

Optimization Research of Multimedia Technology Based on Multi-Chromosome Genetic Algorithm in College Music Teaching

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Objectives: In recent years, along with the rapid development of multimedia technology and network technology, such a combination can assist music teaching through the combination of computer platform and multimedia. **Methods:** In order to improve the level of music teaching in schools, what is needed in the current music teaching environment is to fully understand the teaching methods in the current music classroom. **Results:** Based on the computer platform multimedia combination assisted music teaching mode research, the current music teaching mode is optimized by genetic algorithm. **Conclusion:** The results prove that this study is very successful.

Key words: multimedia; music teaching mode; genetic algorithm

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With the diversification of modern people's lifestyles, the demand for art courses is growing in the development of traditional education. With the development of national quality and quality education, new requirements have been put forward for the development of music teaching. In the traditional teaching mode, it is only limited to the teacher's words and deeds, it is difficult to get a real experience. But the rise of computer algorithm technology has made this all possible. In the development of computer algorithm teaching, it has only been several years since it was widely used, which is enough to prove its practical effect in the teaching process¹. Computer algorithm teaching has become closely related to our teaching changes, especially in today's music teaching. Under the traditional music teaching mode, students can't feel the beauty brought by music². For music courses, the direct experience and the experience of relying solely on theoretical teaching are quite different. Today, with the

rapid development of computers, the application of computer algorithms has been further developed³. The new computer algorithm technology not only satisfies the needs of teaching, but also brings a practical experience to students⁴. The continuous improvement of the level of science and technology makes the teaching model word pay more and more attention to the practical experience of students. In the development of music teaching, the addition of computer algorithms is one of the effective means to promote reasonable teaching⁵.

In the systematic study of the current college music curriculum, it is found that the whole system has obvious disadvantages. One is the lack of professional music theory guidance. The direction and goals of development are not clear. Many students just use the name of the course to make an abstract understanding. With the continuous enrichment of music development, the rationalization of the music curriculum system and the corresponding classified management

should be constructed first⁶. The next is that the name and content do not match. Due to the reform of music education, present music has added new elements, no longer just sticking to the content of traditional music. But the new musical form system has not yet been built⁷. The third is that the professionalism of music is not enough. For the convenience of teaching, many courses focus on the same as the music course. The music classes of many students overlap, which leads to the inability to cover the entire music education⁸. In the future, the need for social development requires comprehensive development of comprehensive talents, and the rationalization of the educational system of music is the key to achieving rational music teaching⁹. The wide application of computer systems should not only focus on the surface form, but should be carried out in depth to build reasonable system content. In the development of music teaching abroad, the emphasis on music lessons is much higher than that in our country. Its adaptive teaching system provides a great reference value for China's future design. The development of music lessons should not be simply the transmission of simple knowledge, but stimulate their creativity in music through the satisfaction of students' needs¹⁰.

METHODS

Based on Computer Platform Multimedia Combination Assisted Music Teaching Design

In the process of designing, it is necessary to integrate the knowledge points in the music teaching covered in the textbook. The technology of computer multimedia is used to convert the scene dialogue in the textbook into a video version, and the learning of new words is memorized by scientific and interesting memory methods. It is shown in the form of pictures that these data need to be extracted in the data conversion of the knowledge in the course. Before constructing the multimedia combination of the computer platform to assist the music teaching, some music data needs to be collected first. As we all know, in the traditional classroom music teaching, the phenomenon often

encountered is that students are misspelled due to inaccurate vocabulary memory, which means that students have low mastery of music. In the algorithm model of the design, the function of learning supervision is added. Students are able to receive feedback in a timely manner, which plays a supervisory role. Students will feel cordial and interesting, so that students have a stronger desire to learn. Therefore, when designing the teaching model, it is necessary to use more interesting and easy-to-remember methods to decompose it, and to remember it through the first notes. In this part of the evaluation, the following process was designed: the common types of errors in the use of music are character insertion, character deletion, and letter replacement. These errors are defined by the way these common mistakes are evaluated through dynamic programming algorithms. The input string $P_m = P_1P_2P_3...P_m$ and the standard character $W_m = w_1w_2w_3...w_m$ are defined in the following way:

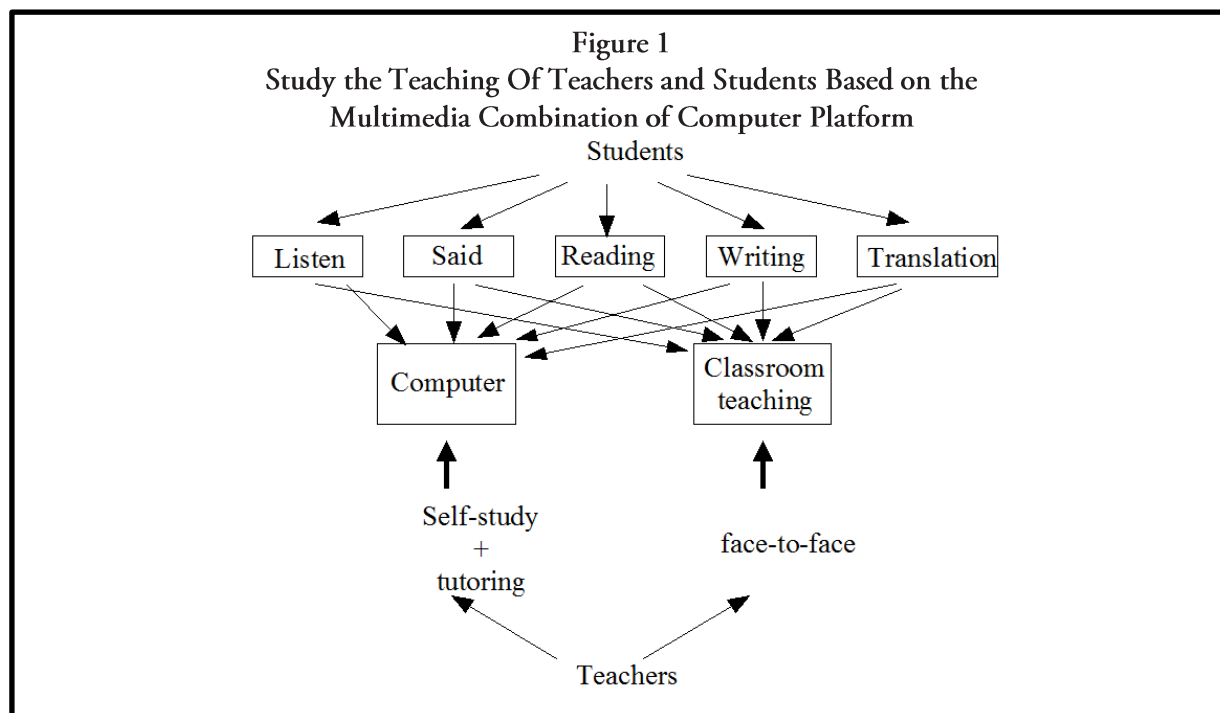
$$P_m = P_1P_2P_3...P_m \quad (1)$$

$$W_m = w_1w_2w_3...w_m \quad (2)$$

D represents the edit distance between P and W. After all the Ps is converted into edits of W, the insert operation is W inserted after P, and P deleted when the operation is deleted. When doing the replacement operation, use W to convert p, so the above-mentioned note can be statistically and researched by the above formula. In the case of statistical errors, the algorithm of the dynamic programming is applied for calculation. Dynamic programming algorithms are often used to solve problems with some optimal properties. There may be many feasible solutions to this type of problem. Each solution corresponds to a value, and it is desirable to find a solution with the optimal value. The dynamic programming algorithm is similar to the divide-and-conquer method. The basic idea is to decompose the problem to be solved into several sub-problems. The sub-problems are solved first, and then the solutions to the original problems are obtained from the solutions of these sub-problems. Different from the divide and conquer method, the problems that are suitable for solving with dynamic programming are often not

independent of each other. If the divide-and-conquer method is used to solve such problems, the number of sub-problems obtained by the decomposition is too large, and some sub-problems are repeatedly calculated many times. If the answers to the resolved sub-questions can be

saved, and then find the answers that have been obtained when needed, this can avoid a lot of double counting and save time. The teaching method between teachers and students is shown in Figure 1:



In this process, the rigid note memory method of the original textbook can be updated, and each note is divided into a method for students to remember by using multimedia technology. This makes it easier for students to remember the notes, thus laying a solid foundation for their notes library. In addition to sweeping in the new notes in the textbook, all that needs to be done is to barcode the sentences containing the new grammar. Because errors often occur during the using of grammar, when using the article statement, what is needed is to have a complete control of the data. The arithmetic formula set is

as follows:

$$T_i = n \times \lg \frac{M}{m} \quad (3)$$

The n in the formula indicates the number of times the correct number of statements appears in the article. The more the number of occurrences, the greater the error rate of the article, and the lower the corresponding score. M/m indicates the error rate value under normal conditions. The calculation results for these parameters are shown in Table 1 below:

Table 1
Research Parameter Calculation of Multimedia Combined With Music
Teaching Mode Based on Computer Platform

Data input value	ε	W	f	s
100	55	60	8	70
200	98	100	18	90
300	140	150	26	110
400	200	250	33	130
500	235	260	45	170
600	298	310	60	220

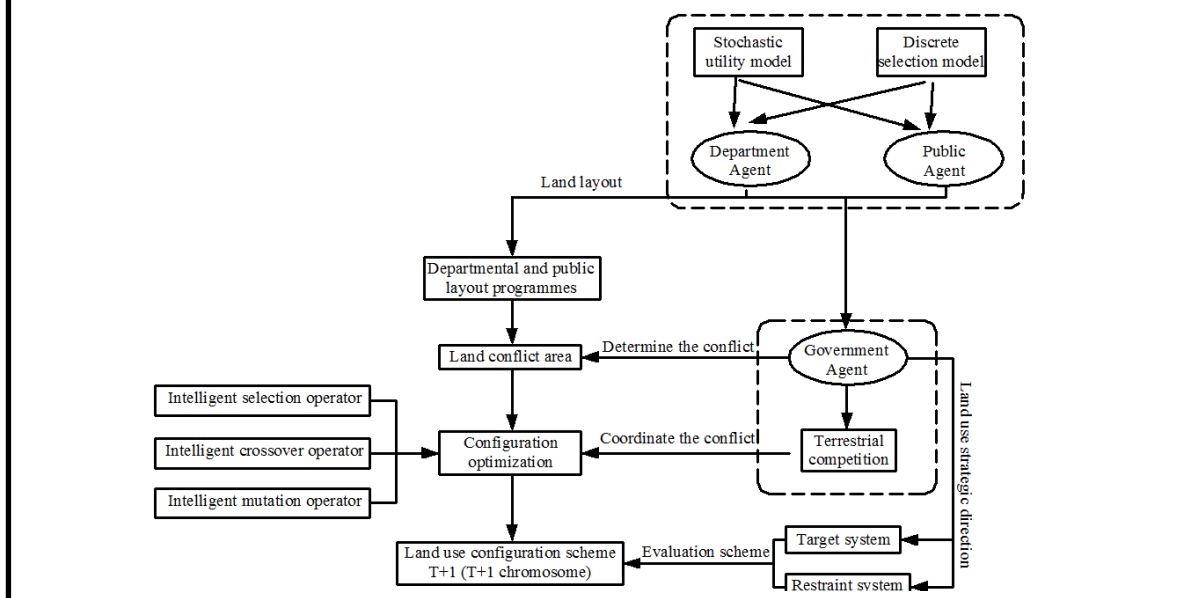
When making input of a textbook statement, the data should be corrected at all times. There are not too many problems in the process of collecting data. When the sentence pattern is answered, the evolution history of the music can be explained to the students through multimedia. It should be noted that in the whole process of lectures, the teacher is the main body of teaching, and multimedia teaching is only a way to assist teaching. Teachers can't rely too much on multimedia teaching methods. If can't make enough supplements in the classroom, it will make classroom teaching flow. In order to avoid this phenomenon, it is necessary to improve the teaching method of the teacher himself.

Multimedia-Assisted Music Teaching Design Based on Computer Platform

After the above evaluation method, the collected data needs to be analyzed and processed

in a centralized manner, so it is necessary to conduct in-depth internal exploration of the collected data. Data mining algorithms are a set of heuristics and calculations that create data mining models based on data. To do this, in order to create a model, the algorithm will first analyze the data provided and look for specific types of patterns and trends. The algorithm uses the results of this analysis to define the best parameters for creating a mining model. These parameters are then applied to the entire data set to extract feasible patterns and detailed statistics. The mining model that the algorithm creates based on your data can take many forms, including: a set of classifications that describe how the cases in the dataset are related. Regarding the prediction results and describing how different conditions affect the results, the composition of this procedure is shown in Figure 2 below:

Figure 2



This design can alleviate the teacher's preparation pressure. In the past, teachers often spent a lot of time preparing a lesson and writing a lot of words, which made it difficult for students to understand. The use of multimedia to prepare lessons is not the same, the software comes with a lot of ready-made formulas, geometric graphics, and even music accompaniment experiments can also simulate. It is worth paying attention to the fact that the teacher's lectures are more vivid and the students are more likely to listen. In the past, teachers' teaching was basically done by sound + board. The course was boring, students didn't like to listen, and they were sleepy. In order to give students a different effect, the teacher used random naming, but this did not stop the students from opening the gap. The atmosphere is dead. Using the multimedia teaching method, the teacher can play the courseware into a beautiful PPT and play it in the form of a projection. The sound and video are matched with it, and it feels different immediately. Because people like the image more, and the memory is deep, but also can fully stimulate the students' imagination and protect the students.

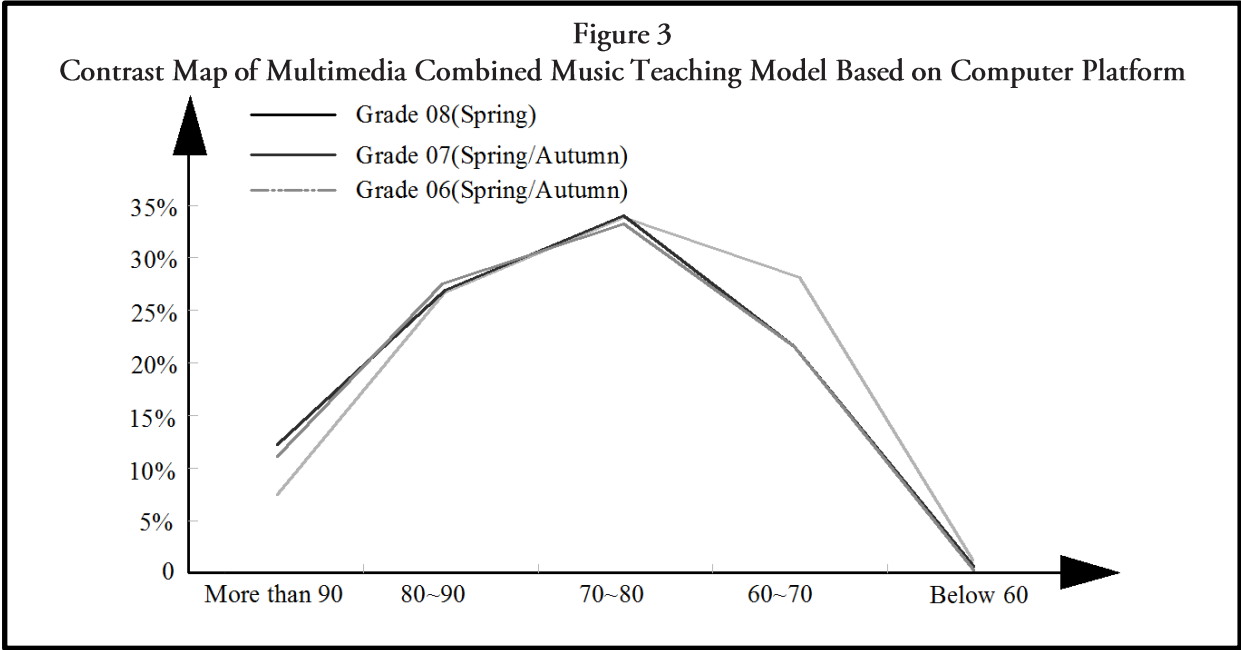
In the traditional teaching, although the teacher asked a person who did not understand after finishing a knowledge point, the courageous classmates usually chose to be silent because of their thin face, which would harm themselves and harm the teacher. In response to this problem, multimedia teaching can be combined with software to achieve anonymous questioning, that is, the person who does not understand can feedback to the teacher through the corresponding feedback button of the student feedback machine, so that the teacher can see it in multimedia. Because the teaching process is anonymous, it can further enhance students' learning ability.

RESULTS

After designing the algorithm model, the algorithm needs to be tested, not only to detect the correctness and performance of the algorithm, but also to test the feasibility of the algorithm model in practical music multimedia teaching. Based on the previously designed chapter model, the core diagnostic code is written via Java. Before the test, what is needed is to prepare and randomly select the average scores of the previous tests of a certain class of students. Then, according

to the corresponding proportions, they are divided into two groups and are taught in different teaching methods. After three months of teaching time, their musical scores are tested in

all aspects. Their comprehensive scores are evaluated and evaluated, and then compared with students in the traditional teaching mode. The comparison between the two is shown in Figure 3:



It can be seen from the above table that students who perform music-assisted instruction in the multimedia teaching mode can comprehensively enhance their musical ability. Especially in both speaking and listening, music multimedia teaching can not only provide students with a good learning atmosphere. In a multi-faceted comparison, it can be found that classes using multimedia for teaching can be quickly attracted to the content of the

courseware. The performance of the model needs to be tested after the feasibility test. In the collection of textbook data, the collected data is currently applied to the actual data. The main test content is the coverage of the music textbook knowledge in the algorithm. The test step is to let the system convert the collected data at a speed that is recorded according to the speed of the conversion. Then compare the results of the algorithm as shown in Table 2 below:

Table 2
Algorithm Running Time Based on Computer Platform
Multimedia Combination Assisted Music Teaching Mode

Measuring the number of students	Fraction	S=0.6	S=0.5	S=0.4	S=0.3
A	13.2	6.6	13.6	11.6	13.6
B	11.25	2.8	12.3	9.8	10.3
C	12.5	9.2	11.2	10.2	11.2
D	9	10.1	10.0	10.1	11
E	4.8	3.8	3.8	3.8	3.8

As can be seen from the above table, the algorithm studied in this paper is very outstanding in the test. Even if it is just an algorithmic program, it can achieve the accuracy and university nature of manual work. After testing the accuracy of the algorithm model, it is necessary to perform the test in the ability to perform when processing big data. It can be seen from the above test that the algorithm model does not have much problem in practical application. However, it is necessary to consider whether the algorithm model can also express a computing power that appears when the number

of people participating in the test increases to a certain extent. So the next test is the overall stability and reliability of an algorithm model that is presented when the algorithm model receives a large amount of data. The algorithm model used and the traditional ant colony algorithm model are compared. The length of the average path is counted at five nodes of 100/500/1000/1500/2000/2500, but the overall algorithm path length is initially detected macroscopically. The final test results are shown in Table 3 below:

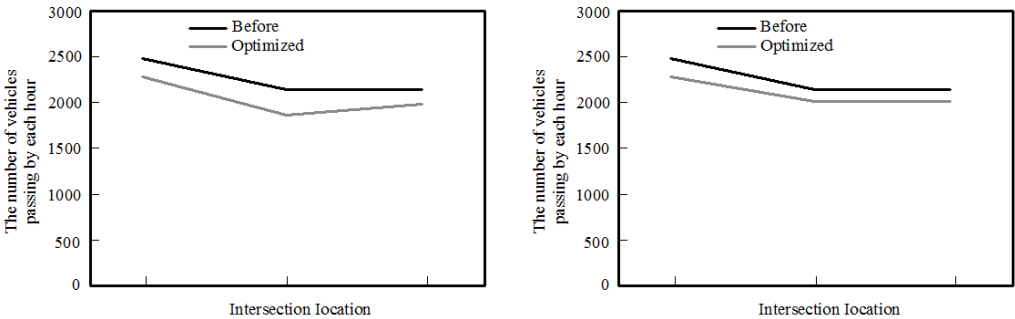
Table 3
Algorithm Node Calculation Based on Computer Platform Multimedia
Combination Assisted Music Teaching Mode

Algorithm	Boundary value	Digital interval	Convergence time	The average convergence time	Convergence value
Traditional algorithm	f_1	100	499	19	0.789
	f_2	500	482	28	-186.2789
The original genetic algorithm	f_1	1000	450	21	0.99487
	f_2	1500	463	19	-186.7135
Improved algorithm	f_1	2000	510	20	0.15
	f_2	2500	488	33	-186.7460

By summarizing the experimental data of the graph, it is found that the shortest path calculated by the algorithm used from beginning to end is always shorter than the path calculated

by the traditional algorithm, especially as the number of cycle increases. The difference between the optimal result of the algorithm used and the optimal result calculated by the traditional algorithm is increasing. The details are as follows:

Figure 4
Comparative Test of Cyclic Path Optimization Based on Genetic Algorithm



When the number of cycles reaches 2000, the path difference reaches a maximum of 15%, which also demonstrates the great advantages and advantages of the improved algorithm. In addition, the experiment of calculating the duration has also achieved great advantages. This algorithm not only has a short calculation time, but also can obtain a shorter path under the same number of cycles. It is an excellent algorithm. A lot of conclusions have been drawn through the use of the algorithm, and better calculation results can be obtained at the same time. For the application of music teaching and testing, it is more extensive and further increase the efficiency. At the same time online, more music classes can use multimedia to assist in the teaching of music. Especially in the music teaching in the lower grades, it can give full play to its huge advantages. Although the algorithm has achieved great success, it still needs to work hard to increase research efforts for better results.

DISCUSSION

In recent years, along with the rapid development of multimedia technology and network technology, it is possible to combine music and multimedia through the combination of computer platform and multimedia. In order to improve the music teaching level of the school, a new music teaching mode is needed, which not only can meet the needs of the teaching in the school, but also can fully play the auxiliary mode of media combination teaching. The traditional plane teaching mode has become a two-dimensional teaching mode. Instead of facing boring textbooks, students can vividly use the vivid use of music to communicate. This allows students to learn and receive information efficiently. At the same time, the teachers can explain the knowledge of the textbooks faster, communicating better with the students within a certain period of time. It has a good impetus to improve the quality of the classroom, so it is necessary to study the multimedia teaching mode based on the computer platform multimedia combination. Based on the research of multimedia platform-assisted music teaching

mode of computer platform, the current music teaching mode is optimized by genetic algorithm. The results proved that the study is successful

Human Subjects Approval Statement

This paper did not include human subjects.

Conflict of Interest Disclosure Statement

None declared.

References

1. Bai P Q I. The Historical Evolution of "Popular"—Historical Review and Performing Research on Popular Songs in Mainland China after the Reform and Opening. *Huangzhong*. 2016;11(11):64.
2. Bartel R, Graham N. Property and Place Attachment: A Legal Geographical Analysis of Biodiversity Law Reform in New South Wales. *Geographical Research*. 2015;54(3).
3. Carey G, Grant C F. Teachers of instruments, or teachers as instruments? From transfer to transformative approaches to one-to-one pedagogy. *Isme Ceprom Relevance & Reform in the Education of Professional Musicians*. 2015;78.
4. Davis A M L. Women and Public Life in Early Meiji Japan: The Development of the Feminist Movement by Mara Patessio. *Journal of Japanese Studies*. 2015;41(4):1149-1151.
5. Fredman A J, Schultz N J, Hoffman M F. "You're Moving a Frickin' Big Ship": The Challenges of Addressing LGBTQ Topics in Public Schools. *Education & Urban Society*. 2015;47(1):56-85.
6. Mastorilli T M, Harnett S, Zhu J. Arts Achieve, Impacting Student Success in the Arts: Preliminary Findings after One Year of Implementation. *Journal for Learning Through the Arts*. 2016;10(1):26.
7. Schroeder S, Currin E, Mccardle T. Mother tongues: the Opt Out movement's vocal response to patriarchal, neoliberal education reform. *Gender & Education*. 2016;1-18.
8. Terven Salinas A. Interlegal relations and construction of cultural projects of justice. The case of the indigenous court of Cuetzalan, Puebla in Mexico. *Computer Methods in Biomechanics & Biomedical Engineering*. 2016;19(4):1-10.
9. Vanessa Freije. Exposing Scandals, Guarding Secrets: Manuel Buendia, Columnismo, and the Unraveling of One-Party Rule in Mexico, 1965-1984. *The Americas: A Quarterly Review of Latin American History*. 2015;72(3):377-409.
10. Xiaolong L I, Music D O. Innovative Research on the Training Mode of "Work Study Combination" of Music Talents in Higher Vocational Colleges. *Guide of Science & Education*. 2016;101(9):1903-1908.