from 11 years old to adult).

At sensory-motoric stage, infants learn about their surroundings by using their sensoric and motoric skills. They moved with reflexes. At pre-operational stage, their language conception were rapidly developed, but still in primitive manner. In developing their skills, they

*Corresponding author. E-mail: dwi_juniati@yahoo.com.

symbolized objects. At this phase, they had no figure on the nature of conservation for they were centering, they fully focused on one state only. Hence, their ideas were intuitive and not irreversible, they could not turn the ways of their thinking back into the initial state. At the concrete stage, their reversibility evolved. Reversibility is individual's mental ability to turn the way of thinking back into the original state. At formal-operational stage, they could readily have an abstract and logical construct.

In accordance to Piaget's theory on cognition growth as earlier discussed, it was suggested that the main characteristic of children at concrete stage was the development of reversibility. If reversibility was involved as the feature of an individual's cognition growth, it would be necessary and should be concerned since it evolved. Thus, this research is inspired by the theory of Piaget about reversibility. The researcher were also motivated by Lamon (2007), that there are few research about reversibility. Lamon requested researchers, especially in education field, to focus and investigate on students' reversibility.

Reversibility is defined as someone's capability to control their mentality in order to be able to return to the starting point (Slavin, 2006). For instance, the problem of conservation according to Piaget (Inhelder and Piaget, 1958), is given in two glasses which contained milk with comparable volume. When one of the milk is poured into a bowl (A container which is shorter and wider), then a question was asked, "Which is more, the milk in the glass or milk in the bowl?". When the children's reversibility has been properly developed, they will respond by saying that the milk in the glass is comparable with the milk in the bowl. Due to the way children think that milk in the bowl poured into a glass will have comparable volume, proving that the volume at both container are similar. It means that children's capability to control their mentality in order to be able to return to the starting point has been developed.

Krutetskii (1976) defines mathematical ability related to pupils' success in solving problems are reversibility and flexibility. Inhelder and Piaget (1958) said that reversibility can be considered a key requirement in a number of problems in mathematics. While Haciomeroglu and Presmeg (2009) stated that pupils' reversibility is really important in understanding mathematics topic related to the inverse. All those opinion prove that pupils' reversibility is important, because toward reversibility, pupils are able to solve a number of case related to mathematical problems, one of them is the topic about inverse.

According to Carpenter and Moser (2008), one of the example about arithmetic problems related to reversibility is "Jim has 5 marbles. He has 8 marbles less than Connie's. How many marbles does Connie have?". If the pupils finish that exercise through involving reversibility, they should think "if Jim has 8 marbles **less than** Connie,

so Connie has 8 marbles **more than** Jim. Due to Jim has 5 marbles, so the total of Connie's are $8 + 5 = 13$ marbles. Or pupils can think that Jim has 8 marbles". Or pupils can think that "Jim has 8 marbles less than Connie' so the **difference** between Jim's and Connie's is 8. Therefore, in arithmetic equation, it can be said *the number of Connie's marbles* – *the number of Jim's marbles* = 8 or *the number of Connie's marbles* – 5 = 8. So, the number of Connie's marbles are $8 + 5 = 13$ ".

According to Fuson (1992), reversibility is needed to deal with addition and subtraction problems that cannot be solved by direct modeling. This judgment implicates that one of the topic related to pupils' reversibility is arithmetic. According to Wong (1977), reversibility is important for the addition concept as "If a child knows that $3 + 2 = 5$, Is he able to answer $5 = \square + 2$ or $3 + \square = 5$?" If he is able to answer it, then his reversibility has been developed, because he understand that $3 + 2 = 5$ similar with $5 = 3 + 2$ ".

The explanation earlier mentioned shows that pupils' reversibility is important and needs to be noticed since the reversibility is being developed. As the first step in identifying pupils' reversibility, the researcher wants to reveal first condition of pupils' reversibility at the Elementary Scholl in solving arithmetic problems. Therefore, the researcher gave arithmetic task related to reversibility concept to the pupils, then the researcher can identify errors done by the pupils in solving arithmetic items related to reversibility concept.

The pupils of Elementary School was chosen as the research subject with the consideration that reversibility is being developed at the concrete level, that is when a child is up to 7 to 11 years old (Piaget and Inhelder, 1958), this means that the pupils are all in Elementary School. Moreover, reversibility is related to arithmetic. Otherwise, arithmetic for the first time was given to the pupils at the Elementary School.

Therefore, the objective of this research is to identify errors done by the pupils at the Elementary School in solving arithmetic problems related to reversibility concept. If the teacher knows the description of pupils' reversibility based on the errors done by them, the researcher's expectation is the teachers are able to think the problem-solving in minimizing errors must be done by the pupils for the next. Furthermore, the research result can be as orientation to compose the next learning and duties for the pupils' reversibility development.

REVIEW OF LITERATURE

Reversibility

Reversibility is a term adopted from Piaget's theory that one of children's characteristic at the concrete

operational level starts at the phase when reversibility is being developed. Furthermore, Inhelder and Piaget (1958) said that "reversibility is defined as the permanent possibility of returning to the starting point of the operation in question".

For instance, two glasses containing milk with comparable volume. When one of the milk is poured into a bowl (A container which is shorter and wider), then a question was raised "Which is more, the milk in the glass or milk in the bowl?". Children at the pre-operational will answer that the milk in the glass is comparable with the milk in the bowl. This is because the children's mentality is "centrally" and *irreversible*. Children only focused on one aspect, that is the milk volume, and ignoring the other aspect. While children at the concrete operational level will answer that 'milk in the glass' is comparable with 'milk in the bowl'. Because children at this level has the mentality that if milk in the bowl is poured into the glass, the volume will be as same as that in the bowl, which shows that the volume for the both container are comparable. It means at that at this level, children's ability to control their mentality return to the starting point where it has been developed. In this case, *starting point* means *two glasses that contained milk with comparable volume*. While, *change their mindset to the starting point is when children pour the milk in the bowl to the glass*. So the milk volume will be as same as the condition before it is poured.

According to Kang and Lee (1999), "reversibility enables the recognition of problems in various ways". For instance, the pupils of Elementary School were given an arithmetic problem, that is " $43 - \square = 24$ ", then they were asked to determine the value at the box. So, through the reversibility, the pupils are able to investigate $43 - \square = 24$ through some ways, that is:

1. $-\square = 24 - 43$,
Since children would think that the two parts of arithmetical equation $43 - \square = 24$ was added by -43 , the equation would be $(-43) + 43 - \square = 24 + (-43)$, hence the result found $-\square = 24 - 43$.

2. $\square = 43 - 24$,
Since children would think that arithmetical equation $43 - \square = 24$ implied that 43 minus particular number (symbolized with \square) equaled to 24. If 43 minus particular number (symbolized with \square) equaled to 24, then, 43 minus 24 should be that particular number (symbolized with \square). Indicating that $43 - 24 = \square$ atau $\square = 43 - 24$.

Such ideas described the notion of reversibility. Firstly, children involved reversibility with reciprocity, operating the two parts of equation with similar element. At the second manner, they involved reversibility with negation, thinking if 43 minus particular number (symbolized with

\square) equaled to 24, then, 43 minus 24 should be that particular number (symbolized with \square).

According to Piaget and Inhelder (1998) they stated that there are two reversibilities concept, which are negation and reciprocity. Here, negation includes understanding which is a way one could be delayed by other way. In this case, reversibility shows the idea which is in every operation has invers which is used for canceling the operation. In the example earlier given, subtraction is simply the reversal of addition while multiplication which is canceled by dividing operation. This means that addition negation is subtraction and multiplication is dividing. While the reciprocity concepts are related to the equivalent relation. The other example of negation and reciprocity in algebra case which is explained by Ardi (2009) are:

"In mathematics education, Adi (1978) used the concept of negation and compensation to study the relationship between college students' developmental level and their performance on equation solving. She provides the equation $14 - \frac{15}{7-x} = 9$ to illustrate her interpretation of negation and compensation. In solving this algebraic equation, *negation* is involved when one is asked to make the following inferences: 'Fourteen minus what equals nine?', 'Fifteen divided by what equals five?', and 'Seven minus what equals three?'. On the other hand, *compensation* is involved when one multiply both sides of the equation by $7 - x$ to obtain $98 - 14x - 15 = 63 - 9x$."

Based on these explanation, the researcher conclude that if the reversibility is being developed optimally, so the children are able to solve the arithmetic problems correctly. To acquire it, the children's reversibility need to be practiced through giving problems related to reversibility concept.

Krutetskii (1976) explained that one of the mathematical ability related to pupils' success in solving problem is reversibility. Reversibility refers to the ability of establishing two-way reversible relations as opposed to one-way relations which function only in one direction. This view implied that reversibility had two process within:

1. A process that started from the initial state moving into the end point as the goal and
2. A process that started from the end point moving back into the initial one, however, it was fine to use another path as its way.

Furthermore, he also explained on reversibility of the mental process, thinking in a reverse direction from the result or the product to the initial data. For instance, the pupils of Elementary School are asked to answer arithmetic problem " $29 + \dots = 46$ ", if the pupils involve reversibility in answering the task, so the pupils will think

Table 1. Indicators of error classification of the reversibility concept in solving arithmetic problem by Roberts (1968).

Error classification of the reversibility concept in solving arithmetic problem	Indicators
Wrong operation	The problems are solved using the operator other than the one specified in the problem. Children were considered in conducting a wrong operation when they completed an arithmetical task by changing the operation presented. Given a task $23 + \dots = 10$, they completed the task by changing the addition operation into the subtraction, which changed the task into $23 - \dots = 10$, with 13 as the result. This error was classified as wrong operation
Obvious computation error	In this form of error, the pupil uses the correct algorithm but due to carelessness in recalling number facts, the wrong answer is given. Given a task $3 + \dots = 10$, the pupil complete the task with correct algorithm, ($\dots = 10 - 3$). The result was supposed to be 7, however, the pupil miscalculated the equation into 10 minus 3, which result in 6. This errors was classified as <i>obvious computation error</i>
Defective algorithm	The pupil uses the wrong algorithm in the problem-solving process. Given a task: $\dots - 4 = 3$, the pupil completed the task by subtracting 4 with 3, which result was 1. This was absolutely false due to the wrong algorithm
Random response	These are errors in which no general pattern is detected. Students' errors were not clearly detected

"if 29 plus a particular number was 46, then, 46 minus 29 should be that particular number. This was due to the fact that the result of 29 plus the particular number was 46". Thus, to fill the blank they need to apply this " $46 - 29 = \dots$ ", and the result is 17. After getting the result, the next mentality activity done by them is to return to the result to the previous data. In this case, the previous data is its problem (that is $29 + \dots = 46$). Then it can be acquired $29 + 17 = 46$. So it is right that the problem-solving is 17.

The classification of the errors which is done by the pupils for arithmetic solving which is related to the reversibility concept

The reversibility of pupils could be practiced through giving the task which is related to the reversibility concept. One of material which could be used for practicing the reversibility is arithmetic. Ramful (2008) stated that, in mathematics, the reversibility is related to the operation of arithmetic, decimal, ratio, algebra, and other cases. According to Wong (1977), the educators' assumes that reversible thought is related to children's performance at arithmetic equations. Secondly, according to Maf'ulah (2015), he stated that reversibility is having strengthened the relation with decimal and arithmetic.

In this study, the researcher has focused on the arithmetic material. The researcher would like to identify the errors which have been done by the pupils in solving

the problem of arithmetic which is related to the reversibility concept. Through this study, hopefully this could be used as previous study of the other arranging the teaching and learning for developing the reversibility of the pupils. In this study, the errors of pupils in solving of arithmetic case which is related to the reversibility concept which is describe is based on the classifications of the error according to Roberts (1968) as shown in Table 1.

RESEARCH METHOD

Research design

The research design of the study is qualitative design with descriptive approach. This study met the characteristics of qualitatif research, as Bpgdan and Biklen (1998) stated which are:

1. It was naturalistic because the data sources was real with researchers as the primary instrument
2. The data was descriptive due to its qualitative nature, in the form of essay. In this case, the data was derived from the result of subjects' works
3. It was inductive, which had no intention to test a hypothesis, but merely describing a phenomena.

Research subject

This study involved 96 pupils of the fifth graders in jombang with 55 males and 41 females as the research subject. Elementary students were selected with consideration that reversibility began to

Reversibility Test	
Name	:.....
Sex (boy/girl)	:.....
Answer all question!	
1.	$322 + 134 = \dots\dots$
2.	$129 + \dots\dots = 416$
3.	$254 - \dots\dots = 138$
4.	$245 + \dots\dots = 133$
5.	$\dots\dots - 346 = 128$
6.	$\dots\dots + 218 = 382$
7.	$207 - 168 = \dots\dots$
8.	$\dots\dots + 166 = 286$
9.	$\dots\dots - 314 = 164$

Figure 1. Arithmetic task.

evolve in the age-range between 7 to 11 years old, indicating elementary graders. Besides, the fifth graders were chosen due to the fact that they had already learned arithmetic. However, the researchers took one sample in each category of errors for data analysis and research findings.

Research instrument

The objective of the study is to identify the errors of arithmetic which is related to the reversibility concept. For reaching up the objective of the study, the researcher made arithmetic task which is related to reversibility concept as this instrument has been validated by expert validator. There are 9 items of arithmetic task as shown in Figure 1.

Data collected procedure

The researcher gave instrument of arithmetic task which is related to reversibility concept to the pupils. Then the pupils completed arithmetic task individually.

Data analysis

Students' works were analysed by counting the students with errors for each number of mathematics task given. Then, they were classified into groups based on their errors. The researchers described the kinds of students' errors for each group based on Roberts' error classification (1968) including *wrong operation*, *obvious computation error*, *defective algorithm* and *random response*. The researchers selected one subject with errors in each group. Analysis was conducted within some procedures which are:

1. Data reduction that aims at assert, select, focus, abstract, and transform all raw data into meaningful ones.

2. Data presentation that included classifying and identifying data, which transcribed the organized and categorized data that enabled one to make the conclusion; and (3) conclusion making.

RESULTS

The item number 1 is not relating item to the reversibility concept. As what Wong (1977) stated that, "the form of $x + y = \dots$ " was not included in Piaget's abstract concept of reversible thought even though it constitutes on form of arithmetic equations". The item 1 is only to check the subject's understanding concerning to sum operation. Thus, for number 1 is not paid more attention in error analyzing. Based on pupils' answers, the data was gotten as shown in Table 2. Based on Table 2, information concerning the types of errors which were committed by the pupils in solving arithmetic problem related to the reversibility concept is gotten and they are presented below:

Wrong operation error

Data of the pupils who committed an error due to this type of wrong operation in completing arithmetic problem related to reversibility concept is presented in Table 3. Based on Table 3, there are 3 items where the pupils have committed error due to the type of wrong operation, those are number 4, 7, and 9. For number 4, all pupils answered 112 by changing " $254 + \dots = 138$ " to " $254 - \dots = 138$ ". Due to the problem number 7, all pupils

Table 2. Summary of the number of pupils who committed errors in solving arithmetic problem related to the reversibility concept.

Number	Arithmetic problem	The number of pupils who committed error for each type of error				The number of pupils who committed error
		Wrong operation	Obvious computation error	Defective algorithm	Random response	
1	$322 + 134 = \dots$	-	-	-	-	-
2	$129 + \dots = 416$	0	3	3	16	25
3	$254 - \dots = 138$	0	5	15	16	36
4	$245 + \dots = 133$	7	2	56	18	84
5	$\dots - 346 = 128$	0	2	12	22	36
6	$\dots + 218 = 382$	0	3	11	12	26
7	$207 - 168 = \dots$	3	39	2	24	68
8	$\dots + 166 = 286$	0	1	9	16	26
9	$\dots - 314 = 164$	2	2	12	17	33

Table 3. Data which present the number of pupils who completed *wrong operation* error.

Number	Arithmetic problems	The number of pupils who committed wrong operation error	
		Quantity	Percentage (%)
1	$322 + 134 = \dots$	-	-
2	$129 + \dots = 416$	0	0
3	$254 - \dots = 138$	0	0
4	$245 + \dots = 133$	7	6.72
5	$\dots - 346 = 128$	0	0
6	$\dots + 218 = 382$	0	0
7	$207 - 168 = \dots$	3	2.88
8	$\dots + 166 = 286$	0	0
9	$\dots - 314 = 164$	2	1.92
-	Total	12	-

answered 375 by changing " $207 - 168 = \dots$ " became " $207 + 168 = \dots$ ". In solving the problem, pupils change the operation given on the task. It means that the pupils commit *wrong operation* in solving arithmetic problem related to the reversibility concept. Figure 2 presents one of the examples of pupil's error. Figure 2 shows the example of error at the type of wrong operation which was committed by the initial subject AI. The problem was $245 + \dots = 133$, however AI changed the sum operation on $245 + \dots = 133$ which became minus operation $245 - \dots = 133$. Thus, the answer which was gotten was wrong.

Obvious computation error

Data of the pupils who committed an error due to the type of obvious computation error in completing arithmetic problem related to reversibility concept is presented in Table 4. The information presented in Table 4 shows that

for each item there are some pupils who are definitely committed to such error. But the obvious computation error was committed mostly by the pupils when they solved arithmetic problem number 7, more than 39 (or 37.44%) pupils committed the obvious computation error. Figure 3 shows the different types of error. The answer presented in Figure 3 should be 39. However, subject LA answered 239 because he committed an error in accounting.

Defective algorithm error

Data of the pupils who commit an error at this type of defective algorithm in completing arithmetic problem related to reversibility concept is presented in Table 5. The information presented in Table 5 shows that for each item there were some pupils who definitely committed the type of error.

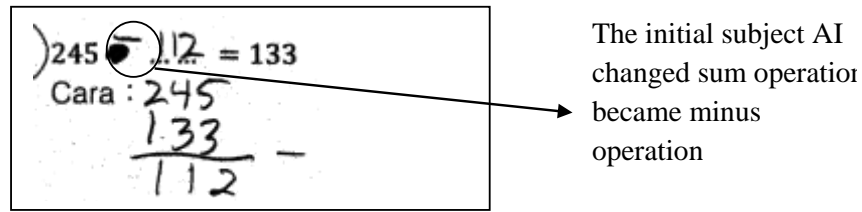


Figure 2. The example of pupil's error due to the type of *wrong operation*.

Table 4. Data which present the number of pupils who completed *obvious computation error*.

Number	Arithmetic problems	The number of pupils who committed "obvious computation error"	
		Quantity	Percentage (%)
1	322 + 134 = ...	-	-
2	129 + ... = 416	3	2.88
3	254 - ... = 138	5	4.8
4	245 + ... = 133	2	1.92
5	... - 346 = 128	2	1.92
6	... + 218 = 382	3	2.88
7	207 - 168 = ...	39	37.44
8	... + 166 = 286	1	0.96
9	... - 314 = 164	2	1.92
-	Total	57	-

The error computation placement that was committed by the initial subject LA, it should be 0, but LA wrote 2, means that LA did an error in accounting.

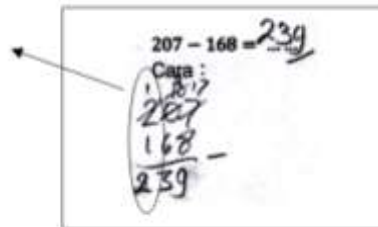
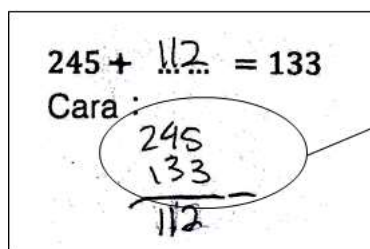


Figure 3. The example of pupils' error in obvious computation error type.

Table 5. Data which present the number of pupils who commit an error due to the defective algorithm type.

Number	Arithmetic problems	The number of pupils who committed "defective algorithm" error	
		Quantity	Percentage (%)
1	322 + 134 = ...	-	-
2	129 + ... = 416	3	2.88
3	254 - ... = 138	15	14.4
4	245 + ... = 133	56	53.76
5	... - 346 = 128	12	11.52
6	... + 218 = 382	11	10.52
7	207 - 168 = ...	2	1.92
8	... + 166 = 286	9	8.64
9	... - 314 = 164	12	11.52
-	Total	120	-



The initial subject F committed an error in algorithm. It should be $133 - 245$, but the subject F used algorithm of $245 - 133$

Figure 4. The example of pupil committed on error due to the defective algorithm type

Table 6. Data which presents the number of pupils who commit an error due to random response type.

Number	Arithmetic problem	The number of pupils who commit "random response" error	
		Quantity	Percentage (%)
1	$322 + 134 = \dots$	-	-
2	$129 + \dots = 416$	16	15.36
3	$254 - \dots = 138$	16	15.36
4	$245 + \dots = 133$	18	17.28
5	$\dots - 346 = 128$	22	21.12
6	$\dots + 218 = 382$	12	11.52
7	$207 - 168 = \dots$	24	23.04
8	$\dots + 166 = 286$	16	15.36
9	$\dots - 314 = 164$	17	16.32
-	Total	141	-

1. For solving the problem number 2, there are 2.88% pupils who used $416 + 129$ method.
2. For solving the problem number 3, there are 14.4% pupils who used $254 + 138$ method.
3. For solving the problem number 4, there are 10.52% pupils who used $245 - 133$ method, and there are 43.24% pupils solving the problem who used $245 + 133$ method.
4. For solving the problem number 5, there are 11.52% pupils who used $346 - 128$ method.
5. For solving the problem number 6, there are 10.52% pupils who used $382 + 218$ method.
6. For solving the problem number 8, there are 8.64% pupils who used $166 + 286$ method.
7. For solving the problem number 9, there are 11.52% pupils who used $314 - 164$ method.

The information earlier mentioned explains that there were still many pupils who committed an error when applying method or strategy in solving arithmetic problem. It means that there were many pupils who committed defective algorithm in solving arithmetic problem related to the reversibility concept thus consist an error. Figure 4 shows an example of this type of error.

Random response error

Data of the pupils who committed an error at this type of random response in completing arithmetic problem related to reversibility concept is presented in Table 6. Data on the Table 6 shows that for each item there were some pupils definitely committed to the type of random response error. Figure 5 shows the example of this type of error. The answer of the problem on Figure 5 should be 287. However, the initial subject ALA answered 136. ALA's answer was wrong. Moreover, the solving process was unclear. Thus, the error which was completed by ALA was not detected clearly. So, the solving problem of Figure 5 was categorized into random response.

DISCUSSION

The objective of this research is to identify the Elementary Schoolpupils' error in solving arithmetic problem which is related to the reversibility concept. The research result goes with Roberts (1986) finding which mentioned, the type of error, namely wrong operation, obvious computation error, defective algorithm, and random response. The error due to this type of random response

$129 + 136 = 416$
Cara :

1	129	
	2	
	136	+

The unclear solving process, thus the type of error was not detected.

Figure 5. The example of pupils' error due to the type of *random response*.

occured when the pupils did not understand what they should complete in solving the item thus, they carried out an unclear completion. This means that the students did not understand arithmetic concept which is related to the reversibility.

According to Krutetskii (1976), "reversibility of the mental process, is the thinking in a reverse direction from the result or the product to the initial data". If it is related to the solving process of arithmetic problem which is concerned with the reversibility concept, then better for the pupils check their work which they completed back to the first data. With this, in solving arithmetic problem which is given by the researcher, most of the pupils did not check their work according to the first data, thus they did not understand that their obtained work was wrong.

The number of errors which was completed by the pupils also shows pupils who lack understanding to arithmetic due to the fact that they did not used the reversibility properly. Due to the fact that the reversibility has a role in understanding the mathematical material related to the inverse, while the arithmetic is part of the mathematical material related to invers. According to the study of Hacımeroglu and Presmeg (2009), the reversibility of the pupils is very important in understanding the material relating to the inverse mathematical, and Fuson (1992) who said that reversibility is needed to deal with addition and subtraction problems. In addition, the research finding by Wong (1977) explained that when he gave reversibility assignment which contain 20 arithmetic equation, the result indicated significant correlation between reversibility and Arithmetic Performance which was found on female subject.

If related to the meaning of the equal sign "=" for pupils, Mc. Neil et al. (2006) said, "equal signs were often presented in standard operations-equals-answer contexts (for example, $3 + 4 = 7$) and were rarely presented in nonstandard operations on both sides contexts (for example, $3 + 4 = 5 + 2$)". The equal sign "=" is often given meaning by the pupils as the context of the answer. And rarely interpreted as connecting both sides contexts of

the equal sign "=", (that is, the right side is the same as the left side). If reversibility pupils are involved in meaning the equal sign "=", then the pupil should think if $x = y$ then $y = x$, nor vice versa. Which imply that the equal sign means "both side are the same or equal right side to the left side".

Arithmetic are basic materials for studying algebra and the other materials. According to what was explained by Greenes (2004), algebra is sometimes referred to as generalized arithmetic because it formalizes arithmetic relationships. Its power lies in the ways it allows us to represent relationships among quantities, to describe properties of operations (such as commutative and distributive), and to describe patterns. Algebra provides rules for manipulating symbols, such as simplifying an expression and then solving for an unknown. Therefore, by detecting the mistakes of the pupils in solving arithmetic problems, is expected to minimize the error.

CONCLUSION

The research conclusions are:

1. There were many pupils who committed errors in solving the second problem, as many as 23% pupils with the following detail: there are 3 pupils who committed error due to the type of obvious computation error, 3 pupils committed due to the type of defective algorithm error, and 16 committed error due to the type of random response.
2. There were many pupils committed errors in solving the third problem, as many as 36 pupils with the following detail: 5 pupils committed error due to the type of obvious computation error, 15 pupils committed error due to the type of defective algorithm and 16 pupils committed error due to the type of random response.
3. There were many pupils committed errors in solving the fourth problem, as many as 84 pupils with the following detail: 7 pupils committed error due to the type

of wrong operation, 2 pupils committed error due to the type of obvious computation error, 56 pupils committed error due to the type of defective algorithm and 18 pupils committed error due to the type of random response.

4. There were many pupils who committed errors in solving the second problem, as many as 36 pupils with the following detail: 2 pupils committed error due to the type of obvious computation error, 12 pupils committed error due to the type of defective algorithm and as many as 22 pupils committed error due to the type of random response.

5. There were many pupils who committed errors in solving the second problem, as many as 26 pupils with the following detail: 3 pupils committed error due to the type of obvious computation error, as many as 11 pupils committed error due to the type of defective algorithm and 12 pupils committed error due to the type of random response.

6. There were many pupils who committed errors in solving the second problem, as many as 68 pupils with the following detail: 3 pupils committed error due to the type of wrong operation, as many as 39 pupils committed error due to the type of obvious computation error, 2 committed error due to the type of defective algorithm and 24 pupils committed error due to the type of random response.

7. There were many pupils who committed errors in solving the second problem, as many as 26 pupils with the following detail: 1 pupil committed error due to the type of obvious computation error, 9 pupils committed error due to the type of defective algorithm and 16 pupils committed error due to the type of random response.

8. There were many pupils who committed errors in solving the second problem, as many as 33 pupils with the following detail: 2 pupils committed error due to the type of wrong operation, 2 pupils committed error due to the type of obvious computation error, 12 pupils committed error due to the type of defective algorithm and 17 pupils committed error due to the type of random response.

The explanations earlier given put up the fact that there are still many Elementary School pupils who experience such difficulties in solving arithmetic problem which are related to their reversibility. The researcher expects that this research result can inspire the teachers especially who teach at Elementary School grade in order to pay attention more to their pupils' reversibility earlier, and draft up the solution to minimize the errors which are probably committed by the pupils in solving the certain arithmetic problems later.

Conflict of interests

The authors have not declared any conflict of interests.

REFERENCES

- Fuson KC (1992). Research on whole number addition and subtraction. In D. Grouws (Ed.), *Handbook of research on mathematics teaching and learning*. New York: Macmillan. pp. 243-275
- Greenes C (2004). *Algebra: It's Elementary*: Boston University. Retrieved on August 7th, 2016 at www.enc.org/focus/k5algebra
- Haciomeroglu ES, Aspinwall L, Presmeg N (2009). The Role of Reversibility in The Learning of The Calculus Derivative and Antiderivative Graphs. *J. Res. Math. Educ.* 5:81-88
- Inhelder B, Piaget J (1958). *The Growth of Logical Thinking from Childhood to Adolescence*. New York: Basic Books
- Kang Mee-Kwang, Lee, Byung-Soo (1999). On Fuzzied Representation of Piagetian Reversible Thinking. *J. Korea Soc. Math. Educ. Ser. D: Res. Math. Educ.* 3(2):99-112
- Krutetskii VA (1976). *The Psychology of Mathematical Abilities in Schoolchildren*. Chicago: The University of Chicago Press.
- Lamon SJ (2007). Rational numbers and proportional reasoning: Towards a theoretical framework for research. In F. K. Lester (Ed.), *Second handbook of research on mathematics teaching and learning: A project of the National Council of Teachers of Mathematics* (pp. 629-667). Charlotte, NC: Information Age Publishing.
- Mafulah S, Juniati D, Siswono TYE (2015). Analysis on the ability of elementary school pupil who had high mathematics ability in making the equation of fractions. *Proceeding of ICERD 2015*. ISBN: 978-979-028-799-0. pp. 130-139. Surabaya. Indonesia.
- McNeil Nicole M, et al (2006). Middle-School Pupils' Understanding of The Equal Sign: The Books They Read Can't Help. *Lawrence Erlbaum Associates, Inc. Cognition And Instruct.* 24(3):367-385.
- Ramful A, Olive J (2008). Reversibility of thought: An instance in multiplicative tasks. *J. Math. Behav.* 27:138-151.
- Roberts GH (1968). "The failure strategies of third grade arithmetic pupils." *Arithmetic Teacher* 16:442-446
- Slavin Robert E (2006). *Educational Psychology: Theory and Practice*. Boston: Allyn & Bacon
- Wong B (1977). The relationship between piaget's concept of reversibility and arithmetic performance among second graders. *ERIC Journal*, Paper presented at the Annual Meeting of the American Educational Research Association (New York, New York, April 4-8, 1977), Serial No. ED 136 962

Full Length Research Paper

Elementary school leaders' perceptions of their roles in managing school curriculum: A case study

Azuraida Shahadan^{1*} and Ron Oliver²

¹Faculty of Education, University of Malaya, 50603, Kuala Lumpur, Malaysia.

²School of Education, California State University, Fullerton, 92831 Fullerton, California.,USA

Received 25 September, 2015; Accepted 19 July, 2016

The implementation of the Malaysian National Education Blueprint in 2012 has expanded headmasters' responsibilities and roles in managing schools. The goal is to stabilize and strengthen the primary school education system, which brings tremendous pressure to bear on the headmasters charged with managing schools, especially in managing the school curriculum. This article explores the roles of elementary school leaders and their perceptions in managing the school curriculum following the National Education Blueprint. It discusses the knowledge and skills in managing and handling the school curriculum, the aspects of school curriculum and guidelines for effective and efficient curriculum. This study is grounded in pragmatic worldview and concerned with applications and solutions that face educational leaders today. It was conducted in a State of Selangor, Malaysia and involved nine headmasters from nine schools. The findings will make a significant contribution to educational leadership by providing a general understanding of headmasters' roles, leadership and challenges in managing primary schools.

Key words: Headmaster leadership, school leadership, educational leadership, educational management.

INTRODUCTION

The Malaysian national goal of education is to develop a world-class quality education system that will realize the full potential of the individual and fulfill the aspirations of the Malaysian nation (Ministry of Education, 2004a). The principal of each school is considered the most important person needed to accomplish this educational goal. As a leader and manager, the principal is key for school improvement and student achievement (Bernhardt, 2004). School administration under the leadership of a principal requires a variety of skills and competencies related to

leadership, experience teaching and administrative ability. Because the principal plays a vital role in fulfilling the mission of quality education in Malaysia, research needs to be done to identify what constitutes quality leadership for primary Malaysian principal, especially in managing school curriculum, and how their perceptions of their roles aligned with what was written in the National Education Blueprint.

The recognition of the headmasters' leadership role and leadership in managing public primary schools in

*Corresponding author. E-mail: miss.asz@gmail.com.

Malaysia was written into the Education Act of 1996. As leaders, headmasters are responsible for ensuring that all students learn (Harun, 2008; Jantan, 2004; Mahmood, 1997). They have the responsibility to lead and to work on school improvement and student achievement.

The objective of this study is to explore the roles of elementary school leaders and their perceptions in managing the school curriculum following the Malaysian National Education Blueprint. It discusses the knowledge and skills in managing and handling the school curriculum, the aspects of school curriculum and guidelines for effective and efficient curriculum.

Review of the literature

Based on the headmaster competency standard in Malaysia, one of the requirements for being a school leader is having knowledge and skills in managing and handling the school curriculum. Curriculum embraces every planned aspect of a school's educational program (National Middle School Association, 2010). Alias et al. (2008) state that school leaders should ensure that teaching and learning are the priority all the time, supervise the teaching and learning process, and enhance cooperation among all parties for an effective teaching and learning process.

A school headmaster is required to think conceptually and strategically in order to achieve school goals. Four main headmaster roles that lead to school success are planning, organizing, leading, and controlling (Institut Aminuddin Baki, 2006). Headmasters need to spend time on planning and organizing school curriculum and instruction (Stronge, 2007) so they can effectively carry out the functions of curriculum leadership (Portin et al., 2003). Effective headmasters must understand how planning, organizing, leading and controlling are used to achieve school success (Kirk and Jones, 2004).

Headmasters have full responsibility for effective teaching and learning in their schools. In order to successfully develop an effective teaching and learning environment, headmasters must have a vision of what they want the school to become. This vision should be encapsulated within the school curriculum (Grigsby et al., 2010). An effective school curriculum is dependent upon headmaster leadership and the appropriate use of multiple teaching and learning approaches at the school (Davis et al., 2005; National Middle School Association, 2010). It is important that teaching and learning approaches should accommodate diverse skills (National Middle School Association, 2010), attitudes and knowledge (Dolceta, 2011) and discovery learning and just-in-time teaching (Prince and Felder, 2007) in order to meet the national goals of education based on the National Education Philosophy.

Most literatures mentioned about variety of tasks and responsibilities of the school leaders but limited research was found focusing on Malaysian headmaster following

the National Education Blueprint. This study comes from the school leaders' perspective and it filled the gaps in the literature because it continues to mine the existing research on school leaders' roles, responsibilities and leadership in managing school curriculum. The fact that the leadership roles and responsibilities of a school leader rapidly evolving and has been defined in so many ways make the results varies over the years and hard to generalize.

METHODOLOGY

This case study focused on participants' perspectives. A case study is based on real life context (Creswell, 1994) and focuses on understanding the dynamics present within a single setting (Eisenhardt, 1989). By conducting a case study, the headmasters' roles in leading and managing public primary schools in Malaysia at a deeper level can be sought and the information regarding headmasters' beliefs, feelings, needs, responsibilities, and abilities in managing school curriculum can be obtained.

This study involved public primary schools in the state of Selangor, Malaysia. Selangor is divided into nine school administrative districts: Gombak, Hulu Langat, Hulu Selangor, Klang, Kuala Langat, Kuala Selangor, Petaling, Sabak Bernam and Sepang. This study involved headmasters with one headmaster was selected to represent each district.

Participants selected for this study were the school leaders who have direct control in managing schools. Based on the *Lists of schools in Selangor* retrieved from the Selangor State Education Department website (<http://jpnselangor.moe.gov.my/>), nine schools that have the same resources and received government allocation were selected for this study. The participants were drawn based on convenience sampling. Convenience sampling is a type of nonprobability sampling, in which the sample is drawn from that part of the population which is close at hand (Patton, 2002). That sample is called a convenience sample because the population selected is readily available and convenient to the researcher. The nine primary headmasters selected were all principals of fully aided government schools and the schools had similar characteristics in regard to their resources, sources of funding, curriculum and administration.

Merriam (1998) stated that interactive methods of data collection are frequently used in qualitative case studies. This study relied on semi-structured interviews, observations and document reviews. The interviews with participants were conducted based on structured questions. Participants were invited to participate in the study and were asked to confirm their interest by email. The primary focus was on headmasters' roles as instructional leaders. To strengthen this case study, the observation and review of school documents related to headmasters' routines and responsibilities were being used.

Triangulation of data from various sources was used for this study. Creswell (2009) mentions that collecting information using a variety of sources and methods is one aspect of what is called triangulation. Because a variety of sources lead to a deeper understanding of the phenomenon under study (Bogdan and Biklen, 2007), multiple sources of data collection was used. Multiple sources of data help in developing "converging lines of inquiry" which are more accurate if data emanate from different sources of information (Yin, 2004). Additionally, employing triangulation as a part of the research methods allows for a broader understanding of the issues investigated and provides improved credibility for the findings.

Member checking was used to enhance validity (Creswell, 2009). In member checking, the researcher solicits participants' views of

interpretations and credibility of the findings (Miles and Huberman, 1984). Lincoln and Guba (1985: 314) considered the member checking technique to be “the most critical technique for establishing credibility”. This approach involves taking data, analyses, interpretations and conclusions back to the participants in order for them to judge the accuracy and credibility of the information.

Finally, to enhance the validity of this study, thick description was provided for all interviews, observations and documents reviewed in order to help place the participants in the context and let participants determine if the situation described in the study applied to their situation. Creswell (2013: 252) states that, “thick description means that the researcher provides detail when describing a case or when writing the research”.

FINDINGS

This article explores the roles of elementary school leaders and their perceptions in managing the school curriculum following the national education blueprint. It discusses the knowledge and skills in managing and handling the school curriculum, the aspects of school curriculum and guidelines for effective and efficient curriculum. As one headmaster mentioned, “Schools need effective leaders to develop and plan the school curriculum and instruction. In the effective school, the headmaster acts as a curriculum leader and effectively manages the school operation.” All of the participants indicated that major responsibilities of the headmaster were to: (a) Develop the school program, (b) Develop curriculum planning, (c) Develop and create the school mission and vision, and (d) Develop the school strategic plan.

Develop the school program

When the participants were asked about the school curriculum and instruction, all participants mentioned that they believed headmasters are responsible for an effective school program. One of the participants said that “Unique characteristics of the effective school programs are correlated with student success and their academic achievement.” All participants agreed headmasters should ensure the development of the following aspects of a school program:

1. After-school program.
2. Reading library program.
3. Anti-bullying program.
4. Free breakfast and lunch program.
5. Community involvement program.
6. Information technology program.
7. Integrated study program.
8. Cooperative learning program.
9. Mentor and mentee program.

Develop curriculum planning

Seven out of the nine participants in this study mentioned

curriculum planning for students as an important component of leadership because it encourages teachers to think about their teaching and reflect on their own practice and what they offer to students. All the participants felt curriculum planning helped to promote student learning and development. One of the participants stated that “Good curriculum planning should include consistency of approach from all teachers, documentation of students’ learning and development and careful analyses and interpretation that clearly shows how students are progressing toward the learning outcomes.”

One of the participants admitted a strong developmental perspective and believed that theoretical perspective and leadership style influence the way a headmaster plans curriculum. The respondent added, “Curriculum planning should be based on individual development, and this development is determined by genetic and environmental influences.” This was different from the response of another headmaster who said, “In planning the curriculum, children have a right to be consulted and heard. That means curriculum planning considers learning from the student’s perspective and teachers have to use critical reflection to make curriculum decisions.” This participant believed that having a critical perspective is important and influences the way a curriculum leader plans and develops their curriculum. Another participant mentioned that her school is using a professional curriculum planning module to better assist her to develop program plans for students that will best support their learning. That module helps her develop a whole school program and curriculum plans for students that reflect a strong understanding of the NEB’s goals and standards.

Develop and create the school mission and vision

One of the participants said that school leaders must be able to inspire others to reach for ambitious goals. A shared vision should be recognized as a common direction of growth and help the school to be better. Another headmaster proposed that in effective schools “school leaders should clearly articulate the school mission and vision and help teachers and staff share an understanding of instructional goals, accountability, and assessment and most importantly high expectations for the school.” To be an effective curriculum leader, another headmaster suggested a principal should create common goals, build effective terms to implement goals, and engender commitment to accomplish the goals. Overall, headmasters in this study agreed that one of the important roles curriculum leaders possess is to plan and develop the school mission and vision.

Develop the school strategic plan

When asked about the school strategic plan, one out of

nine participants was not able to show or discuss his school strategic plan. That participant was a newly appointed headmaster and had less than one year of experience in a school site. He was drafting a new school strategic plan and said, "It is not like we do not have a school strategic plan, currently we are using the old plan developed by previous headmaster."

One participant said one of the most important things in managing a school is having the school's strategic plan. He believed the purpose of developing a strategic plan was to refocus and engage the teachers and community to think, to act strategically, and to help the school continue to grow. Three participants mentioned the main purpose of having a school strategic plan is to educate students to be responsible and successful, and the aim is to improve student academic achievement. One headmaster said "The strategic plan made clear how we will use effective strategies to help students learn, and one key to successful planning is having a realistic, approachable and comprehensive assessment of the school strengths and weakness."

The participants in this study were aware of their roles and responsibilities in managing curriculum and instructions. All of participants were aware of their responsibility to (a) encourage good teaching, (b) increase student academic achievement, (c) ensure effective teaching and learning, and, (d) supervise curriculum management. All of the participants recognized their responsibility to improve student academic achievement by encouraging effective teaching. All headmasters agreed that in order to achieve these goals supervision plays an important role and that headmaster need to carefully supervise curriculum management. They all agreed headmasters continuously review the implementation of the written curriculum and teaching objectives. One of participants stated that the headmaster "shall educate teachers on the importance of instructional practice and effective curriculum by monitoring curriculum delivery." Another said, "It is headmasters' roles to review student academic achievement data and identify their learning needs. This can be done by supervising curriculum management". The participant added, "Curriculum management plans include expectations and procedures for delivery of teaching and learning." One participant stated he conducted annual reviews of the curriculum and programs as outlined in his curriculum management plan, and he believed it was his responsibility to ensure his curriculum management plan included a complete list of teacher evaluation and student assessments.

DISCUSSION

A school leader is an instructional leader who is responsible to guide and supervise the school curriculum and finance. In managing the school curriculum and instruction, the headmaster acts as a curriculum leader

and has to effectively manage the school operation. Headmasters are responsible for developing a school program, including planning and implementing the curriculum, and the school mission, vision, and strategic plan. Developing a strong school mission and vision helps schools a reach common understanding of how to improve student achievement and overall school performance. Effective school leaders should be able to help their schools to develop visions that ensure the best thinking about curriculum development. Headmasters should be aware of these responsibilities and are responsible to encourage good teaching, increase student academic achievement, ensure the effectiveness of teaching and learning, and supervise the curriculum management. Some literatures highlighted headmasters' knowledge and skills in managing and handling school curriculum. Alias et al. (2008) state that school leaders should ensure that teaching and learning are the priority at all the time. School leaders need to supervise the teaching and learning process, and enhance cooperation among all parties to create effective teaching and learning environment. Others stated that school leaders need to spend time on planning and organizing school curriculum and instruction in order to effectively carry out the functions of curriculum leadership (Portin et al., 2003; Stronge, 2007).

Most of the school leaders are comfortable with their role of as a curriculum leader, however, it is believed that they are spending considerable amounts of time trying to help, empower, train, inform, and reward their staff to ensure the effectiveness of school curriculum activities. One participant complained about the lack of training provided by the Ministry of Education for novice headmasters and the increased workload associated with achieving the National Education Blueprint goals. Waters et al. (2003) mentioned about the lack of practical guidance and training to assist principals and headmaster to become effective leaders. It can be concluded that most of the headmasters in the State of Selangor have a wide knowledge in managing school curriculum although they are facing tremendous challenges it appears that they manage to effectively lead the school curriculum following the National Education Blueprint standard.

Conflict of Interests

The authors have not declared any conflict of interests.

REFERENCES

- Alias BS, Yusof ABM, Mustapha R, Ibrahim MS (2008). *Pengurusan dan kepimpinan bidang kurikulum dalam kalangan pengetua sekolah menengah Malaysia* [Curriculum management and leadership among Malaysian secondary school headmasters]. Kuala Lumpur, Malaysia: Institut Aminuddin Baki.
- Bogdan RC, Biklen SK (2007). *Qualitative research for education: An introduction to theories and methods* (5th ed.). Boston, MA: Pearson Education.

- Creswell JW (1994). *Research design: Qualitative and quantitative approaches*. Thousand Oaks, CA: Sage.
- Creswell JW (2009). *Research design: Qualitative, quantitative and mixed method approaches* (3rd ed.). Thousand Oaks, CA: Sage.
- Creswell JW (2013). *Qualitative inquiry and research design: Choosing among five approaches*. Thousand Oaks, CA: Sage.
- Davis S, Darling HL, LaPointe M, Meyerson D (2005). *School leadership study: Developing successful headmasters*. Stanford, CA: Stanford University.
- Dolceta (2011). *Teaching and learning approaches*. Retrieved May 21, 2012 from <http://www.dolceta.eu/malta/Mod4/spip.php?article12>
- Eisenhardt KM (1989). Building theories from case study research. *Acad. Manage. Rev.* 14(4):523-550.
- Grigsby B, Schumacher G, Decman J, Simieou F (2010). A headmaster's dilemma: Instructional leader or manager. *Acad. Leadership J.* 8(3):68-97.
- Hatch JA (2002). *Doing qualitative research in education settings*. Albany: State University of New York Press.
- Institut Aminuddin Baki [Aminuddin Baki Institute] (2006). *Standard kompetensi kepengetahuan sekolah Malaysia* [Headmaster competencies standard]. Kuala Lumpur, Malaysia: Kementerian Pelajaran Malaysia.
- Lincoln YS, Guba EG (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage.
- Merriam SB (1998). *Qualitative research and case study applications in education*. San Francisco, CA: Jossey-Bass Publishers.
- Miles MB, Huberman AM (1984). *Qualitative data analysis: A sourcebook of new methods*. Newbury Park, CA: Sage.
- Ministry of Education (2004a). *National education policy*. Kuala Lumpur, Malaysia: Ministry of Education.
- Ministry of Education (2004b). *The development of education*. Kuala Lumpur, Malaysia: Ministry of Education.
- Ministry of Education (2005). *Integrated curriculum for primary school: Curriculum specification*. Putrajaya, Malaysia: Curriculum Development Centre.
- National Middle School Association (2010). *This We Believe: Keys to Educating Young Adolescents*. National Middle School Association.
- Prince MJ, Felder RM (2007). Inductive teaching and learning methods: Definitions, comparisons and research bases. *J. Engineer. Educ.* 96(4):283-294.
- Portin BS, Schneider P, DeArmond M, Gundlach L (2003). *Making Sense of Leading Schools: The School Headmastership*. Seattle: University of Washington Press.
- Stronge JH (2007). *Qualities of effective teachers* (2nd ed.). Alexandria, VA: ASCD.
- Waters T, Marzano RJ, McNulty B (2003). *Balanced leadership: What 30 years of research tells us about the effect of leadership on student achievement*. Retrieved February 20, 2012 from [http://www.mcrel.org/PDF/Leadership Organization Development/5031RR_BalancedLeadership.pdf](http://www.mcrel.org/PDF/Leadership%20Organization%20Development/5031RR_BalancedLeadership.pdf)
- Yin RK (2004). *The case study anthology*. Thousand Oaks, CA: Sage.

The background of the slide is a stack of books. The top book is open, and its pages are visible. The spine of the book is visible, and the word "SHAKESPEARE" is printed vertically on it. The books are stacked on a wooden surface. A semi-transparent green overlay covers the top half of the image, and a white box with a red and black logo is at the bottom.

Educational Research and Reviews

Related Journals Published by Academic Journals

- African Journal of History and Culture
- Journal of Media and Communication Studies
- Journal of African Studies and Development
- Journal of Fine and Studio Art
- Journal of Languages and Culture
- Journal of Music and Dance

academicJournals