PalArch's Journal of Archaeology of Egypt / Egyptology

The Impact of the Van Hiele Model in Correcting Mathematical Misconceptions Among 10th Grade Students

Ibrahim Moh'D Arman

College of Education Sciences, Al-Quds University, Palestine

Ibrahim Moh'D Arman, The Impact of the Van Hiele Model in Correcting Mathematical Misconceptions Among 10th Grade Students– Palarch's Journal Of Archaeology OfEgypt/Egyptology 18(4)2021. ISSN 1567-214x

Keywords: Impact, Van Hiele Model, Correcting Mathematic Misconceptions

ABSTRACT

This study aimed to reveal the Impact of the Van Hiele model in correcting misconceptions in Geometry construction among tenth grade primary students in the Directorate of Education in South Hebron. The experimental methodology was used where an stratified sample of (44) female students from Dura Girls' Vocational Secondary School was distributed into two groups of 22 students each. The experimental group was taught using Van Hiele's model, and the control group was taught in the usual way. The study was conducted during the first semester of the 2020/2021 academic year. A test tool was built to correct misconceptions.

The results of the study showed that there were statistically significant differences in the test of correcting misconceptions among the students in favor of the experimental group that was taught using the Van Hiele model, and the presence of statistically significant differences according to the academic achievement variable, and in favor of the group with high achievement, and the absence of statistically significant differences according to the interaction between the teaching method And academic achievement.

In light of these results, the study recommended the necessity of employing the Van Hiele model, the importance of training mathematics teachers to use it in teaching mathematics, and the necessity of conducting further studies on the Van Hiele model using dependent variables.

Study Problem and its Importance:

Van Hiele's model of mathematical Geometry thinking was met with great interest by educators in the world, and this interest indicates that understanding and knowing this model helps in teaching Geometry For students in different stages, it shows to teachers the necessity of students passing through levels of the model to help develop their thinking levels, Meng and Idris (2012).Van Hiele has classified the levels of thinking in Geometry into five levels: the level of visual recognition, the level of analysis, and the level of non-formal inference. The three aforementioned levels are considered appropriate for teaching students in basic grades, and the teacher should use them gradually to enable students to understand concepts, generalizations and Geometry skills without the need. To any logical proofs, as for the fourth level, formal inference and the fifth level, the level of extreme accuracy, it is for students of the upper basic and secondary classes because it is based on the perception of the Geometry structure and the use of mathematical proofs in theories and the solution of Geometry exercises (Rashid and Khashan, 2009).

Because of this importance and the great impact of the Van Heel model, the study came to know the Impact of the Van Hiele model in correcting the misconceptions of tenth grade students in the South Hebron Education Directorate.

The Study Problem:

Because of the weakness and low level of students 'achievement in mathematics, the occurrence of many errors in its concepts and lack of mastery of the required degree, and complaints about Geometry units and concepts, lack of understanding of Geometry lessons and the difficulty of their concepts and the inability to solve their questions.

Study Questions:

The study tried to answer the following question:

What is the Impact of using the Van Hiele model in correcting misconceptions in Geometry construction among tenth grade students in the South Hebron Education Directorate? Does this activity differ according to the method and academic achievement, and the interaction between them?

Study Hypotheses: The study question was transferred to the following Null Hypothesis:

"There are no statistically significant differences at the level of statistical significance ($\alpha \leq 0.05$) between the arithmetic averages of the grades of the tenth grade students in the test for correcting misconceptions in Geometry constructions due to the method variable, academic achievement, and the interaction between them.

Objectives of the Study: The study aimed to reveal the Impact of using Van Hiele's model in correcting misconceptions in Geometry constructions in mathematics for tenth grade students, and to indicate whether this Impact differs according to the method of teaching, academic achievement, and the interaction between them.

Importance of Study: The study came in response to the development and renewal of methods and methods of explaining Geometry units in mathematics in line with modern trends and achieving educational goals that we all seek. This study may benefit mathematics teachers in clarifying how to use the Van Hiele model.

This study may benefit curriculum planners and those in charge of developing mathematics projects, especially in Geometry, to include the curriculum with many exercises and practical activities based on the Van Hiele model.

Limitations of the Study: This study was limited to:

- Human borders: the tenth grade students in the South Hebron District
- Temporal limits: during the first semester of the academic year 2020/2021 AD.
- Spatial boundaries: Schools affiliated to the South Hebron District, Dora Girls Secondary Vocational School
- Objective limits: the unit of Geometry constructions in the tenth grade mathematics book.

Terminology of Study:

Misconception: It is defined as the error that students make in Geometry concepts, which includes errors resulting from confusion between concepts, and errors resulting from incorrect Geometry generalizations of some rules in Geometry, which are misconceptions that cannot be corrected by quick scrutiny because they are the result of not understanding the required mathematical rule or The necessary Geometry procedures Abu-Odeh (2006) and Al-Kilani (1994) defined misconceptions as: Those concepts that do not correspond to the current scientific meaning used for them.It was defined procedurally: the error in the Geometry mathematical concepts that students possess and which are included in the Geometry construction unit in the tenth grade mathematics course and is measured by the tool that was prepared.

Theoretical Framework:

Al-Balawi (2013) explained that learning a certain level of the Van Hiele model requires learning for the previous level, and that moving from one level to another requires time for its maturity before moving to the next level. Above it does not take place learning, but only memorization and revelation.

Malloy (2002) argues that one of the most important strengths of using the Van Hiele model is that a student's progress from one level to the next depends on teaching more than the student’s age or maturity.

Below is a description of each of the Van Hiele levels

The first level (visual level): It is the level at which the learner judges the geometric shape and classifies it from its general appearance and distinguishes it as a whole, and does not know anything about its characteristics, and the student at this level cannot connect between the characteristics and does not know the relationships between them, as the student is expected to distinguish shapes according to their appearance and describe them in words, and recognize cases Shapes as they appear in their overall image, and recognizes shapes while they are in different situations, and looks at any geometric shape separately without generalizing, making, drawing or copying shapes with general names, naming natural forms from the environment and from photographs, and verbally classifying shapes based on their general appearance And solve routine problems and some life Geometry problems that require dealing with them by measuring and counting, or by cutting and recombining.

The second level (analysis): At this level, the learner begins to analyze geometric shapes, distinguish the apparent characteristics through observation and experimentation, and the student is expected to distinguish between shapes according to the general characteristics and components of them, and to use the properties in drawing the required shape (by Geometry construction) and generalize them, and the ability to observe, measure and determine relationships, and solve some exercises Activities are based on generalized properties, or insightful approaches, and it begins by using verbal and verbal expressions about the concepts they have learned and formulating geometric sentences.

Level Three (Informal Deduction): At this level includes the learner’s awareness of the relationships between the different geometric shapes, the ability to formulate the definition of the geometric shape using words that have a logical character, and to find relationships between the properties of the same shape and link them with each other at the level of the shape or at the level of different shapes, where the student is expected to realize the characteristics that It suffices to distinguish one form from another, or an Geometry construction from another, and deduce some properties of relationships through inference, and mention and arrange the properties of Geometry constructions, and the learner's awareness of the relationships between concepts and their Geometry constructions.

Level Four (Formal Deduction Level): This level is determined by theoretical thinking as well as evidence-building for Geometry theories, where the student is expected to recognize defined and undefined terms, to distinguish between what needs proof and what is taken for granted, and to use the axioms, relationships and steps that were explained in the previous level, and to prove the internal relationships between Theories, data, and related Geometry questions, comparing and discovering various proofs of theories, giving Geometry theories about it, studying the effect of changing one of the basic conditions in an Geometry construct, being able to justify the steps of proof, using what is abstract, and writing proofs in a manner that is characterized by understanding.

Level Five (Rigor Level): It is considered the highest level of the Van Hiele model, in understanding relationships to build Geometry theories and axioms, where students at this level are expected to be able to develop methods for solving some Geometry problems, to devise general methods for general problems, to compare different Geometry systems based on axioms, and to deduce and prove some Theories in different geometry systems, whether Euclidean or non-Euclidean, and the full awareness of the different methods of direct and indirect proof and the perception of any contradiction or inconsistency between a set of statements or characteristics.

Mathematical misconceptions: The reason for the prevalence of misconceptions in mathematics is due to the relationship between what a student receives in school and what is formed in his mind, assuming the concept is correct. Errors in Geometry concepts are the product of learning and experience that the student goes through, so the student either creates correct concepts or otherwise and places them in the contexts of his life according to his understanding and perception and consistent with his experiences (Al-Selouli and Khashan, 2010).

Correct Misconceptions: Rashid and Al-Khashan (2009) believes that mathematics is a cumulative logical construct whose learning leads to the acquisition of concepts of concepts, trends and values, and care should be taken in its teaching methods to ensure the correctness of what students learn, and this requires detecting errors in Geometry concepts and treating them as always.

Dahir (2009) emphasized that diagnosing and correcting conceptual errors among students is one of the most important goals of learning, and that errors in Geometry concepts can be changed into correct concepts, by making deliberate attempts and using new strategies to facilitate the change of the basis of the wrong understanding into a sound and correct mathematical concept.

Previous studies:

The study of Alex and Mammen (2016): which aimed to know the effect of teaching Geometry according to the Van Hiele model on developing levels of Geometry thinking. The study sample was from tenth grade students in South Africa. The study examines the levels of Geometry thinking, and the results showed that there are statistically significant differences between the scores of the two groups in testing the levels of Geometry thinking in favor of the experimental group that studied Geometry according to the Van Hiele model.

The study Al-Ebous (2016): which aimed to know the effect of using the Van Hiele model on the acquisition of Geometry concepts and orientation towards Geometry for students of the first three grades in Jordan, and the sample for this study consisted of (60) third-grade students in Amman. The sample was divided into two groups: experimental and control, and the researcher used the quasi-experimental approach, and the study tools represented a scale for acquiring Geometry concepts and a scale for measuring the orientation towards Geometry. For the benefit of the experimental group that studied using the Van Hiele model.

Al-Harbi study (2015): which aimed to know the effect of employing Van Hiele's model in teaching the unit of geometry and spatial reasoning on developing levels of Geometry thinking among second-grade intermediate students in the Qurayyat governorate, and the sample consisted of (52) students of the second intermediate grade from Qurayyat in the Kingdom They were divided into two groups: (25) students were an experimental group and (27) students were a control group. The study tools consisted of a program prepared by the researcher and a test for Geometry thinking, and the results showed statistically significant differences between the degrees of the conceptual thinking level and the level of semi-inferential thinking and the level of Analytical thinking is attributed in favor of Van Hiele's experimental group.

Al-Shukry's study (2016): which aimed to find out the effect of Karen's model in modifying the misconception of mathematical concepts among students of the second intermediate level, and the sample consisted of (73) students from the Al-Hashemite intermediate school for boys, and the sample was divided into two experimental groups (35) students, and (35) 1) students were a control group, and (3) students were statistically excluded, and the tools consisted of testing the diagnosis of mathematical concepts, and the pre and post test, and the results showed statistically significant differences between the mean scores of the two groups in the test of mathematical concepts in favor of the experimental group.

Study Methodology: The experimental method was used, for its suitability for such type of studies.

Study Population: The study population consisted of tenth grade students in government schools affiliated to the Directorate of Education in South Hebron.

The Study Sample A Stratified Sample was chosen as shown in Table (1).

Table (1): Distribution of the sample members into the experimental and control groups.

Group	Achievement	Number	Total
Experiment	High	7	22
	Low	15	
Control	High	7	22
	Low	15	

Study tools:

A test was built and validated by presenting it to a group of experienced and competent arbitrators. The reliability coefficient was also found, with a value of (0.78), which is an acceptable stability value for the purpose of the study.
Study variables:
Independent variables:
Method: two levels (teaching using the Van Hiele model, and teaching using the standard method).
Academic achievement: two levels (high and low).
Dependent variables:
Correcting the misconceptions of tenth grade students in the Geometry Construction Unit.
Statistical Procedure: SPSS was used.
Results related to the answer to the first question:
What is the Impact of using the Van Hiele model in correcting misconceptions in Geometry construction among tenth grade primary students in the South Hebron Education Directorate? Does this activity differ according to the method and academic achievement, and the interaction between them?
The question was converted to the following null hypothesis:
The first null hypothesis: "There are no statistically significant differences at the level of statistical significance ($\alpha \leq 0.05$) between the arithmetic averages of the grades of the tenth grade students in the test for correcting misconceptions in Geometry constructions due to the method variable, academic achievement, and the interaction between them.
To test the validity of this hypothesis, the arithmetic averages and standard deviations were calculated as shown in Table (2).
Table (2): The arithmetic means and standard deviations in the pre and post correction of misconceptions test according to the teaching method and level of achievement.

Group	Number	Descriptive. Statistics	Pre-test	Post-test
Control	22	Arithmetic Mean	9.73	17.73
		Standard Deviation	2.76	5.23
Experiment	22	Arithmetic Mean	9.23	22.36
		Standard Deviation	3.05	4.51
High Achieve.	14	Arithmetic Mean	10.14	25.64
		Standard Deviation	3.37	3.93
Low Achieve.	30	Arithmetic Mean	9.17	17.43
		Standard Deviation	2.64	3.68

It is noticed from Table (2) that there are apparent differences in the arithmetic averages attributed to the teaching method, as the arithmetic mean of the experimental group in the post test reached (22.36) with a standard deviation of (4.51), while the results showed that the arithmetic averages of the scores of the tenth grade students of the control division were less than the averages Arithmetic of experimental division scores.
It is also noticed that the arithmetic averages of the scores of the tenth grade students with high academic achievement in the test of correcting misconceptions in the dimensional Geometry constructions are higher than the arithmetic averages of

the scores of the tenth grade students with low achievement levels, where the arithmetic average of the marks of the students with a high achievement level was ((25.64 with a deviation) Standard amount (3.93).

To find out whether these apparent differences in the arithmetic means of the students 'grades are statistically significant at the level (α ≤0.05), the researcher used the (ANCOVA) test as shown in Table (3).

Table (3): Results of (ANCOVA) test due to the method, achievement, and the interaction between them

Source of Variance	Sum Of Squares	Degree of Freedom	Mean Squares	F-value	Sig.	Effect Size
Pretest	34.75	1	34.75	4.31	0.04	0.100
Method	193.04	1	193.04	23.98	0.001*	0.381
Achieve.	579.78	1	579.78	72.01	0.001*	0.649
Meth*Achiev	4.65	1	4.65	0.58	0.452	0.015
Error	314.01	39	8.05			
Total	18918	44				

* Statistical significance at level (α≤0.05)

Results related to the teaching method variable:

It is clear from Table (3) that the value of p calculated for the difference between the mean scores of the tenth grade students of the control and experimental groups in the misconceptions correction test according to the teaching method is (23.98), with a calculated significance level of (0.001), which is less than the level of statistical significance (α ≤0.05), and accordingly the first null hypothesis of the study is rejected, that is, there are statistically significant differences attributed to the teaching method, and to know the benefit of those differences, the modified arithmetic averages and standard errors were calculated for the tenth grade students of the control and experimental groups in the misconceptions correction test, as shown in the table No. (4).

Table (4): Marginal Estimated Means due to the teaching method.

Method	Marginal Estimated Means	Standard Error
Experiment	23.75	0.656
Control	19.21	0.650

It can be seen from Table (4) that the modified arithmetic mean of the experimental group that studied Geometry constructions according to Van Hiele model is (23.75), which is higher than the modified arithmetic average of the control group that studied Geometry constructions in the usual way, reaching (19.21), which indicates that The differences between the two groups were in favor of the experimental group.

The results also indicate from Table (3) that the effect size of the teaching method amounted to (0.381), which is higher than (0.14), which is the reference criterion for the size of the effect as it was explained in the third chapter, by looking at previous studies such as Mahmoud's study (2017) This indicates that there is a significant impact of the teaching method using Van Hiele's model in teaching Geometry constructions on correcting the misconceptions of tenth grade students.

The result indicates the Impact of teaching using Van Hiele's model in the subject of Geometry constructions in correcting misconceptions among students of the tenth grade, as Van Hiele's model, with its five levels: (conceptual, descriptive, analytical, deductive, non-formal, deductive, formal, and abstract) in developing the ability of learners On reviewing knowledge and linking past experiences with new knowledge and experiences, as teaching in this model worked on the learner’s progression from one level to the next level in a smooth, sequential and hierarchical manner in understanding ideas, understanding concepts and vocabulary, and correcting ideas and concepts that the learner had in different Geometry contexts in the different previous stages of education Each level of the Van Hiele model depends on the level before it, and the learner cannot move from one level to another, unless she has mastered the previous level or levels, as each level of the Van Hiele model in teaching the subjects of the Geometry Construction Unit had its language, terminology, concepts and knowledge. The Van Hiele model also helped the tenth graders in the experimental group to perceive the relationships between the mathematical concepts present in the mathematical cognitive structure and the new concepts, and this in turn led to correcting any misconceptions that the student had previously formed, thus helping to correct this concept in the student’s structure By representing him in new educational situations formed by the activities of the Van Hiele model in unit teaching, What was apparent was the increase in students correcting misconceptions in the experimental group compared to the control group, and this was apparent in determining the correct reasons for choosing the correct answer in the misconceptions correction test that the researcher had placed in her experimental study.

Thus, the use of Van Hiele's model in teaching the experimental group was consistent with the nature of science among the tenth graders, helping them in interaction, participation, attracting attention, arranging ideas, and positive association with them in correcting their misconceptions.

Results related to the variable of academic achievement level:

It is evident from Table (3) that the value of p calculated for the difference between the mean scores of the tenth grade students in the control and experimental groups in the misconceptions correction test according to the level of academic achievement is (72.01), with a calculated significance level of (0.001), which is less than the level of statistical significance ($\alpha \leq 0.05$), and accordingly, the null hypothesis is rejected, that is, there are statistically significant differences attributed to the level of academic achievement of the students. It is shown in Table (5).

Table (5): Marginal Estimated Means and standard errors due to the level of academic achievement.

Achievement Level	Marginal Estimated Means	Standard Error
High	25.43	0.765
Low	17.53	0.520

It is noted from Table (5) that the adjusted arithmetic average for the level of high academic achievement in the correction of misconceptions test is (25.43), which is higher than the arithmetic average adjusted for the level of low achievement, and this indicates that the differences between the two levels of academic achievement were in favor of the high level.

The results also indicate in Table (3) that there is a significant impact of the educational attainment level on the students ’grades in the correction of misconceptions test.

The results were in favor of female students with high academic achievement, and this can be explained by relying on the indication of many male and female teachers with the keenness of this group to be always the best in the class and the most eager to access information correctly and most committed to instructions, perform tasks and homework, perform the required activities, and obtain Satisfactory results to prove their ability to pay attention to study in the fullest possible way, which led to an increase in their arithmetic mean in the test for correcting misconceptions, while female students with low academic achievement are neglecting many educational tasks and performing the required activities and solving the homework imposed on them and not adhering to the educational instructions .

Results related to the interaction between the method and the level of academic achievement:

The results of Table (3) indicate that the level of significance calculated for the interaction between the teaching method and the level of academic achievement is (0.452), which is a value greater than the level of statistical significance ($0.05 \geq \alpha$), meaning that there are no statistically significant differences for the interaction between the teaching method and the level of academic achievement.

Teaching according to Van Hiele's model in the Geometry Construction Unit was appropriate for all high-achieving and low-achieving students in the experimental group and is fair, and this shows the availability of equal opportunities for learning for all levels of students by applying the same tasks, duties and educational experiences and similar conditions with their extraneous variables in terms of number of classes, time and application The same curriculum, tools, and evaluation methods, taking into account the desires, inclinations and characteristics of everyone, and in return the same harmony, interaction and involvement of everyone in correcting their misconceptions in exchange for teaching using Van Hiele's model in the Geometry Construction Unit

Recommendations:

In light of the study's findings, the following recommendations and suggestions can be made:

• Calling upon those in charge of developing and updating Palestinian mathematics books to reconsider the formulation of the content of Geometry units in mathematics courses for all stages in line with the Van Hiele model.

• Include a teacher's guide for the new mathematics curriculum by preparing some procedural lessons for the Geometry units in it according to the Van Hiele model, so that mathematics teachers can review it.

• Holding training courses for mathematics teachers through which they are introduced to the Van Hiele model on levels of Geometry thinking, its use and application in planning, preparing and implementing Geometry lessons in the textbooks.

• The necessity of mathematics teachers' interest in correcting students 'misconceptions, especially Geometry ones, and identifying the reasons for the formation of these concepts, and appropriate teaching strategies to amend them.

References

Abu-Odeh, S. (2006): **The effect of using the structural model in teaching mathematics on developing and retaining systems thinking skills among seventh grade students in Gaza**. Unpublished MA thesis, Islamic University, Gaza, Palestine.

Al-Shukry, H. (2016): The effect of Karen's model in modifying the misconception of mathematical concepts among second-middle students, **Journal of the College of Basic Education for Educational and Human Sciences**, University of Babylon, Issue (29), Iraq, pp. 375-394.

Al-Balawi, A. (2013): **A training program based on interactive programs in teaching and learning mathematics**. PhD thesis, College of Education, Umm Al-Qura University, Saudi Arabia.

Al-Harbi, A. (2015): **The effect of employing the Van Heel model in teaching the unit of geometry and spatial reasoning on the development of levels of Geometry thinking among second-grade intermediate students in Qurayyat Ditrict**. Unpublished MA thesis, Yarmouk University, Jordan.

Khasawneh, Amal. (2007): Levels of Thinking in Space Geometry for Tenth Grade Students, **The Jordanian Journal of Educational Sciences**. Issue 3, Part 1, pp. 11-32, Jordan.

Al-Ramahi, R. (2014): Levels of Geometry thinking in mathematics textbooks in Palestine for grades (1-10), **Al-Azhar University Journal**. Gaza, Humanities Series, Issue. 16, Part 1, pp. 235-260, Egypt.

Dahir, KHieled. (2009). **The effect of using a generative learning strategy in treating alternative perceptions of some mathematical concepts among eighth grade students**. Unpublished MA Thesis, College of Education, Islamic University, Gaza, Palestine.

AL- ebous, T. (2016): Effect of the Van Hiele model in geometric Concepts acquisition. The attitudes towards geometry and learning transfer effect of the first three grades student in Jordan, **Canadian center of science and education**, 9(4), pp87-98.

Alex J. & Mammen k. (2016): Lessons learnt from employing Van hiele theory-based instruction in senior secondary school geometry classrooms. **Eurasia journal of mathematics, science & Technology Education**, 12(8),pp223-236.

Bal, A. (2014): Predictor variables for primary school students related to Van Hiele geometric thinking**, Jornal of theory and practice in education**. 10(1), pp259-278.

Malloy. C. (2002): **The Van Hiele framework, Navigating Through Geometry in Grades 6-8** , USE , Reston va : (NCTM) , INC , WWW.nctm,org .

Meng, C. & Idris, N. (2012): Enhancing students geometric thinking and achievement in solid geometry, **journal of mathematics education**, 5(1),pp15-33.

Teppo, A. (1991): Van Hiele levels of Geometric thought revisited, **Mathematics Teacher**, 84(3), pp210-221.

Usiskin, Z. (1982)**: Van Hiele levels and achievement in Secondary School**

Geometry, Department of Education the University of Chicago, 5835s. kimbark Avnue Chicago, IL 60637.

Van Hiele P. (1986):**Structure and insight: A theory of Mathematics Education**, Orlando, Florida, academic press, Inc.

LIU, YI-CHING. "VOCATIONAL SCHOOLS IN THE FIELD OF INTERIOR DESIGN CREATIVITY OF STUDENTS." International Journal of Humanities and Social Sciences (IJHSS) 5.2 (2016) 95-102

RAJPUT, PRAMOD KUMAR. "AN EMPIRICAL STUDY OF THE ATTITUDE OF FIRST DEGREE STUDENTS TOWARDS ENTREPRENEURSHIP IN RELATION TO THEIR ACADEMIC ACHIEVEMENTS." International Journal of Humanities and Social Sciences (IJHSS) 6.5 (2017) 61-76

Venkataraman, S., and S. Manivannan. "A Study on usage of lap tops among the first year college students." IMPACT: International Journal of Research in Humanities, Arts and Literature (IMPACT: IJRHAL) 6.12 (2018): 455-462.

Eya, Ngozi M., et al. "SOCIO-PSYCHOLOGICAL FACTORS AS CORRELATES OF STUDENTS'PERFORMANCE IN CHEMISTRY: IMPLICATION FOR SCIENCE AND ENGINEERING EDUCATION." International Journal of Mechanical and Production Engineering Research and Development (IJMPERD) 10.4 (2020): 239-248.

BENSON, OZICHI O., CHINWE R. NWAGBO, and CHRISTIAN S. UGWUANYI. "STUDENTS’PERCEPTION OF TEACHERS’PEDAGOGICAL SKILLS AND ITS INFLUENCE ON THEIR ATTITUDE TOWARDS SCIENCE: IMPLICATION FOR SCIENCE, TECHNOLOGY AND ENGINEERING CAREERS." International Journal of Mechanical and Production Engineering Research and Development (IJMPERD) 10.3 (2020) 14701-14714

Jasmine, Johanna. "TRAINING EFFECTIVENESS OF EMOTIONAL INTELLIGENCE ON ACADEMIC ADJUSTMENTAMONG POST GRADUATE STUDENTS." IMPACT: International Journal of Research in Humanities, Arts and Literature (IMPACT: IJRHAL) 7.2 (2019) 129-136