The Use of Application Neuroscience in Facing the Industrial Revolution 4.0 the Principals of Senior high School Over the Branch of the Education Department

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Abstract Industrial revolution produces the changes of mindset, work methods, and patterns of building harmonious relationships between community groups and organizations. The principal as the leader of the organization must be able to face the industrial revolution. Facing the industrial revolution can be done by applying neuroscience in the practice of leadership management education. The neuroscience application creates synergy and engagement with high added value. This study aims to determine the principal's leadership in facing the industrial revolution by applying neuroscience. Research method using a two-stage approach: Qualitative and quantitative. The quantitative design uses the pre-test and post-test. The finding research is the principal applying neuroscience before knowing the theory showed a significant toward industrial revolution 4.0 where the experimental class t counted 15,649> from t table 2.037 in the control class pre-test and post-test that t count 5.131> from t table 2.040. This shows that it is important to apply neuroscience in order to realize good managerial demands according to the industrial revolution 4.0.
Keywords: Neuroscience, Industrial Revolution 4.0

1. Introduction

The world and everything in it starts from the human condition until the whole civilization experiences development. Many people say that the world today is changing rapidly and has entered a new environment with "Volatility, uncertainty, Complexity, and Ambiguity that increase continuously". [1] This VUCA terminology enters the world of leadership in educational institutions. In facing this new environment, it is necessary to fill ourselves with thinking skills. The ability to think and act through the application of neuroscience. How to apply neuroscience must be appropriate and not miss communication from various lines. Neuroscience is able to balance the primary emotional system with behavior patterns. Activity in the emotional neural network is able to react at noutside views. The emotional neural network is connected to the level of the secondary and tertiary brain to facilitate stimulation to work. [2]

In educational institution, the principal's role in organizing schools is important to implement neuroscience. The principal functions all his neurosciences in responding toward developments and changes. If it is not deal with quickly and carefully, these changes will be disruptive (unthinkable). The school principal conducts his leadership management by applying neuroscience in carrying with the urgency of academics and education practitioners. The principal can do ideas: design school, planning school, positioning school,

entrepreneurial school, cognitive school, learning school, power school, cultural school, environmental school, and configuration school. [3]

Arranging schools by designing school goals requires ideas that can break through the industrial revolution 4.0. The industrial revolution 4.0 resulted in changes in mindset, work methods, and patterns of building harmonious relationships between groups. The neuroscience application creates synergy and engagement with high added value. Application of neuroscience in leading schools by designing schools. School design is structured through appropriate planning. Planning should cover all educational kinds. Where the school culture can be achieved. In this case the principal towards the 4.0 industrial revolution should encompass education with the strength of the school itself so that negative things from the industrial revolution can be avoided such as security risks and can also damage interrelationships (relationships) between humans. [4] In order to easily understand it, it starts from the school principal himself. The application of neuroscience by increasing the quality of leadership, respecting trust, understanding effective communication, attitude of responsibility, rewarding and applying justice and providing savings and opportunities to all educational citizens and also controlling. [5] This situation is not easily done because the principal faces many problems. Start the problem of advancing school. Improve the quality of student learning. Lead the teacher as a subordinate. Increasing the professionalism of teachers and loyalty to the ministry of education through extension of the branches of the education office. Considering the complicated and overwhelming tasks and responsibilities of the principal, it is important to balance the brain thinking process with work activities. To this end, applying neuroscience through theory and practice is important to see the positive and negative influences towards the industrial revolution 4.0.

2. **Neuroscience**

Neuroscience is the scientific study of the nervous system [6] about the nervous system concerning things that gang up and control nerve function. In this case it is important to do with MRI technology to study the human brain. [7] Neuroscience as an effort to process of movement illustration for level hight.[8] mental functioning of a person so as to be able to perform basic skills, such as managerial skills, mental functions are unitary abilities but concits of simple and more basic skills.[9] Neuroscience is able to distinguish the review process to detect and direct attention to relevant sensory signals in the environment (detection); the process of classifying information and processes to connect emotions (processes for detecting and orienting attention to emotion relevance sensory cues in the environment detection).[10] Through the application of neuroscience it can create propitiity. (Neurosience is the largest and fastest growing associated of professionals). [11]Neurosience produces intellectual behaviors of cognitive emotions and physiological responses so that running leadership can be directed and effective. (Neurosience produce intellectual behaviors of cognitive emotion and physiological response). [12]

3. Industrial Revolution 4.0

The industrial revolution 4.0 characterized that the basis of human life focused on information technology.[13] Likewise with implementing leadership in the school building. In addition to the management of schools run by technology, the school of thought is also determined by neuroscience. Neuroscience is expected to be able to control information technology. The era of the industrial revolution 4.0 also disrupted various human activities. The principal must synchronize between neuroscience and the industrial revolution, so that

digital systems, artificial intelligence and virtual technology in the era of industrial revolution can bring digital on working life to be important in running school organizations. In the hope that the principal can be able to socialize face to face as a characteristic of the industrial revolution to accelerate changes experienced by the organization. [14] The principal made the industrial revolution a priority for thought in order to realize good management.[15] Good managerial by functioning the brain in which the contralateral human brains control every movement that responds to events such as events planned to supervise. [16] Leadership events carried out by principals towards the industrial revolution 4.0 should prepare a more innovative system so as to be able to integrate fysik, digital and human objects. [17] The workings offered in this study are through industrial revolution 4.0 trying to interconnect the capabilities of machine devices, sensors and people to connect and communicate with each other through the internet of Things (IoT) and the internet of People (IoP). [18] Here are described how Neuroscience works towards Industrial Revolution 4.0

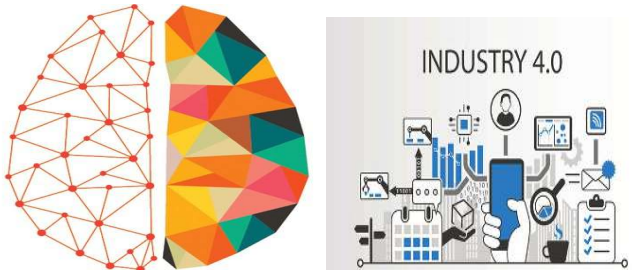

Figure 1 Network structural dependency in the human connectome across the life-spa

4. Method

4.1 Research Design

This study uses a quantitative approach in which observations are converted into numbers analyzed using statistics. The researcher explained the approach of the relationship between variables. Quantitative research is an approach for testing objective theories by examining relationships among variables. [19] The design used was a pretest and posttest group experiment, namely an experimental group measured the dependent variable (pretest) the application of neuroscience theory and then given a stimulus, neuroscience knowledge. In this design, at the beginning of the study measurements were made on the dependent variables that the subject had. After being given manipulation, a re-measurement of the dependent variable with the same measuring instrument is carried out. In this design, observations were made twice, namely before the experiment and after the experiment. Observations made before the experiment are called pretest, and after the posttest experiment.

4.2 Types of research

This type of experimental research looks for the influence of certain variables on other variables. Characteristics of experimental design are: a. Random assignment (random assignment), assigns principals to groups randomly for treatment. Padangsidimpuan City Group, Mandailing Natal District and South Tapanuli Regency. b. Control Over Extranous Variables, controls foreign variables that might influence the relationship between new habits and results. Treatment manipulation (Manipulation of Treatment Conditions) sets the subject in one of the treatment conditions. d. Outcome Measures assess treatment conditions affect outcomes. e. Group comparisons (Group Comparison) compare scores for different treatments on results. f. Threats of Validity to draw conclusions.

4.3 Research Subjects

Determination of the subject in this study was conducted randomly, because the characteristics of each headmaster could be categorized the same. The division by region was done randomly. Subjects in this study were principals of Public High Schools in Padangsidimpuan city consisting of 8 schools, principals in Mandailing Natal 20 district and school principals in South Tapanuli district 10. Determination of research subjects was to take one lottery number from the number of schools, so that one district / city can be obtained for treatment / treatment. The district area of the city used as the experimental area is the district of South Tapanuli.

4.4 Collecting Data Techniques

Collecting Data techniques used interviews,questionnaires, and observations.

5. Results and Discussion

This study involved two research groups, namely the experimental group of principals in the South Tapanuli district and the control group of school principals in the area of Padangsidimpuan city. School principals in the South Tapanuli district as an experimental group without applying neuroscience in leadership management and the school principal's control group in the city of Padangsidimpuan applied neuroscience. Both of these groups were placed together in the Padangsidimpuan education office branch. The research data consisted of initial tests and final tests on neuroscience theories. In this study, researchers obtained data from the results of the pre-test and post-test conducted in the experimental group and the control group. The pre-test is a test of ability given to principals before being given treatment, while post-tests are carried out after the heads get treatment. Both of these tests serve to measure the extent of management leadership by applying neuroscience towards industrial revolution 4.0.

This study aims to determine the application of neuroscience before understanding the theory and after understanding the theory / carrying out practice towards the industrial revolution 4.0. Analysis used by t test. The application of neuroscience theory to industrial revolution 4.0 conducted by principals in leadership management after seeing the results of the pretest and posttest t test of the experimental group saw whether or not the experimental group had increased scores after applying neuroscience theory in leadership management to industrial revolution 4.0. The conclusion of the study is stated to be significant if t count> t table at the significance level of 5%.

Tabel 1. The summary of the result pair t Test Pre-Test with Post-Test Experiment Group

Class	Rate	t count	t table	P
pre-test Experimental class	18,21	15,649	2,037	0,000
Post-test Experimental Class	21,00			

Tabel 2. The summary of the Result Pair t Test Pre-Test with Post-Test Control Group

Kelas	Rate	t Test	t table	P
pre-test Control Class	18,31	5,131	2,040	0,000
Post-test Control Class	19,12			

Base the two tables above it can be concluded that the application of neuroscience when carrying out the pretest and posttest in the experimental class calculated 15,649> from the 2.037 t table shows the significant application of neuroscience in the management of the principal's leadership towards the industrial revolution 4.0. Likewise in the control class at the pretest and posttest that t count 5.131> from t table 2.040. This shows that it is important to apply neuroscience in order to realize good managerial that is in accordance with the demands of the industrial revolution 4.0.

6. Conclusion

Based on the analysis above, it is evident that there is a significant difference between neuroscience before it is applied and after being applied by principals in implementing leadership management towards the industrial revolution 4.0. The application of neuroscience is the first step for modifying school principals between the ability to think about the problem with the managerial acting skills of the school. The application of neuroscience creates professionalism in acting, thinking and acting. Neuroscience is very appropriate to understand every human attitude and action towards perfection. Perfect in integrating physic, physical and artificial intelligence systems using virtual technology that brings digital working life.

7. Acknowledgments

Thanks to Mr. Ihsan and Mr. Fahri as the chairman and the head of the administration at the branch of the education office in Padangsidimpuan Town. To all principals at the branch of the education office in Padangsidimpuan Town.

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