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The Design and Effect Evaluation of the Training Program of Body-Building Exercises

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Abstract: *Imagery Training way is irreplaceable not only because it's an effective way of training in Populace Aerobics teaching, but it plays an essential role in helping students practise it. Based upon Delphi Method, Imagery Analysis and Factor Analysis as its theoretical foundations, this paper demonstrates advantages of Image Group Training. On the basis of various ways of teaching, this paper puts forward specific designs in training and teaching of aerobics, to stimulate the enthusiasm for students to learn movement in series and enhance the memory in their brains more effectively. It turns out that,more ways associated with imagery training could be applied into aerobics in series,which can make it easier for students to master the movement, and increase the preciseness and proficiency as well.*

Keywords: *Aerobics; Complete Set of Movements; Image Training*

1. Foreword

1.1. Rationale for the selection of the topic

Aerobics is becoming more and more popular with students and their community, so its popularity is currently on a linear upward trend [1]. Aerobics incorporates movements from street dance, Latin dance and line dance, which not only makes it more energetic [2], but also helps to improve people's coordination and flexibility. University physical education aerobics class is very popular with students, it is not too high requirements for venues, equipment, etc., and is not limited to gender, age and physical condition of students, but the use of traditional teaching methods in aerobics teaching makes the teaching effect is not obvious, students are mainly teacher-led, imitative exercises, students themselves do not think, but only in a mechanical acceptance of the movement technology [3]. Over time, such traditional teaching methods will reduce students' interest in aerobics and will not be able to pass it on better.

The exercises of the representational body and the exercises of the imaginary body can be organically combined, and while the eyes are closed and the body movements are imagined, they can also be practised by themselves. Through a number of integrated exercises, the accuracy and beauty of the specific movements of aerobics can be improved, helping the students to build up a good aesthetic feeling themselves. At present, representational training methods based on sports psychology are receiving more and more attention in university sports.

1.2. Research hypothesis

Based on the design of this study, I propose the following hypothesis: representational training can be used in the teaching of aerobics to improve teaching effectiveness, self-confidence and physical fitness of students. Representational training is a proven method in the teaching of aerobics.

2. Research Subjects and Methods

2.1. Object of study

A study on the design and effectiveness measurement of an aerobics set performance training programme.

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2.2. Research Methodology

2.2.1. The Delphi Method

The Delphi method is an unobtrusive way of expressing an opinion based on a systematic process. It is based on a question of prediction, and after obtaining the opinion of experts, these opinions are collated, summarized and counted.

2.2.2. Phenomics analysis method

Using the characteristics of the phenomics of physical fitness, all testers were tested on the phenotypic index and the results were compared.

2.2.3. Factor analysis method

Factor analysis is: the identification of representative factors among many quantitative variations and the classification of variables of the same nature into one factor. This is to reduce the number of variables and make it easy to understand the relationships between the variables tested.

2.2.4. Experimental method

The experimental method is a method in which students, under the guidance of the teacher, use certain instruments and equipment to induce certain changes in the experimental object through controlled conditions and gain knowledge from observing these changes.

3. Experimental design

3.1. Purpose of the experiment

The predominance of aerobics as a fitness sport has led students to have a higher quality, standard and quality for it. The purpose of the proposed model is to better address these factors and to use the phenomic characteristics of physical fitness for the purpose of improving teaching effectiveness. The model is constructed to solve problems and focus on how to improve the cognitive issues and quality levels of students. It is also important to better guide all students as much as possible in the context of learning differences [5]. By combining individual differences in the teaching process and using the teaching method of representational training, students can not only better master the technical movements of aerobics sets, but also enhance their memory of the sets.

3.2. Experimental thinking

Firstly, the 80 students who took university physical education aerobics were divided into two groups, A and B. Each group consisted of 40 students, with group A being the experimental group and group B being the control group. The experimental group adopted the representational training method, while the control group just used the traditional teaching method.

3.3. Experimental design options

1) The experimental group's experimental programme: the third set of movements of popular aerobics was drawn out and given to the students of the experimental group before the class, according to the teacher's explanation of the movements and the demonstration of the movements, so that the students could quickly understand the movements and form a memory in their brains.

2) After learning new content and repeating the exercises in each class, students in the experimental group stand or sit in place and listen to the music with their eyes closed for a specified period of time under the guidance of the teacher, while imagining that they are doing the exercises to the music.

3) The control group uses the usual teaching methods: announcing the task, explaining and demonstrating. After learning the new content, the students repeat the exercises as a group or in small groups and summarize them afterwards.

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Table 1: Teaching schedule for the first six weeks of the first semester of aerobics class

Basic Theory of Aerobics	Overview of aerobics
Basic techniques	Basic aerobics posture, stride, hand positions, high and low impact step combinations for aerobics
	Prescribed movements for Mass Exercise Standard Level 2 (Combination I)
	Prescribed movements for Mass Exercise Standard Level 2 (Combination 2)
	Prescribed movements for Mass Exercise Standard Level 2 (Combination 3)
	Prescribed movements for Mass Exercise Standard Level 2 (Combination 4)
Physical fitness	Low back, back, abdominal muscles, upper body strength, endurance, flexibility

4. Analysis of effects

4.1. The Delphi Method

The Delphi method is a questionnaire organization. The questions to be predicted are organized, summarized, counted and then answered and the predictions are obtained repeatedly. Using the Delphi method, an aerobics research questionnaire for undergraduate students is developed, consultation with panel members is conducted, and after repeated consultation and feedback, a collective judgement is obtained based on the opinions of the panel members.

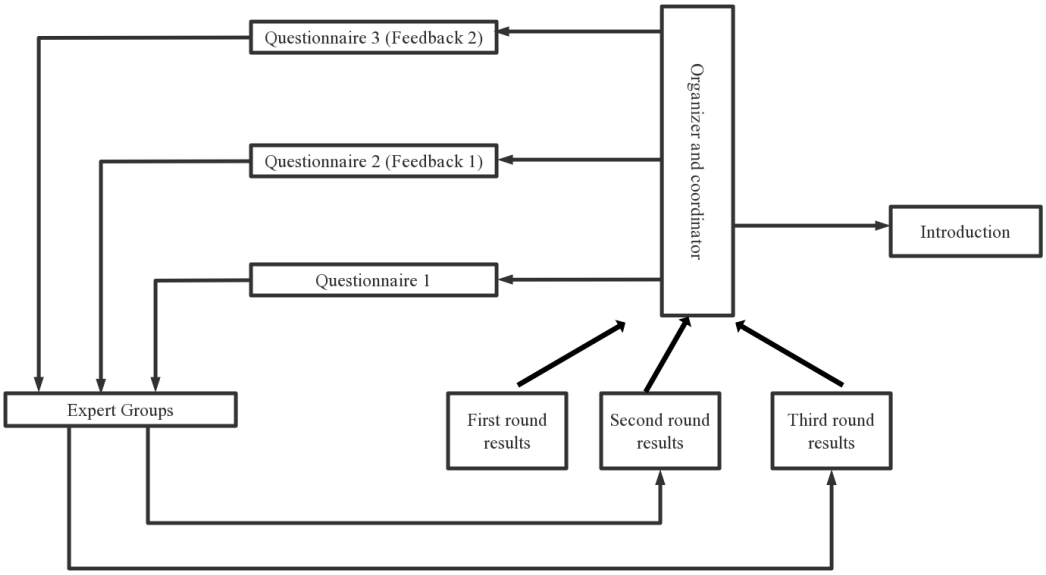

Figure 1: Delphi method survey

Based on the experts' choice of indicators, the numbers of "high", "high", "medium", "low" and The number of people with "low" is expressed as Nl, N2, N3, N4 and N5 respectively, and the index of the indicator is

(Equation I) index= $(10 \times Nl+7.5 \times N2+5 \times N3+2.5 \times N4)/Nall$

The index is 10 when all experts consider the issue to be of "high" importance and 0 when all experts consider it to be unimportant.

(Equation 2) $\overline{M}$ index=$(3 \times Nl +2 \times N2 +2 \times N3 +0 \times N4)/Nall$

The average index was calculated to be 7, indicating that both teachers and students were willing to use the representational training method to implement the teaching. The representational training method has a positive impact on students' learning of aerobics sets, not only increasing students' interest in learning aerobics sets, but also improving the teacher's teaching efficiency to a certain extent.

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4.2. Characteristic analysis of changes in physical fitness before and after the phenotypic training test

Physical fitness in sport is a comprehensive product that fully reflects the complex characteristics of the attributes of sport. To analyse the issue of aerobics, it is important to start with the attributes of aerobics. This study relies on the theory of physical fitness of students as a reference point for the measurement of physical fitness of students. The movements used to measure physical fitness include: sit-ups, seated forward bends, reaction time, 800m, and tree pose to measure coordination.

Table 2: Results of the normality test analysis

Designation	Sample size	Average	Standard deviation	Skewness	kurtosis	Kolmogorov-Smirnov Testing		Shapro-Wilk Testing	
						Statistical *D*-value	*p*	Statistical *W*-value	*p*
Sit-ups before training for the control group	40	36.375	4.716	0.461	0.148	0.118	0.175	0.977	0.579
Sitting forward bend before training in the control group	40	10.990	2.069	0.263	-0.639	0.076	0.813	0.963	0.217
Reaction time before training in the control group	39	0.703	0.043	-1.610	6.131	0.165	0.009**	0.872	0.000**
800m race before training for the control group	40	4.183	0.384	-0.840	0.515	0.194	0.001**	0.881	0.001**
Tree-style coordination in the control group before training	40	9.550	2.689	0.292	-0.010	0.134	0.070	0.958	0.145
Sit-ups after training in the control group	40	40.475	4.368	0.190	0.230	0.157	0.014*	0.962	0.190
Sitting forward bend in the control group after training	40	13.310	2.147	-0.022	-0.705	0.086	0.648	0.980	0.680
Response time after training in the control group	40	0.640	0.045	-0.409	0.793	0.113	0.228	0.938	0.029*
800m race after training for the control group	40	3.811	0.399	-0.490	-1.460	0.266	0.000**	0.831	0.000**
Tree-style coordination in the control group after training	40	13.225	3.017	0.233	-0.945	0.120	0.159	0.959	0.156

* $p<0.05$ ** $p<0.01$

The control group was tested for normality before training in sit-ups, sit-forward bends, reaction time,

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800m race and tree coordination, and after training. The table above shows that there was no significant improvement except for the sit-ups ($p>0.05$), which means that the control group did not have a positive trait before and after training.

A paired t-test study was conducted on the experimental and control groups after training to analyse whether a significant difference (p-value less than 0.05 or 0.01) was observed between the paired items in each group and, if so, to specifically compare the magnitude of the mean (or difference) and describe where the specific differences were.

Table 3: Results of the analysis of the paired t-test of physical fitness indicators before and after the test

Designation	Pairing (mean ± standard deviation)		Difference (pair 1 - pair 2)	t	p
	Pairing 1	Pairing 1			
Sit-ups after training in the control group vs. sit-ups after training in the experimental group	40.48±4.37	47.63±3.56	-7.15	-8.581	0.000**
Sitting forward bend after training in the control group vs. sitting forward bend after training in the experimental group	13.31±2.15	16.59±3.17	-3.28	-7.177	0.000**
Response time after training in the control group vs. response time after training in the experimental group	0.64±0.05	0.61±0.05	0.03	4.172	0.000**
800m race after training in the control group vs. 800m race after training in the experimental group	3.81±0.40	3.59±0.45	0.22	3.455	0.001**
Tree coordination of the control group after training vs. tree coordination of the experimental group after training	13.22±3.02	17.75±3.39	-4.53	-9.581	0.000**
* p<0.05 ** p<0.01					

As can be seen from the table above, the paired t-test was used to compare the data with the study experiments, which all showed different differences ($p<0.05$). A specific analysis shows that the performance of the sit-ups showed: a greater variability exists when $p<0.01$ ($t=-8.581$, $p=0.000$). The performance of seated forward bending presented, when $p<0.01$, also a large variability ($t=-7.177$, $p=0.000$). Reaction time also presented a 0.01 level of significance ($t=4.172$, $p=0.000$). Performance in the 800m race presented a 0.01 level of significance ($t=3.455$, $p=0.001$). The change in tree coordination showed a 0.01 level of significance ($t=-9.581$, $p=0.000$). This indicates that there is a good learning effect for the use of the representational training method for the learning of the University Sport Mass Aerobics Level 3.

4.3. Analysis of aerobics sets after the phenomics analysis test

The role of representational training in improving performance is supported by a number of studies: Fortes [8] found that representational training improved the serve of male tennis players; Rhodes [9] used representational training to improve the clinical performance of football players; and Fortes [10] used eight weeks of representational training to improve the decision-making of volleyball players.

From the above table, it can be seen that a total of 5 groups of paired data, all did not show their respective significant differences ($p>0.05$). This indicates that the use of the phenomics method of teaching is significant. Through comparison, the use of the phenomics method is more in line with the teaching of aerobics and it has an important impact on improving the quality of teaching aerobics.

4.4. Factor analysis

Factor analysis explores quantitative data which can be reduced to the same few factors as the groups, with each group of factors and questions corresponding. The purpose of using factor analysis is to pool information and ignore the composition of a matrix of score factors.

The data in this study were rotated using the maximum variation method so that the factors and study terms corresponded one-to-one. The table above shows the factors from which information was extracted

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from the research items, as well as the factors shown in the table above and the corresponding research items: all the research items corresponding to the common values had factor loading coefficients above 0.4, implying a strong correlation between the research items and the factors from which information could be effectively extracted. After ensuring that the factor was able to extract most of the information from the study items, an analysis was carried out to determine the correspondence that existed between the factor and the study items. When performing weight calculations using the AHP hierarchical analysis method, it is necessary to perform a consistency test analysis, which is used to evaluate the consistency test results of the weight calculations for the study, i.e. to calculate the consistency index CR value (CR-CI/RI). Firstly, the CI value for the calculation of CI is described as "CI" (maximum characteristic root n)/ (n-1) and the RI value is obtained by combining the order of the judgement matrix to calculate the CR value and make a consistency judgement.

Table 4: Results of the paired t-test analysis

Designation	Pairing (mean ± standard deviation)		Difference (pair 1 - pair 2)	*t*	*p*
	Pairing 1	Pairing 2			
Motor skill formation in the control group paired with motor skill formation in the experimental group	20.00±18.67	20.00±23.54	0.00	0.000	1.000
Consolidation and reinforcement of memory in the control group paired with consolidation and reinforcement of memory in the experimental group	20.00±16.85	20.00±22.19	0.00	0.000	1.000
Movement and music matching in the control group paired with movement and music matching in the experimental group	20.00±22.19	20.00±23.77	0.00	0.000	1.000
Natural coordination of movements in the control group paired with natural coordination of movements in the experimental group	20.40±23.58	20.00±23.61	0.40	0.022	0.984
The holistic view of movement in the control group paired with the holistic view of movement in the experimental group	19.00±21.19	20.00±24.65	-1.00	-0.056	0.958
* $p<0.05$ ** $p<0.01$					

Table 5: Table of factor loading coefficients after rotation

Designation	Factor loading coefficient		Commonality (common factor variance)
	Factor 1	Factor 2	
Motor skill formation in the control group	0.978	-0.187	0.991
Consolidation and memory enhancement for the control group	0.947	-0.310	0.994
Movement of the control group with music	0.967	-0.253	0.999
Natural coordination of movements in the control group	0.963	-0.269	0.999
Overall movement of the control group	0.965	-0.257	0.997
Formation of motor skills in the experimental group	-0.244	0.961	0.983
Consolidation and memory enhancement for the experimental group	-0.239	0.957	0.973
The experimental group's movements in tune with the music	-0.269	0.959	0.991
Natural coordination of movements in the experimental group	-0.257	0.966	0.999
A holistic view of the movement of the experimental group	-0.250	0.964	0.991

Note: Where figures in the table are coloured: blue indicates that the absolute value of the loading coefficient is greater than 0.4 and red indicates that the commonality (common factor variance) is less than 0.4.

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Table 6: Random consistency RI tables

n order	3	4	5	6	7	8	9	10	11	12	13	14	15	16
RI value	0.52	0.89	1.12	1.26	1.36	1.41	1.46	1.49	1.52	1.54	1.56	1.58	1.59	1.5943

Usually the smaller the CR value, the better the consistency of the judgment matrix, when CR < 0.1, the judgment matrix meets the consistency test: when CR > 0.1, there is no consistency, so adjust the judgment matrix appropriately and then re-run the analysis. This calculation obtained a CI value of 0.000 for the judgement matrix at stage 10, for an RI value of 1.490, so when the CR value is 0.000 ,CR < 0.1 then the judgement matrix of this study meets the consistency test and the calculated weight is consistent.

AVE and CR are generally used for convergent validity (convergent validity) analysis; usually when AVE is >0.5 and CR is >0.7, convergent validity is high; when AVE or CR is low, consider removing some factors and re-analyse the convergent validity.

Table 7: Indicator results for model AVE and CR

Factor	AVE values	CR values
Factor1	1.122	1.118

This validated factor analysis (CFA) was conducted for a total of 1 factor, as well as 3 analysis terms. As can be seen from the table above, when all AVE values corresponding to 1 factor are greater than 0.5 and all CR values are above 0.7, this means that the data from this analysis have good convergent (convergent) validity. After training using phenomics, all aspects of the representations were superior to when taught in general, increasing the strength of the factor arguments.

5. Conclusion

5.1. Conclusion

1) By using the Delphi method, it was calculated that teachers as well as students prefer to use the representational training method, which can motivate students and improve classroom efficiency.

2) The analysis of the normality test and the t-test showed that the physical fitness of the students in the experimental group after the phenotypic training improved faster than that of the students in the control group.

3) Through factor analysis, it is concluded that the experimental group can fully use body representation teaching in aerobics sets of body movement training to effectively accelerate the formation of sets of movement training skills and improve the completion rate and quality of sets of movement training skills.

5.2. Precautions

1) To provide students with an initial understanding and awareness of representational training in order to work with teachers in the classroom to complete teaching experiments;

2) Strengthen classroom organization and discipline to ensure students' concentration;

3) Teachers should use correct language skills in teaching paired representational training;

4) The best time for students to perform representational training is usually 3 to 5 minutes;

5) Teachers should pay attention to the recovery and adjustment of students' mental fatigue and physiology during the teaching process

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