



International Journal of Psychology and Educational Studies

Volume 5, Issue 1

January 2018

DOI: 10.17220/ijpes.2018.01

2018

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Oral History Attitude Scale (OHAS) Validity and Reliability Study

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ARTICLE INFO

Article History:

Received 25.09.2017

Received in revised form 11.11.2017

Accepted 03.01.2018

Available online

01.01.2018

ABSTRACT

The purpose of this study is to develop a valid and reliable Oral History Attitude Scale. The 25-item trial form created under the supervision of an expert opinion was applied to 714 elementary school third and fourth grade students, 345 female and 369 male students in Sakarya province. Then the obtained data were analyzed. As a result of the Explicit Factor Analysis (EFA), a structure consisting of two dimensions, which are named "individual" and "social", and a total of 15 items have been found out. It has been determined that the model's goodness of fit indexes is quite high. Validation Factor Analysis also confirms EFA results. It was determined that the reliability coefficient of the scale was .76, the split-half half reliability was .74, the test-retest reliability coefficient was .91, and all the differences between the averages of the 27% upper and lower groups were significant. In the study, it was concluded that the scale can be perfectly used as a valid and reliable instrument in research to determine the attitudes of primary school students towards oral history.

Keywords:

Primary School, Scale, Social Studies, History, Life Science, Oral History.

1. Introduction

As a social institution whose primary goals are to prepare students for higher education as good citizens, primary school emphasizes the development of students as a whole (Özdemir, 1998). In the development of the students as a whole, life science and social studies courses have important roles for students to acquire basic knowledge, skills and values regarding living in order to learn about themselves and their surroundings. Students should be prepared for social life by using non-school education in the teaching of life science and social studies courses which are created by being selected from different disciplines, integrated, adapted to the developmental characteristics of the students (Foran, 2008; Öztürk, 2006; Sağlam, 2007). Out-of-school learning offers unique opportunities for teachers and students. It is very important for teachers to be aware of these opportunities and conceive them (Foran, 2008). Through out-of-school learning, students realize the relationship between daily life and the courses, life science and social studies. Thus, students learn to link the class and the real world, allowing parents to support their learning activities as a resource (Alleman & Brophy, 1994). Oral history is one of the non-school teaching methods that allows parents to be benefited.

Oral history is a certain systematic evaluation of the obtained knowledge about a certain subject resulting from the long interviews made and recorded with the relevant persons (Öztürkmen, 1998; Tan, 1997). In other words, oral history can be defined as general transferring memories of living people, social events, narratives about familiar people into recording (Somersan, 1998). It is possible that the oral history activities, which enable the students to develop an consciousness of history and allow them to connect the life and the

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<http://dx.doi.org/10.17220/ijpes.2018.01.001>

lessons with the development of the consciousness of the history, can be carried out by the mother, father, grandfather, grandmother, grandmother etc. (Demircioğlu, 2010). A student can handle the wedding of his grandfather or a close relative in accordance with oral history study.

Despite criticisms, it is seen that there is a growing interest towards oral history in schools. Thanks to oral history, it is thought that students gain skills by doing, living, asking questions, and empathizing between their own lives and the past (Arslan, 2013; İncegöl, 2010; Kaplan, 2005; Sarı, 2007). The topics *"They compare family elders' characteristics of childhood period with their childhood period characteristics"* and *"They give examples for the importance of neighbourhood relations in terms of themselves and their family"* (Ministry of National Education [MEB], 2017) found in "Life at Home" unit in elementary school third grade teaching curriculum of life science course and *"They place chronological sequences of certain life-related events"* found in unit named "Individual and Society" in elementary school fourth grade social studies lesson and *"They create a family tree by benefiting from Oral, written, visual sources and objects"* and *"They give examples by investigating the elements reflecting national culture in their family and surroundings"* found in "Culture and Heritage" teaching curriculum (MEB, 2017a) can be handled in accordance with oral history study. This may make it possible to increase students' curiosity about learning and consciousness for history, as well as their awareness of the environment proximodistally.

It is seen that oral history has started to be used for educational purposes and has taken place in school programs since basic education (MEB, 2005; Doğan, 2015). Oral history, which has been used for many years as a data collection tool used by historians at the academic level, has begun to be used as a teaching method at school level in recent years. Historians have attempted to adapt this method to course topics in order to use the oral history method at school level. In this way oral history, history, life science and social studies have become one of the unique methods of the course (Kaya, 2013).

Researches related to oral history include (Ablak, 2016; Akçalı & Aslan, 2012; Akbaba & Kılcan, 2012; Arslan, 2013; Doney, Parker, & Freathy, 2017; İncegöl, 2010; Kaya, 2013; Kurtdede Fidan, 2015; Sarı, 2007). Ablak (2016) examined the attitudes of teacher candidates towards history and social history. Akçalı & Aslan (2012) have reached the conclusion that oral history allow students to actively participate in history topics of social studies class. Akbaba & Kılcan (2012) developed an oral history attitude scale for history and social studies teacher candidates. Arslan (2013) has determined that the inclusion of oral history in history lessons and textbooks in relation to the reflection of oral history on secondary school students has increased the like and interest for history lessons and contributed to social tolerance and peace. Doney, Parker, & Freathy (2017) were interested in enriching the history of religious education with ideas from oral history. İncegöl (2010), Kaya (2013), and Sarı (2007) have examined the effects of using oral history as a method in class and have reached the conclusion that oral history method positively influenced students' active participation in the lessons and create active connections between classes and life. Kurtdede Fidan (2015), in their study analyzing the views of class teachers regarding the use of oral history method in social studies classes has determined that oral history developed students' various skills against some problems. This study was deemed to be different from the studies in the literature, since primary school students did not have a tool to evaluate their attitudes towards oral history and this study was designed to develop a valid and reliable scale that could evaluate oral history attitudes of primary school students.

2. Method

The relational survey method was used in this study.

2.1. Study Group

Appropriate sampling method was used in the research. Appropriate sampling is defined as sampling done on the individuals in the immediate vicinity who want to participate in volunteer researches (Erkuş, 2009; Ekiz, 2009). It is therefore more appropriate to use the concept of a research group instead of the concept of sampling. The research group determined according to the appropriate sampling method is composed of 714 students in primary and secondary schools in Sakarya in the 2016-2017 education year. Personal data of the students participating in the survey are shown in Table 1.

Table 1. Personal data of the students participating the survey

Variable		f	%
Gender	Female	345	48
	Male	369	52
Class	Third	305	43
	Fourth	409	57
School Type	Private	342	48
	State	372	52

When Table 1 was examined, it was found that 48% of the students who participated in the survey were female and 52% were male; 43% of them are third, 57% of them are fourth grade students; 48% were studying at private schools, and 52% were studying at state school. The inclusion of 3th and 4th graders in the research group increases the representation power for similar groups at the objective scale, thus ensuring a wide variance in terms of age.

2.2. Development of Scale

Studies and theoretical knowledge about oral history were examined. As a result of the examinations, it has been determined that there is no means of measuring the oral history attitudes of elementary school students. An item pool of 29 items was created by the researcher in line with the information obtained from the field. The 29 items in the pool were examined by 3 faculty members specializing in social studies education, assessment, psychological counseling and guidance. At that point Balcı's view (2004) "Scope validity is about whether the measurement of scale is measured or not, and it can be explained by being based on expert opinion" canalized the direction of the study. Faculty members made their evaluations by using a form including three options "appropriate", "partially appropriate" and "not appropriate" In accordance with the evaluations and recommendations of the faculty members, necessary corrections were made to the materials and 4 items were removed from the scale. It was agreed that the remaining 25 items had the capacity to represent the scope. Participants were expected to express their views on a 3-point Likert-type scale including the options "I do not agree", "I partially agree", "I fully agree".

2.3. Data Collection

The researchers brought the test form of the Oral History Attitude Scale to primary schools in Sakarya for preliminary application and explained to the teachers after they were interviewed by the school administration. After the class teachers applied the scale test form on a voluntary basis in their class, tests forms were handed over to the school administration. The scales delivered by the classroom teachers to the school administration were received by the researchers.

2.4. Data Analysis

A total of 730 scale received from the school management were individually checked by the researchers and it was determined that 16 of these scales were not filled in properly. After removing the 16 data collection tools that were not properly filled, the remaining 714 data collection tools were used to conduct validity and reliability studies. For factor analysis, Tabachnick and Fidell (2011) evaluated 300 people as "good", 500 people as "very good" and 1000 people as "excellent". In the context of this evaluation, it was decided that the research group including 714 students was "very good" for factor analysis. Explanatory Factor Analysis (EFA) was performed using the basic components analysis with varimax rotation to determine the validity of the structure of the "Oral History Attitude Scale". In the analysis, factor loadings were determined to be at least .30 (Büyüköztürk, 2006). Cronbach Alpha coefficient, Split Half, test-retest reliability coefficients were calculated for the sub-dimensions and total reliability of the scale and t-test was used for the significance of the differences between item averages of the upper 27% and lower 27% groups. In addition, a Confirmatory Factor Analysis (CFA) was conducted to test the accuracy of the EFA. The interval width of the scale was determined by using the formula "sequence width/ number of groups to be made" (Tekin, 1996) and the arithmetic average sequenced were determined as 1.00-1.66 disagree, 1.67-2.32 partially agree, and 2.33-3.00 fully agree.

3. Findings

In this section, "Oral History Attitude Scale" findings about validity and reliability studies are included.

3.1. Findings Related to Validity

Factor analysis was carried out in order to determine the structural validity and scale the factor loads of the items. The KMO value used to determine whether the size of the data and sample size were appropriate and adequate for the selected analysis was found to be .92. In addition, the Barlett globality test, which was used to check whether the data came from a highly variable normal distribution, was checked and found significant ($\chi^2 = 3205.69; p = .000$). The results of the KMO test should be .60 and above, and the result of the Barlett globality test should be statistically significant (Jeong, 2004). It was decided that factor analysis could be done because the values obtained as a result of the analyzes met these basic assumptions at a fairly good level.

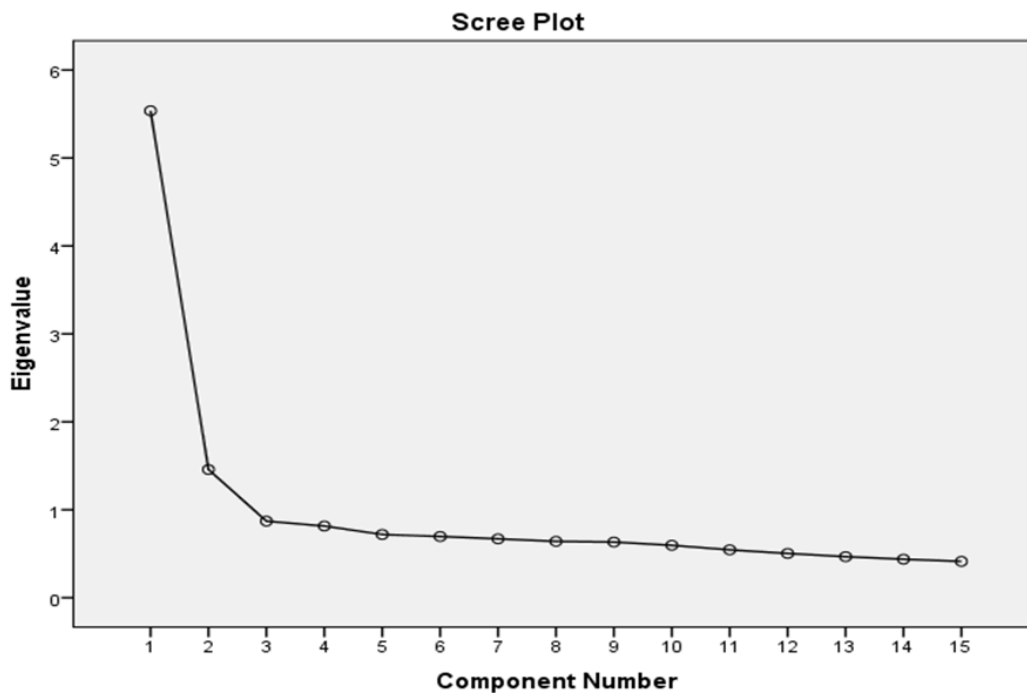


Figure 1. Slope-Deposition Graphic

The 25-item "Oral History Attitude Scale" was tested for structural validity by using the "varimax" rotation technique, which is a key component analysis, and it was determined that the scale had a two-factor structure with an eigenvalue greater than 1.00. Analyzes were repeated by removing items (2, 4, 5, 9, 11, 13, 14, 16, 18 and 25th items) that were not included in any factor in the scale or that were close enough to be indistinguishable in multiple factors (2, 4, 5, 9, 11, 13, 14, 16, 18. and 25th items). After the items were removed, it was seen that the 15-item scale was collected under two factors and that no item remained outside. According to the slope-deposition graph in Figure1, it is seen that the slope is fixed after two factors.

Table 2. Findings Related to Items Resulting from Factor Analysis

Item Number	Common Variance	Factor 1	Factor 2
S1	.55	.74	
S3	.55	.66	
S8	.57	.54	
S10	.58	.72	
S17	.60	.55	
S22	.52	.62	

S23	.59	.71	
S24	.56	.74	
S6	.45		.60
S7	.46		.53
S12	.51		.64
S15	.44		.58
S19	.48		.57
S20	.44		.69
S21	.52		.61
Explained Variance	Total: %46.62	%25.82	%20.79

When the data for the factors in Table 2 are examined, 25.82% of the 46.62% variance explained in the total is explained by the first factor and 20.79% by the second factor. It is expected that at least 30% of the total variance explained in the single factorial designs is considered sufficient (Büyüköztürk, 2006) and it is expected to be over 41% in the multi-factorial designs (Kline, 1994). Accordingly, it can be said that the total variance explained is good and sufficient. The items seen under each factor; it can be seen that the first factor can be called "individual" and the second factor can be called "social" when examined in terms of content and conformity with the theoretical structure. For example, while the item "Parents, grandparents, and grandmothers like to tell the story of my childhood." is in the first factor, the item "I want to describe the toys that my grandparents, grandmothers, and grandmothers played when they were children," is in the second factor. The factor loadings for the items constituting the scale vary between .54 and .74 for the first factor and between .53 and .69 for the second factor. When the common factor variances of 15 items belonging to the "Oral History Attitude Scale" are examined, it is seen that the values are between .44 and .60. The scale respondent gives a triple rating opportunity. In addition, all the items in the scale were scored positively. The minimum score that can be taken from the scale is 15 and the maximum score is 45. The level of score indicates the significance given to oral tradition. The factor structure obtained by the exploratory factor analysis to determine construct validity of the scale was also examined by confirmatory factor analysis (CFA). The results for CFA are shown in Figure 2.

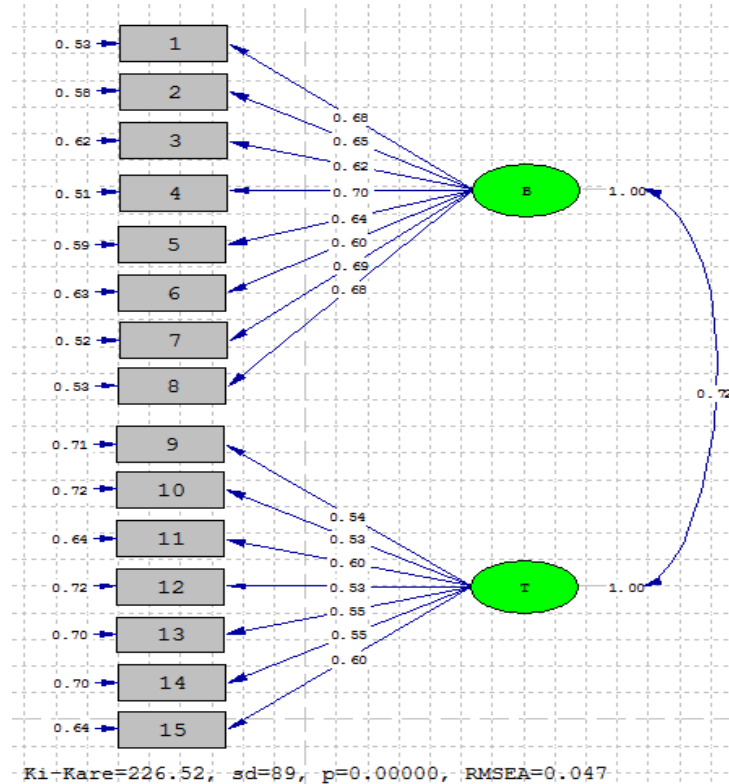


Figure 2. Results of Confirmatory Factor Analysis Regarding Oral History Attitude Scale

To determine whether the theory and the truth are consistent with each other, the factor structure determined by the EFA result is tested with CFA. Confirmatory factor analysis was performed to examine the validity of the scale when the fit indices of the factor loads obtained were within an acceptable range ($\chi^2 / sd = 2.545$, RMSEA = .047, GFI = .96, AGFI = .95, CFI = .96, IFI = .96, NFI = .93, NNFI = .95 and SRMR = .03), all of the t values were found significant.

3.2. Findings Regarding Reliability Studies

Cronbach Alpha coefficient, Split Half, test-retest reliability coefficients were calculated for the sub-dimensions and total reliability of the scale and t-test was used for the significance of the differences between the item averages of lower 27% and upper 27% groups.

Tablo 3. Alpha and Split Half Test Reliability Results for “Oral History Attitude Scale”

Factors	Alpha	Split Half	Test -Re-Test
Factor 1	.87	.83	.72
Factor 2	.85	.73	1.00
Total	.76	.74	.91

When Table 3 was examined, internal consistency split half test and test-retest reliability coefficients were examined to determine the reliability of the Oral History Attitude Scale. As to the reliability of the scale, the internal consistency coefficient (Alpha) was calculated as .76. This value indicates that the items forming the scale are consistent with each other. Reliability coefficients were calculated for each sub-factor. The reliability coefficient for the first sub-factor was .87 and the reliability coefficient for the second sub-factor was .85. Split Half test correlation coefficient of the whole scale is .74, first factor coefficient is .83 and second factor coefficient is .73. In addition, to determine the test-retest reliability coefficient, the scale was applied to 77 elementary school students for the second time with 3 week interval. Correlation between total scores in these two applications was .91; .72 for the first factor and 1.00 for the second factor. The test retest reliability coefficient for the second factor appears to be very high. If the test-retest reliability coefficient for the second factor is too high, it can be attributed to the application of the test with a short 3-week interval.

Tablo 4. Comparison of the Lower and Upper Groups of the Items in Oral History Attitude Scale

Item Number	t (Lower %27- Upper %27)**	Item Number	t (Lower %27- Upper %27)**
M1	-16.644***	M17	-18.476***
M3	-18.006***	M19	-16.810***
M6	-13.041***	M20	-15.091***
M7	-15.705***	M21	-18.132***
M8	-20.858***	M22	-17.591***
M10	-17.743***	M23	-19.729***
M12	-16.718***	M24	-16.922***
M15	-14.450***		

*n=714 **n1=n2=193 ***p<.001

In Table 4, 714 learners' total scores from the scale were ranked from minimum to maximum in order to be able to reveal the distinguishing characteristics of each of the 15 items constituting the Oral History Attitude Scale. The total point averages of participants in the upper and lower groups were compared for each item by t test. When Table 3 is examined, it can be seen that the t values of the difference between the item scores of the 27% upper and lower groups change between -13.04 and -20.85. It was also found that all the items were significant at $p < .01$ level.

4. Conclusion and Suggestions

As a result of the research, in order to determine the attitudes of elementary school students towards oral history; a 15-item scale consisting of two sub-dimensions, individual and community, was developed. EFA and CFA results also confirm the validity of scale. The internal consistency coefficient (Alpha) of the scale,

which explains 46.62% of the total variance as a result of exploratory factor analysis, is .76; .87 for the "individual" sub-factor and .85 for the "social" sub-factor. The Split Half test correlation coefficients for all scale were calculated as .74, .83 for "individual" sub-factor and .73 for "social" sub-factor. However, the correlation between the test-retest reliability coefficient and the total scores of the scale was .91; .72 for the "individual" sub-factor and 1.00 for the "social" sub-factor. The high reliability coefficients for the subscales of the scale indicate that the subscales are consistent with each other. In addition, t test results between 27% lower and upper group scores revealed a significant difference for all items and sub-factors. All findings from the study show that the scale is a 3-point Likert-type scale that can measure the attitudes of the 3rd and 4th grade students in elementary school to verbal learning as a valid and reliable tool.

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Industry 4.0 Manpower and its Teaching Connotation in Technical and Vocational Education: Adjust 107 Curriculum Reform

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ARTICLE INFO

Article History:

Received 28.11.2017

Received in revised form
13.01.2018

Accepted 19.01.2018

Available online

01.01.2018

ABSTRACT

This research aims to understand industry participants' opinions about vocational education under the development of Industry 4.0 manpower and its teaching connotation. The study adopted the expert interview method and invited 10 industry experts to hold 2 meetings. According to the research results, the original teaching contents in the departments of junior colleges have been changed and departments have been recombined, so that the schools can now offer courses related to big data analysis, cloud computing, Internet of Things, etc. to meet the demands of Industry 4.0. Higher vocational education has set about establishing a practical classroom based on the concept of Industry 4.0, in order that schools and industry can establish a close cooperation relationship and share resources with each other. Industry can help schools update their equipment and eliminate the gap between learning and practice by equipping students at technical and vocational universities with the right competitiveness under system integration and industry connection.

Keywords:

Industry 4.0; teaching connotation; Higher vocational education

1. Introduction

Face the aging population, declining birth rate, and the lack of industrial labor. The Industrial 4.0 will be an opportunity for Taiwan (National Institute of Experimental Research, 2015). As the industrial development in Taiwan, clarifying the advantages, disadvantages, and positioning of manufacturing industry in the global industry that putting forward unique value propositions will our government promote the policy of "productivity 4.0" and intelligence. Industry can sustain the fierce competition in the world Competitive advantage. With regard to the electronics industry, precision machinery industry and ICTs industry, it is our country's traditional strength to actively develop and innovate in smart robots and the Internet through industry 4.0 trains to enable industry to reproduce its global competitiveness (National Institute of Experimental Research, 2015).

The 107 course reform in response to Industry 4.0 on the wisdom of the workforce needs. The impact of the 107 curriculum are: First, the 107 programs develop the "core competences in fields subjects" and the "key areas of study" Implementation of the teaching of the course. Secondly, the professional and internship subjects assigned by the course department are clearly divided into professional subjects and internship

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<http://dx.doi.org/10.17220/ijpes.2018.01.002>

subjects so as to ensure that the internship facilities and supporting measures in each school are consistent. The internship subjects are mainly based on the curriculum of common skill areas in inter-disciplinary. Enhance students' ability to plan interdisciplinary skills areas under clusters so that schools can offer courses more than they can to align their skills with employment. The 107 Course Reform is pragmatic and practical for the core concept of technical education. It shows curriculum design emphasizes practice and theory, and taking into account internship and teaching, so that students can successfully apply what they learned to work. Taiwan has adopted productivity 4.0 as the center of its development in science and technology. It also includes the import of an enterprise resource planning (ERP) system and the digitization of a manufacturing system in addition to the electronization of production and manufacturing. In the future, Industrie 4.0 needs to incorporate Information and Communication Technology (ICT) and intelligent and flexible (customization) production systems so as to achieve productivity digitization and networking of machines (M2M) (Stock & Seliger, 2016; Stosich, 2016; Tait-McCutcheon & Drake, 2016).

Taiwan is facing drastic changes in the global environment, and industrial personnel are confronting the development trend of informatized and intelligentized business service models. The guiding measures taken by the government in Industrie 4.0 are as follows: Industrial Development Bureau, MOEA subsidizes the development of small- and medium-sized enterprises (SMEs); the Ministry of Science and Technology allows schools to conduct fundamental research; and the Ministry of Education plans courses to train new talents (Faller & Feldmüller, 2015; Tan & Atencio, 2016; Wang, Wan, Li, & Zhang, 2016).

In terms of the difficulties possibly met by teachers in the face of Industrie 4.0, vocational schools should precisely design vocational education courses according to future graduates' new work fields and opportunities. During the process of industrial transformation under Industrie 4.0, the main problems met by the teachers include: teachers' industrial experience cognition; rational usage of off-campus resources; adaptation of textbooks suitable for industry courses; ability to design industry-oriented courses; teaching activities about industrial and practical skills; and teaching assessments (Bauer, , Hämmerle, Schlund, & Vocke, 2015; Schuh, Gartzen, Rodenhauser, & Marks, 2015).

When the pre-service teacher in the occupational matter class faced the concern of "pro-industry teaching specialization" of Industry 4.0, it explored how to start professional practice related to teachers and how the professional pre-service teachers in the pro-industry teaching specialization cognitive, value and needs adjustment process. In Industry 4.0, teachers not only need to participate in the common industry-oriented curriculum, but also practice rather personal characteristics of pro-industry teaching specialization. In the process of cognitive adjustment that teaching practice of thoughtful learning is one of the main contributions of this study. Under the impact of Industry 4.0, what are the views of industries on vocational education in cultivating industry 4.0 and its pedagogical connotation? To explore the phenomenon of vocation education facing industry 4.0 How to professionalize teaching in pro-industry? What is the cognitive connotation of teachers' professional development of the pro-industry? What is the teacher's adjustment of the pro-industry teaching specialization? Taiwan is pushing schools to develop Industrie 4.0 talents, and schools can cooperate with the Ministry of Education and the Ministry of Science and Technology to cultivate students with "Industrie 4.0" courses in university courses. The course structure of Industrie 4.0 must be understood to realize sustainable operations in vocational education, with an urgency to upgrade industry and teaching professionalism in technical and vocational departments in response to Industrie 4.0. This research aims to understand industry participants' opinions about vocational education in the development of Industrie 4.0 manpower and teaching connotation. The purposes of this study are to address the 2 following issues.

- (1) To understand the industry's view of vocational education in cultivating industrial 4.0 human and its teaching content.
- (2) To understand the needs of vocational teachers in industry in response to the specialization of industry 4.0 in industry-related professions.

2. . Methodology

2.1 Research Method and Subjects

With the use of expert interviews and an in-depth interview method, this research aims to understand industry participants' and technical and vocational education experts' opinions about technical and vocational education in the development of Industrie 4.0 manpower and their teaching connotation. In addition to technical and vocational education experts, the subjects in this research also included 10 persons in charge of enterprises or directors of human resources with more than 7 years of industry experience or seniority in the industry, or those in the manufacturing industry with a related background, or in the ICT industry and Internet service industry. Two expert interview meetings were held that aimed to understand the demands of enterprises and technical and vocational education experts in the development of Industrie 4.0 manpower as well as the teachers' opinions about teaching connotation of technical and vocational education. The in-depth interviews were conducted against the 5 persons

The experts discussion record includes live video, audio recording and immediate key recording. First, the contents of the recordings are converted into verbatim discussion records and the original language habits and contents of the participants are retained as far as possible. The logical place, be amended in reply to the participants intention. After completing the verbatim transcripts of the discussion discourse and reading in detail, the key points of the pro-industry teaching expertise and industry experience were searched from the written records. The professional pro-industry teaching was applied and coded, and then converted for the specific concept.

.2.2 Research Tool and Data Analysis

This research used an expert interview outline table to analyze human resource directors' opinions about Industrie 4.0. The contents of the expert interview outline table include enterprises' viewpoints and their adaptive educational measures in education practice, teachers' professional development, students' assessment, teachers-parents communication, industrial transformation, and professional leadership, so that technical and vocational education can conform to Industrie 4.0.

The interview questions included the project's requirements for technical personnel in response to Industry 4.0, the teaching content of cultivating industrial 4.0 human resources in vocational and technical schools, and the priorities and requirements of pro-industry that teachers should cultivate. As a collection of teachers in the industry in response to the process of Industry 4.0, the pro-industry teaching specialization in educational practice, professional development of teachers, student assessment, teacher communication, industrial restructuring and professional leadership and other cognitive content and cognitive course.

Subsequently, according to the materials acquired by expert interviews, a modified analysis was adopted to sort out and analyze all the data and to record their differences and similarities; the related materials in the literature were then compared and discussed; finally, the findings in this research were concluded.

3. Results

The industry participants believe that the import of intelligent manufacturing of productivity 4.0 is one of the important measures to improve production efficiency and manufacturing quality, so as to help the SME manufacturing industry to conquer the above-mentioned difficulties. Industry 4.0 applies Intelligent Robot, Internet of Things (IOT), and Big Data to promote industry development towards the direction of equipment intelligence, factory intelligence, and system abstraction and concretization. The added value and productivity should be improved and accelerated to further create industry's growth momentum. Such actions can help the SME manufacturing industry overcome its current difficulties (Sokolor & Ivanov, 2015; Wang, Wan, Zhang, Li, & Zhang, 2016). The interview as follows:

With the increasing popularity of communications equipment, coupled with the interactive use of wearable devices and the Internet of Things, connects us more closely to the world(A1)

In order to ensure the smooth flow of information, no matter in the world, walking through the mobile phone

network, but also can accurately grasp the important information of business operations, and even remote users increase or decrease the status. (B3),

Future Industry 4.0 technical talents need to meet the market requirements to conform to international development trends. When industry pursues the upgrading of new technology, more important measures must be cultivated for high-quality talents. The development of enterprise's industrial talents should adapt to market changes and requirements. In addition to the emphasis on the overall thinking structure and the improvement of technical integration ability, vocational development ability should also be cultivated. Through cooperation with educational institutions and input in the policies and plans of industry, governments, universities, and research institutes, the Industry 4.0 talent development model has been established to achieve resource sharing of advanced experiences in both product and technology. Education can also conform to industrial trends so as to increase international competitiveness, cultivate talents required by interdisciplinary Industry 4.0, and promote Taiwan's industrial talent cultivation and technical development (Lee, Bagheri, & Kao, 2015). The interview as follows:

In the case of mechanical and electrical integration engineers, enterprises should, in addition to planning practical assembly and operation of electro-mechanical components, plan to analyze and solve problems of the whole electromechanical system while handling on-the-job training. They should also understand the relevant product life cycle and Supply chain relations. (A2)

At the institutional level, we must consider how to integrate the system of long government wagons into a more efficient and forward-looking mechanism for promotion. As for the implementation aspects, we must plan and implement the incentives to promote teacher-to-business cooperation and encourage industry to engage in industry-university cooperation. (C2) Industry 4.0 adopts a combination of virtuality and reality to drive upgrading and transformation in the manufacturing industry and national economy to create added employment opportunities. Advanced manufacturing technology is applied to become the key power through artificial intelligence and machines' deep learning. Therefore, leaders and policy makers in industry, governments, and schools must have insight into international development trends to cultivate Industry 4.0 talents. The effective methods to improve Industry 4.0 technical talents include the following (Chen & Zhang, 2015; Weiss, Huber, Minichberger, & Ikeda, 2016; Witte & Jansen, 2016).

- Enterprise: Enterprises use intelligent machines to assist with their working environment to retrain front-line in-service staff. Faced with transnational competition in new E-leadership talent, new recruitment policies and human resource plans should employ a business model where advanced intellectual technology is used to develop new products and initiate new services.
- Academic education: Schools should try their best to provide extensive interdisciplinary vocational skills and knowledge education courses by conducting academic and practical cross-boundary communication and innovation. Information and technology education is listed as a required course in each department to close the gap in IT applied technology. Schools and enterprises must cooperate to open up online platforms for free course learning to provide lifelong vocational knowledge education.
- Government: To expand Industry 4.0 employment opportunities, the government must help enterprise staff remain in office or be competent in a new job, so as to coordinate the gap between enterprise talents and academic talent cultivation. It must also continuously deepen qualitative research and soften the effects of diversified advanced technology development on industry labor. The national overall development policy is formulated through central overall planning to give play to cross-functional coordination and to successfully realize the vision of Industrie 4.0.

4. Discussion

The Industry participants' opinions is important about vocational education in the development of Industry 4.0 technical talents and its teaching connotation. To respond to the demands for Industrie 4.0 technical talents, it is suitable to continuously promote talent integration between schools and training units in electromechanics, communications, and information, so as to cultivate the key talents required by the industry. Some specific practices are noted below (Faller & Feldmüller, 2015; Stock & Seliger, 2016; Stosich, 2016; Wang, Pascarella, Laird, & Ribera, 2015; Wijnia, Kunst, Woerkon, & Poell, 2016).

The training of personnel in line with the needs of the workplace in the enterprise has enabled the convergence of technical and vocational education and vocational training systems and laid a solid foundation of human resources in response to the trend of globalization. It has introduced the dual system of Germany into China

(also known as the "Painting"), so that high school students directly after graduation into public institutions, job positions in the workplace to learn the skills and professional knowledge required, supplemented by two-year college or four-year technical education, and by vocational training. In order to reduce the gap between the cost and technical cohesion of trainees and to effectively nurture the human resources required in the workplace, we hope that through double-track and parallel mode, both theoretical education and practical work in schools can be effectively and effectively doubled. Verify, in order to achieve "learn practical" realm (Stock & Seliger, 2016). Productivity 4.0 requirements of the wisdom of "people" is the key to the success of productivity 4.0, the future promotion of smart factories, the first consideration is to train the existing manpower to enable it to future industrial 4.0 environment, improve production efficiency and efficacy. Therefore, in the process of planning the productivity 4.0, priority should be given to cultivating "qualified personnel". By strengthening the existing quality of the labor force, gradual nurturing of all kinds of talents required for the future development of productivity 4.0 will ensure the provision of industrial manpower.

- Dominated by the government, industry group or regional industry group resources can be combined to help manufacturers to investigate the manpower gap and function gap required by the future development of Industry 4.0.
- Based on industry needs, the key industrial function standards of productivity 4.0 shall be constructed and the function standards or function unit courses be opened to carry out function quality certification and improve labor quality.
- The industrial value chain shall be integrated, and a satellite factory or settlement industry model can be used by leading enterprises or enterprises' backbone force for cooperation in cultivating key talents.
- Schools, vocational training units, and research institutions can be combined to discuss together the development and opening up of various professional courses required by Industrie 4.0, such as cloud computing, Internet of Things, big data, mobile application, network marketing, etc., so as to cultivate fundamental professional talents, senior and middle managerial talents, and cross-disciplinary talents.

5. Implications for practice

The strategy of a narrow international talent attraction can be changed and adjusted into a strategy of a more inclusive international talent attraction. Taiwan should adopt more liberal policies for those coming to Taiwan in order to cultivate potential overseas students, encourage them to continue to work in Taiwan after graduation, and to attract more outstanding overseas talents to be voluntarily engaged in Taiwan's industries.

Acknowledgements

This study was financially sponsored by the National Science Council, Republic of China, under Grant No. NSC105-2511-S-224-001-MY3 & NSC 106-2511-S-224-001-MY3.

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Influence of Peer Groups to The Self-Esteem of Lampung and Javanese Students

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ARTICLE INFO

Article History:

Received 20.07.2017

Received in revised form
28.11.2017

Accepted 12.12.2017

Available online

01.01.2018

ABSTRACT

The importance of peer relationships among teenagers makes them form peer groups. Peer groups are children or adolescents with the same age or maturity level. Peer interactions of the same age play a unique role among adolescents. The purpose of this study is to see the effect of peer groups on the self-esteem of Lampung and Java students. The research method used ex-post facto research with 40 research students of Grade XI SMK Negeri Talangpadang Lampung Lesson Year 2016/2017 consisting of 20 students of Lampung tribe and 20 students of Java tribe. The instrument used is a questionnaire of peer groups and self-esteem questionnaires. Data analysis technique used is a parametric statistic with regression analysis. The results showed that there is a significant influence among peer groups on student self-esteem. Peer groups contributed 34.9% of students' self-esteem, while the remaining 65.1% were influenced by other factors.

Keywords:

Peer Groups, Self-Esteem, Adolescence

1. Introduction

Adolescence is one of the most important periods in life in terms of self-esteem development (Santrick, 2007). According to Branden (1992), self-esteem is an evaluation made by the individual and maintained, it expresses an agreement or disagreement, and indicates the extent to which an individual believes that he is capable, important, successful, and worthy. In short, self-esteem is a self-assessment of the worthiness expressed in the individual's attitude toward him.

Self-esteem in adolescents is often associated with the search for identity by trying to find status as a stand-alone without the help of parents. The search for a positive identity will lead to the development of the potential that teenagers have in a better direction, whereas the search for negative identities is usually expressed by teenagers in behavioral forms, such as brawls, drug abuse, dating to declining achievement. The process of identity formation is closely related to how adolescents assess or evaluate themselves because

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<http://dx.doi.org/10.17220/ijpes.2018.01.003>

the development of self-esteem in a teenager will determine the success or failure in the future (Santrock, 2007).

Each adolescent has different self-esteem that can be divided into three parts, namely high self-esteem, moderate self-esteem and low self-esteem. According to Rosenberg (Burn, 1993) individuals who have high self-esteem will be able to respect and consider themselves as useful individuals, otherwise, individuals who have low self-esteem cannot accept himself and assume that he is useless and has many shortcomings. Every teenager should have a high self-esteem in order to understand the advantages and disadvantages that exist in him.

Teenagers who have high self-esteem will generate confidence, a sense of self-worth, a sense of usefulness and a sense that his presence is needed in this world. In addition, adolescents also have the confidence to achieve the achievement that he and others expect. That confidence will motivate the teenager to really achieve what she desires. Conversely, adolescents with low self-esteem are more likely to behave negatively because self-esteem can affect one's behavior (Clemes & Clark, 2012), so in school indirectly students will face problems because of negative behavior due to low self-esteem.

The desire to be accepted and afraid of being ostracized makes students try to be the same as their school friends. Robins, Hendin, & Trzesniewski (2001) this drive not only comes from within the individual itself but comes in the form of group pressures or other group members. This pressure is then called the peer pressure.

A person who is in peer pressure will tend to conform, judge, believe, or act according to his or her group's judgments, beliefs or actions (Robins, Hendin, & Trzesniewski, 2001). While Rosenberg (1979) states that the motive of self-esteem is the strongest motive in human behavior, where if a person gets pressure in the group will get emotional satisfaction will identify differently from others.

During adolescence, the formation of groups of friends based on the context of development is normal. The tendency to form such a group begins in childhood. So comes the Group of playmates, schoolmates, scout friends, who are the natural tendency of adolescents to form group attachments that provide a social release. Peers are children or adolescents with the same age or maturity level. Usually, in the school environment, adolescents form groups commonly called friendship.

In the friendship that exists among teenagers, there is support as a sign of concern for each other. In the world of psychology, peer support is called peer group support. Mead, Hilton, & Curtis (2001) define peer group support as a system of giving and receiving assistance with respect, collective responsibility, and mutual agreement through support, friendship, empathy, sharing, and mutual assistance.

While Repper & Carter (2011) argue that peer group support is defined as emotional social support, instrumental support, and sharing in any condition to bring about desired social or personal change. So it can be concluded, that peer group support is a type of social support that combines information, assessment (feedback) and emotional assistance.

The adolescent stage involves a process that reaches an important period in one's life. Adolescence presents many challenges, because of the many changes that must be faced from the physical, psychological, biological, and social changes. Important change processes will occur in adolescents if these changes are able to be adaptive and successful.

Many think that the teenage phase has a valuable meaning in life. But there are also who feel adolescence as an age that causes fear and various problems. Teenagers are regarded as children who are neither tidy nor trustworthy and tend to damage, also behave destructively. Yet many teenagers managed to overcome the stereotype of the teenager. They make obstacles and failures in the teenage phase as opportunities and challenges to rise to success.

In an effort to strengthen each other, adolescents need the support and help of others, generally, they form peer groups to share together, and ultimately successfully carry out developmental tasks naturally. The importance of peer relationships among teenagers makes them form peer groups. Peer interactions of the same age play a unique role among adolescents. From peer groups, Teens learn about whether what they do is better, as good as, or even worse than what other teenagers do. Peer influence can be positive and negative.

Various tribes exist in Indonesia as one form of wealth from Indonesian culture. Javanese tribe is the largest tribe in Indonesia. Based on the research of Wijayanti and Nurwianti (2010), 10 characteristics of Javanese tribe are grateful, kindness, demography, justice, integrity, perseverance, religion, hope, openness of thought, and humility. The Javanese are famous for their lively passions. The Javanese felt themselves not the communion of individuals, but a unified form of "one for all and all for one" (Herusatoto, 2008).

While the Lampung tribe has a life philosophy 'Piil Pesinggiri' commonly called Piil. Hadikusuma (1990) states that the character of the people of Lampung has a 'piil pesinggiri', which is a big soul, has a sense of shame, and self-respect. The philosophy of life 'Piil Peseggiri' contains values, moral teachings, and ethics which are an open identity and can answer the challenges of foreign culture in the process of social and cultural transformation (Nurdin, 2009).

The background of the student's tribe will affect the student's perspective on self and the other's judgment on the student which will then affect the student's interaction within her peer group. This diversity of cultures, tribes, and worldviews is a unique characteristic possessed by each individual. Therefore, the author tries to examine the influence of peer groups on the self-esteem of Lampung and Java students.

2. Methods

The research method used in this study is *ex-post facto*, the researcher tries to take effect from the dependent variable and examine it retrospectively (based on the past) to build the cause, relationship, association, or meaning (Cohen, Manion & Morrison, 2007). In an *ex-post facto* study the researcher cannot manipulate the variables, the researcher simply describes what happens to the independent variables and seeks information about the cause and effect relationships of events.

Population in this study all students of class XI SMK Negeri Talangpadang Lampung Lesson Year 2016/2017 which amounted to 103 people. The reason for consideration in population selection is that the class XI students are in the adolescent age range, ranging from 15-17 years which is a period of developmental transition between childhood and adulthood, involving biological, cognitive, and socio- emotional; and have a tendency to seek self-identity, according to the respondents required in the study.

Determination of the sample adjusted to the existence of the problem and the type of data to be collected, so that the samples in this study are 40 students of class XI SMK Negeri Talangpadang Lampung Lesson 2016/2017 which consist of 20 students of Lampung tribe and 20 students of the tribe of Java. The authors took samples randomly so that the population had the same opportunity to be a research sample. While the number of 40 students from 103 existing students is considered to be quite representative of the population. The instrument used is a questionnaire about peer groups and self-esteem developed from the operational definition of variables. Peer group questionnaires and self-esteem questionnaires use the Likert model rating scale to measure the attitudes, opinions, and perceptions of a person or group of people on a question in question. The data needed in this study is about the influence of peer groups on students' self-esteem in school. Data analysis technique used is with regression analysis.

3. Results

The results of the analysis test of the research conducted by regression analysis obtained data as follows:

Table 1. Regression Analysis to See the Peer Group Influence on Student Self-Esteem

	Model	Sum of Squares	df	Mean Square	F	p
1	Regression	6182.020	1	6182.020	59.329	.000 ^a
	Residual	3959.580	38	104.199		
	Total	10141.600	39			

From Table 1 above can be seen that the value of F arithmetic is 59.329 while the value of F table can be obtained by using table F with degrees of freedom (df) Residual is 38 as df denominator and df Regression (treatment) is 1 as df numerator with significance level of 0.05, so that the value of F table is 4.10. Because F arithmetic (59.329) > F table (4.10) it can be concluded that peer group (peer group) have a significant effect on student self-esteem. In other ways, based on the Table when viewed from the value of Sig. 0,000 by following the sig level. 0.05 as the cut off value of the significance value (Sig. 0,000 <0.05). This means that if the value of probability (significance) below 0.05 then the independent variable (peer group) has a significant effect on the dependent variable (student self-esteem).

Meanwhile, to see how big the contribution of a peer group (peer group) to students' self-esteem can be seen in Table 2, the following:

Table 2. Regression Analysis to See Contribution of Peer Group Contribution to Student Self-Esteem

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.187 ^a	.349	.299	10.208

From Table 2 above shows that the R square number of 0.349 means that peer group influence or contribute 34,9% to student's self-esteem. While 65.1% influenced by other factors.

To see the difference in the self-esteem of Lampung tribe students with Javanese peoples in terms of peer groups described in Table 3, the following:

Table 3. Differences in Self-Esteem of Lampung Tribe with Javanese Tribe from Peer Group

	Self-esteem	N	Mean	Std. Deviation	F	Sig.
Peer Group	Lampung tribe	20	201.45	13.383	.223	.639
	Jawa tribe	20	196.35	18.466		

Based on Table 3 it can be seen that the value of Sig. 0,659 > 0,05, it can be concluded that there is no difference between students' self-esteem of Lampung tribe with Javanese students seen from peer group, although there is difference between the value of self-esteem of Lampung tribe ($\bar{x} = 201,45$) with the average self-esteem of the Javanese ($\bar{x} = 196,35$) is 5.10, but the value is not significant enough to affect the difference between the two.

4. Discussion

The results showed that there is a significant influence among peer groups on student self-esteem. Peer groups contributed 34.9% of students' self-esteem, while the remaining 65.1% were influenced by other factors. Positive peer groups provide opportunities for youth to help others and encourage youth to develop networks to give each other positive encouragement. Interactions among peers can be used to shape meaning and perceptions as well as new solutions. A positive peer culture provides an opportunity for adolescents to test the effectiveness of their communication, behavior, perceptions, and values. A positive peer culture helps teenagers understand that he is not alone in facing challenges.

This study is in line with the results of research conducted by Wardhani (2014) which shows that there is an influence of peer group against self-esteem of adolescent class X Madrasah Aliyah Negeri Pakem Sleman Yogyakarta. However, the results of this study differ from research conducted by Kristiani (1994) which shows there is a negative relationship between self-esteem with attitudes toward the development of intimate relationships and learning achievement.

One of the reasons a teenager joins a peer group by finding out who he is. Erikson (1956) explains that the identity of teenagers seeking an attempt to explain who he is, what his role in society, whether to be a parent, whether to be self-confident even if the background of race, ethnicity or religion make some people patronize it. Furthermore, Erikson (1956) also explained that the search for this identity affects adolescent behavior. "In seeking new feelings of sustainability and equality, teenagers must fight for the struggles of

past years, although to do so teenagers must artificially appoint the kind-hearted people as enemies; and teenagers are always ready to put the teen idol as a mentor in achieving final identity. The identification that occurs in the form of ego identity is more than just the sum of childhood identification. "

This opinion is reinforced by the results of research conducted by Nurjanah (2010) which states that self-esteem is a very strong basic human need that makes an important contribution to the life process that is necessary for normal and healthy development so as to have value for survival. Lack of self-esteem will inhibit the psychological growth of individuals because high self-esteem plays a role in exercising the influence of the immune system of concepts (consciousness immune system) that can provide resistance, strength, and capacity for regeneration. When the individual experiences low self-esteem, his self-resilience in the face of life's misery diminishes, becomes destroyed, before conquering his precious feelings, tends to avoid pain.

According to Coopersmith, (1967) when the teen gets rejected or unnoticed by his peers he will feel lonely and arise hostility so that the teenager has a low sense of self-esteem and have less learning achievement. This happens also in adolescents who are familiar with peers but in a group that gives a negative influence than the teenager becomes lazy, smoking, drinking alcohol, fighting, ditching, violating school rules and others that can make self-esteem teenagers it becomes progressively lower and affects lesser learning achievement (Hurlock, 1994).

This opinion is reinforced by the results of Ristianti research (2010) which shows that peer social interactions affect the behaviors displayed, aggressive friends or who do not directly or indirectly affect the psyche and behavior of adolescents, so that what is displayed from friends and how friends treat it as well as peer ratings about him will be used as a reference to socialize with the environment.

Adolescence has intensive contact with peers (Santrock, 2007). Teenagers interact with each other, ordinary teens trying to become members of a group. The strong influence of peer groups during adolescence comes partly from the desire of adolescents to be accepted by the group and partly from the fact that teenagers spend more time with peers. The search for identity to explain who he is and his role in society cause many teenagers to be out of the house with peers.

Peer groups make students feel safe because with a group of peers make students have high self-esteem. This makes students more secure and not bullied by their friends, because of the results of research Mujiyati (2015), students who have high self-esteem levels tend not to be victims of bullying from friends who feel more senior and strong. Self-esteem is fundamental to students because it reflects a passion for strength, achievement, precision, competence, self-belief in the world, independence and freedom. Self-esteem is based on real competence and not just the opinions of others (Adiputra, 2015).

Peer groups become a means as well as a goal in their quest for identity (Erikson, 1956). No wonder if many cases of adolescent behavior caused by the bad influence of this peer group. Basically, it is not easy for teenagers to bind themselves to a group because a group has demands that every teenager wants to join. Teenagers always want the harmonization and emotional support in making friendships and will be easier

in conformity, following the prevailing norms in the group, although there is no direct coercion for it. Teenagers will equate the behavior, hobbies, lifestyle, appearance so as not to be different from his colleagues and can be accepted as part of his group. Teens who become members of a deviant group like a punk will also follow the norms that prevail in the group and will equalize his behavior. If a motorcycle gang engages in aggressive action or behavior, then its members will also equate its behavior with the prevailing norms.

5. Conclusion

Based on research results, it can be concluded that peer group have a significant effect on student self-esteem. Because in high school or vocational students desperately need the support of peer groups. With support, mutual understanding, mutual encouragement in everything that he gets from his peers as well as a positive influence both of behavior, and the way of thinking is good then adolescents have a high sense of self-esteem that teenagers are highly accepted, valued, and acknowledged in the environment of peers, so the more spirited the spirit because it gets support and good influence. Conversely, if the teen gets rejected or not noticed by peers he will feel lonely and arise feelings of hostility so that the teenager has a sense of low self-esteem and have less learning achievement. In addition, peer groups also contributed 34.9% of students' self-esteem. While the remaining 65.1% influenced by other factors, such as family factors, social status, economic status, personal factors (internal), and so forth.

Acknowledgement

The writers would like to express their gratitude to the Indonesian government especially the Indonesian Directorate General of Higher Education (DIKTI), Indonesia Endowment Fund for Education (LPDP) in funding this research and Indonesia University of Education (UPI) for permitting them to conduct a development research in education field.

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Integration of Structured Cooperative Learning in Mathematics Classrooms

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ARTICLE INFO

Article History:

Received 14.09.2017

Received in revised form
30.11.2017

Accepted 20.12.2017

Available online

01.01.2018

ABSTRACT

Cooperative learning model played a dynamic role in improving students' achievement in mathematics. The purpose of this research study was to compare the effects of three instructional methods on students' mathematics achievement and attitudes toward mathematics among secondary students in Natore, Bangladesh. These instructional methods were used to teach students in three experimental groups such as group 1 with structured cooperative learning, group 2 with unstructured cooperative learning and group 3 with conventional teaching. 105 students took part in the experiment and completed pre-test and post-test of mathematics achievement and attitudes toward mathematics. The statistical analysis such as ANOVA, MANOVA and post hoc pairwise comparison were used to analyze the data. The results showed a significant effect of structured cooperative learning on mathematics achievement and attitudes toward mathematics. The findings revealed that the structured cooperative students outperformed the unstructured cooperative and conventional students on mathematics achievement due to structured form of cooperative learning integration. Therefore, structured cooperative learning can successfully be implemented to promote students' achievement in mathematics.

Keywords:

Structured cooperative learning, mathematics achievement, Natore

1. Introduction

Cooperative learning models are well recognized in teaching and learning mathematics, science, language and many other subjects in different levels of institutions. Cooperative learning is working together in conjunction with others to achieve a mutual benefit. According to Johnson et al. (1994), cooperative learning is the instructional use of small groups through which students work together to maximize their own and each other's learning to reach a common goal. Cooperative learning is also working together in the form of structured cooperative groups to help each other, encourage each other and share each other's knowledge to solve mathematical problems to obtain a shared achievement. Over the past decades, the use of cooperative

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<http://dx.doi.org/10.17220/ijpes.2018.01.004>

learning has greatly increased. Cooperative learning has grown into structured cooperative group works such as Learning Together, student teams-achievement division (STAD), teams-games-tournaments (TGT), team accelerated instruction (TAI), cooperative integrated reading and composition (CIRC), Jigsaw, group investigation (GI), etc. Hence Learning Together, STAD, TGT, TAI, CIRC, Jigsaw and GI are cooperative learning models, that is, structured cooperative learning activities in which students are held accountable for their contribution, participation and learning. Students are provided incentives to work as team in teaching others and learning from others (Slavin, 1995).

Researchers like Ozsoy and Yildiz (2004) in their study mentioned that cooperative learning is a group working but every group working is not cooperative learning. Group working is a cooperative learning when it is structured under group learning conditions, that is, groups are formed with students of different levels of abilities and work together for a shared goal such as Learning Together model. Hossain et al. (2013) in their study in Natore found that teachers in secondary mathematics classrooms used unstructured cooperative learning by the name of cooperative learning and familiar with conventional way of teaching. The result of secondary school certificate examination as seen in 2014 (BISE, 2014) no students from 24 schools came out successful in which most of them failed in mathematics. This high rate of failure indicates deficiency in teaching mathematics - teachers teach mathematics using conventional teaching method along with unstructured cooperative learning in line with their individual creativity. To develop students' achievement in mathematics, Hossain et al. (2013) encouraged mathematics teachers to implement structured form of cooperative learning, therefore, this research study is to focus on structured cooperative learning strategy, that is, Learning Together model of Johnson and Johnson (1994) because their model of developing cooperative learning based on five basic principles such as positive interdependence, individual accountability, face to face promotive interaction, interpersonal and small-group skills, and group processing are widely applicable for the successful implementation of cooperative learning in mathematics classrooms.

The effects of cooperative learning models has produced outstanding performance in mathematics education in various studies. Researchers in many countries implemented cooperative learning models as medium of instruction in teaching and learning mathematics and found that the students who learn mathematics using cooperative learning models outdone the students of other forms of instructional methods. Alabekee (2015) conducted a study on STAD model of cooperative learning in selected secondary schools in Nigeria and found that teachers were successful using STAD which developed students' achievement in mathematics improving their feelings of cooperation and level of understanding. Likewise, Ozsoy and Yildiz (2004) carried out an experimental study on the implementation of Learning Together model of cooperative learning with 7th grade students in Turkey. The findings revealed a significant effect of Learning Together model on students' performance in mathematics. Besides, researchers like Hossain et al. (2013) and Zakaria et al. (2010) found similar findings that cooperative learning models contributed to the improvement of students' performance in mathematics. Hence this research study aimed at investigating the effects of structured cooperative learning, unstructured cooperative learning and conventional teaching on mathematics achievement and attitudes toward mathematics among secondary students in Natore, Bangladesh. The objectives of this research study were:

1. To compare the effects of structured cooperative learning and unstructured cooperative learning on mathematics achievement and attitudes toward mathematics.
2. To compare the effects of structured cooperative learning and conventional teaching on mathematics achievement and attitudes toward mathematics.
3. To compare the effects of unstructured cooperative learning and conventional teaching on mathematics achievement and attitudes toward mathematics.

2. Method

This study is an experimental research conducted following the approval of District Education Officer with the Government of Bangladesh in selected secondary school mathematics classrooms for 5 months from the 1st of January to the 31st of May, 2015. The participants of this study were 105 students of grade IX randomly

selected from mathematics classrooms of Dharabarisha High School in the district of Natore, Bangladesh. Out of 105 participants, 34 were selected for experimental group 1, 35 for experimental group 2 and 36 for experimental group 3.

This research study compared the effects of three independent variables on two dependent variables. The independent variables are structured cooperative learning, unstructured cooperative learning and conventional teaching while the dependent variables include mathematics achievement and attitudes toward mathematics. Structured cooperative learning, unstructured cooperative learning and conventional teaching are the instructional methods were divided into three experimental conditions such as group 1 with structured cooperative learning, group 2 with unstructured cooperative learning and group 3 with conventional teaching. The students in the experimental group 1 were taught using structured cooperative learning while students in the experimental group 2 and experimental group 3 were taught using unstructured cooperative learning and conventional teaching respectively.

Pre-test of mathematics achievement and attitudes toward mathematics was employed before the beginning of this research study. The purpose of pre-test was to test the level of students' performance in mathematics achievement and attitudes toward mathematics at the start of this experiment.

As seen in Table 1 that mathematics achievement pre-test mean scores of structured cooperative learning, unstructured cooperative learning and conventional teaching are 11.03, 11.17 and 11.00 respectively which are relatively similar. And the pre-test mean scores of attitudes toward mathematics are 3.03, 3.00 and 2.92 for structured cooperative learning, unstructured cooperative learning and conventional teaching respectively which are also relatively similar.

Table 1. Pre-test mean and standard deviation of mathematics achievement and attitudes toward mathematics

Dependent variable	Group	Mean	Std. Deviation
Mathematics achievement pre-test	Structured cooperative learning (n = 34)	11.03	0.76
	Unstructured cooperative learning (n = 35)	11.17	0.66
	Conventional teaching (n = 36)	11.00	0.76
Attitudes toward mathematics pre-test	Structured cooperative learning (n = 34)	3.03	0.80
	Unstructured cooperative learning (n = 35)	3.00	0.87
	Conventional teaching (n= 36)	2.92	0.87

It was found from Table 2 that the pre-test MANOVA results across three groups are not significant ($F = 0.35$, $p = 0.84$), and follow up ANOVA results also not significant on mathematics achievement ($F = 0.56$, $p = 0.57$) and attitudes toward mathematics ($F = 0.17$, 0.85). This results indicate that the performance of participants across three groups are equivalent in mathematics achievement and attitudes toward mathematics and they started out equal prior to the experiment.

Table 2. MANOVA and follow up ANOVA results on mathematics achievement and attitudes toward

mathematics pre-test

MANOVA effect and Dependent variable	Multivariate F Pillai's Trace df = 4, 204	Univariate F df = 2, 102
Group effect	0.35 (p = 0.84)	
Mathematics achievement pre-test		0.56 (p = 0.57)
Attitudes toward mathematics pre-test		0.17 (p = 0.85)

The instruments used in this study were the mathematics achievement test and attitudes toward mathematics questionnaire. The instruments - mathematics achievement test and attitudes toward mathematics questionnaire were content validated by the expert in mathematics education. The reliability of mathematics achievement test were calculated by using Kuder-Richardson 20 formula. The K-R 20 reliability coefficient of mathematics achievement test was 0.72. The reliability of attitudes toward mathematics questionnaire was determined by computing the Cronbach's Alpha reliability index. The Cronbach's Alpha reliability coefficient of attitudes toward mathematics questionnaire was 0.85.

Post-test of mathematics achievement and attitudes mathematics was administered at the end of this research study after the integration of structured cooperative learning in experimental group 1, unstructured cooperative learning in experimental group 2 and conventional teaching in experimental group 3. Post-test was conducted to identify the changes made in mean scores of mathematics achievement and attitudes toward mathematics in comparison to pretest.

The data which collected after pre-test and post-test were analyzed using MANOVA, ANOVA and ANOVA post hoc pair wise comparison. MANOVA was used to determine the effects of three independent variables on two dependent variables. MANOVA examined how dependent variables were influenced by independent variables. ANOVA was performed as follow up analysis of post MANOVA results. Follow up ANOVA examined the effects of three independent variables on each dependent variable. ANOVA post hoc pair wise comparison was administered to find out where the differences of means existed for each dependent variable in terms of three independent variables.

3. Results and Discussion

The results of this research study are presented based on the objectives stated earlier. The study was conducted to compare the effects of three independent variables such as structured cooperative learning, unstructured cooperative learning and conventional teaching on two dependent variables, mathematics achievement and attitudes toward mathematics. The post-test results of this study identified that the students' mathematics achievement and attitudes toward mathematics were influenced and affected by three instructional methods based on three experimental conditions such as structured cooperative learning, unstructured cooperative learning and conventional teaching groups of 105 students.

As seen in Table 3 that mathematics achievement post-test mean scores of structured cooperative learning, unstructured cooperative learning and conventional teaching are 21.79, 19.83 and 18.44 respectively. And the post-test mean scores of attitudes toward mathematics are 4.47, 4.03 and 3.83 for structured cooperative learning, unstructured cooperative learning and conventional teaching respectively. There are differences in post-test mean scores across three groups in mathematics achievement and attitudes toward mathematics.

Table 3. Post-test mean and standard deviation of mathematics achievement and attitudes toward

mathematics

Dependent variable	Group	Mean	Std. Deviation
Mathematics achievement post-test	Structured cooperative learning (n = 34)	21.79	02.19
	Unstructured cooperative learning (n = 35)	19.83	02.22
	Conventional teaching (n = 36)	18.44	01.96
Attitudes toward mathematics post-test	Structured cooperative learning (n = 34)	04.47	0.51
	Unstructured cooperative learning (n = 35)	04.03	0.62
	Conventional teaching (n = 36)	03.83	0.56

Table 4 shows post-test MANOVA results of comparing three groups are significant ($F = 11.17, p = 0.00$), and follow up ANOVA results also significant on mathematics achievement ($F = 21.93, p = 0.00$) and attitudes toward mathematics ($F = 11.64, p = 0.00$). The MANOVA results suggest that three types of instructional methods significantly influence mathematics achievement and attitudes toward mathematics. The results of ANOVA describe significant differences between students' mean scores on mathematics achievement and attitudes toward mathematics across three experimental groups.

Table 4. MANOVA and follow up ANOVA results on mathematics achievement and attitudes toward mathematics post-test

MANOVA effect and Dependent variable	Multivariate F Pillai's Trace df = 4, 204	Univariate F df = 2, 102
Group effect	11.17 ($p = 0.00$)	
Mathematics achievement post-test		21.93 ($p = 0.00$)
Attitudes toward mathematics post-test		11.64 ($p = 0.00$)

As depicted in Table 5, the students of structured cooperative learning (Mean = 21.79, SD = 2.19) performed significantly better ($p = 0.00$) than the students of unstructured cooperative learning (Mean = 19.83, SD = 2.22) and conventional teaching (Mean = 18.44, SD = 1.96) on mathematics achievement with a mean difference of 1.97 and 3.35 respectively. And the performance of unstructured cooperative learning (19.83, SD = 2.22) students is significantly higher ($p = 0.02$) than conventional teaching (18.44, SD = 1.96) students on mathematics achievement with a mean difference of 1.38. Besides, structured cooperative learning students (Mean = 4.47, SD = 0.51) performed significantly better ($p = 0.00$) than unstructured cooperative learning students (Mean = 4.03, SD = 0.62) and conventional teaching (Mean = 3.83, SD = 0.56) on attitudes toward mathematics with a mean difference of 0.44 and 0.64 respectively. In addition, the mean of unstructured cooperative learning (4.03, SD = 0.62) students is higher than conventional teaching (3.83, SD = 0.56) students on attitudes toward mathematics which is insignificant ($p = 0.32$).

Table 5. ANOVA post hoc pairwise comparison between independent variables on dependent variables

Independent variable	Dependent variable			
	Mathematics achievement		Attitudes toward mathematics	
Comparison group	Mean difference	Sig.	Mean difference	Sig.
Structured cooperative learning versus unstructured cooperative learning	1.97	0.00	0.44	0.00
Structured cooperative learning versus conventional teaching	3.35	0.00	0.64	0.00
Unstructured cooperative learning versus conventional teaching	1.38	0.02	0.20	0.32

The findings revealed that the students of structured cooperative learning outperformed the students of unstructured cooperative learning and conventional teaching on mathematics achievement. The performance of structured cooperative learning students is much better in comparison to unstructured cooperative learning and conventional teaching students on mathematics achievement and attitudes toward mathematics. It was found that students in structured cooperative learning group outdone the students in unstructured cooperative learning and conventional teaching groups due to structured form of cooperative learning integration.

The findings of this research study are consistent with the findings of Alabekee's (2015) study. Alabekee found that students in the STAD model had higher mean scores than their counterparts in the other forms of experimental conditions promoting their learning outcomes in mathematics which encouraged them actively involved in the structured way of cooperative learning. The results of this research study are also consistent with the study of Ozsoy and Yildiz (2004). Ozsoy and Yildiz's study revealed that the students who taught using Learning Together model of cooperative learning outdone the students of conventional method of teaching on mathematics achievement. The findings of this research study are also in line with the findings of other studies by Hossain et al. (2013) and Zakaria et al. (2010). Hossain et al. implemented Learning Together and Zakaria et al. used STAD models in their studies and found a significant effect on mathematics achievement in favor of cooperative learning models.

4. Conclusion

This research study showed that structured cooperative learning had a significant effect on students' achievement in mathematics. The findings revealed that the improvement of mathematics achievement for structured cooperative students was due to structured cooperative learning integration. The researcher found that structured cooperative learning was more effective in teaching and learning mathematics in comparison to unstructured cooperative learning and conventional teaching. It was found structured cooperative learning contributed to develop students' mathematics achievement and attitudes toward mathematics, therefore, teachers are suggested to implement structured cooperative learning to improve students' performance in mathematics. Teachers in primary, secondary and tertiary levels are encouraged to implement structured form of cooperative learning in their teaching and learning activities to bring a change in the system of unstructured cooperative learning and conventional teaching.

In conclusion, the researcher is lending two recommendations on the basis of the findings of this research study as follows:

1. This research study was limited to mathematics on a sample of 105 students in selected secondary school for 5 months, further studies can be conducted on mathematics with a larger number of samples for a longer period of time in primary, secondary and tertiary institutions.
2. Studies can be conducted to show the comparison between male and female, co-educational and single gender school, general and religious school, rural and urban school students through the implementation of structured cooperative learning, unstructured cooperative learning and conventional teaching.

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