

DOCTORAL THESIS SUMMARY

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Thesis title: **Optimization the Ypton 22`s sailing boat handling technique of Constanta Maritime University students**

Key words: sailing, boat, technique, student, optimization

Through this thesis we wanted to determine and present new ways that can improve the sailing keelboats handling technique. The theoretical information and the practical studies showed the importance of theoretical, technical, tactical and psychological training on sailing boats handling technique. Preliminary study checked the ways that three Romanian universities approached sailing through their learning plans and helped to create a new syllabus for teaching sailing in a better way for Romanian universities students. Second study investigated the way that intelligence and attention influence the learning of sailing boat handling technique. The last experiment investigated how mental training exercises and real simulator exercises influence learning of sailing boat handling technique.

In **Part I - Theoretical background - scientific and methodological topics** we presented importance and the timeliness of theme. The first chapter is dedicated to introductory information focusing upon the importance of this specific topic, the up-to-datedness of the theme and the reasons behind choosing it. Chapter 2 represents a theoretical incursion into the study of sailing training, starting with the opinion of international sailing experts and analysis of sailing training components as theoretical, technical, tactical and psychological training components.

Part II of our thesis consist in the **preliminary research on the scope of course yachting in the curricula of universities in Romania**

For this **study (No.1)** we started from the next hypotheses:

- Sheets disciplines differ because different materials and specific profile of each university;

- The existence of some common elements that teaches yachting into discipline sheets of universities will ensure the development of the teaching sailing at the beginning level.

The purpose of the research study

The purpose of this research is to develop a syllabus for the discipline of yachting for forming Ypton 22`s sailing boat handling skills.

Objectives of the study

In carrying out the present research we aimed to achieve the following objectives:

- Detection of the universities that have sailing classes in the curriculum;

- Creation of a model curriculum for teaching sailing on Ypton 22 sailing boats at beginner level.

Methods used in the study

In order to achieve preliminary research we used bibliographic study method to investigate underlying documents training (curricula, course description) and analysis method.

Study conclusions

The study noted that only three universities, from Constanta, had in the curricula compulsory sailing courses, with theoretical lessons and practical lessons. All these universities had nautical bases lakeside Suitghiol in Constanta, which offers the possibility of practicing sailing in most weather conditions from March to late November. Another explanation for the presence sailing lessons in the curricula of the three universities could be that they are located in Constanta is the main yachting center since 1921. The boats used by the three universities are different in terms of classification categories. Constanta Maritime University uses Ypton 22 sailing keel boats because they can be used easily by subjects without special physical training. Mircea cel Bătrân Naval Academy uses "Tourism" sailing boats which are folding centerboard sailing boats, with increased stability. The safety is lower than Ypton 22 but is offset by the presence of a teacher who controls the boat all the way it goes. "Ovidius" University uses light sport craft (dinghy) because the course is made for students of the Physical Education and Sport Faculty which allow their physical condition.

The analysis of syllabuses used for teaching sailing activities from Constanta Maritime University, Mircea cel Bătrân Naval Academy and the University Ovidius was observed that:

- There is not, at this level, a uniform syllabus for learning sailing on keel boats;
- Theoretical and practical knowledge are common in the syllabus referring basics;
- There are a number of different classes and practical work in the three universities;
- Content not provide practical lessons to strengthen and improve the sailing handling technique under changing of wind direction and in conditions of the contest.

Thus hypothesis "sheets disciplines differ because different materials and specific profile of each university" confirmed partly because all three universities are in Constanta and sporting facilities on Lake Suitghiol, differences emerged between the three universities course description is given by types of boats used.

Finding these issues led us to develop a syllabus for teaching sailing on Ypton 22 sailing boat and started an experimental research designed to emphasize specific aspects of teaching sailing at a beginner level on keel boats

by comparing two training strategies. Thus the hypothesis "the existence of some common elements that teaches yachting into discipline sheets of universities will ensure the development of the teaching sailing at the beginning level" confirmed the fact that the data extracted from the files studied consisted in a syllabus for teaching yachting.

Part III - Personal contributions on technique optimization for handling Ypton 22 sailing boat.

This part consists in two studies made to determine which is the better strategy for optimizing the handling technique of Ypton 22 sailing boat.

Study No. 2 - Study on the influence of attention and intelligence in learning the handling technique in sailing

Based on research assumptions we formulated the following **hypotheses**:

- Subjects with a high level of intelligence will record superior technical indicators;

- If over a period of 14 weeks is acting with a theoretical and practical program will be observed an improvement of attention;

The **purpose** of this study is to determine the influence of intelligence and attention on handling of Ypton 22 sailing boat for subjects at a beginner stage.

The **study load**

In conducting this study we had performed the following **tasks**:

- Choice of subject assessment tests;

- A trial technique adapted to the study;

- Choosing and using research methods;

- Initial testing;

- Practical intervention;

- Final testing;

- Processing, analysis and interpretation of data;

- Drawing conclusions.

The study **subjects**

Subjects were selected from among the students of the first year of specialization: navigation and electromechanical in Constanta Maritime University. The number of students selected was 18, all boys aged between 20 and 22 years.

Research **methods**

To meet the goals and objectives of the study No.2 were used several research methods:

- Bibliographic study method was used to achieve scientific documentation regarding the information that provides the theoretical foundation of the study;

- The experimental method was used to determine the influence of the level of intelligence on the subject`s boat handling technique;

- Test method was used to assess the level of attention, intelligence and technical training of the subjects included in the study;

- Statistical and mathematical method was used after the experiment for interpreting the results of tests carried out in the initial, intermediate and final tests. Indicators used in interpreting the data were represented: the arithmetic mean, standard deviation, coefficient of variation, "t" test, ANOVA, Tukey HSD test and Pearson correlation test;

- Graphical method was used to highlight aspects of evolution observed in the tests applied in the studies;

- Teacher observation was used as a research method in the evolution of the educational subjects included in the experiment.

Tests of study No.2

Anthropometric tests

To assess the subjects anthropometric we measured weight and height. To assess body weight, subjects were dressed lightly and used an electronic balance for height we used a measurement of height, subjects were barefoot.

Psychological tests

Since the efficiency of the educational process depends largely on the intelligence and attention tests we chose the Raven Progressive Matrices test to test intelligence and Prague test for attention. With "Raven Progressive Matrices" test we assessed nonverbal operationalized general intelligence. "Prague" is a test that evaluates the distributive or mobility attention. The two tests were conducted in Constanta Maritime University by a clinical psychologist of Constanta Municipal Hospital. Was applied a test per day to not vitiate the results.

Ypton 22 handling technique trial

In addition to the testing and evaluation test used in the two experimental studies and described above we have made and used for this study the Ypton 22 handling technique trial on trapezoidal course.

Evaluation equipment

In this research used the following assessment tools:

- A calibrated digital scale Beurer GS27, with an error of 0.1 kg;
- Audio video camera GoPro V.2;
- An audio video camera Sony DCR-DVD110E MiniDVD;
- A mobile anemometer Silva ADC;
- A marine GPS, mobile, Lowrance Ifinder Go;
- A recorder Olympus VN 960;
- Two boats Ypton 22
- 20 Bluewave lifejackets, EN396, Manual;
- Two motor boats for assistance (60 hp Yamaha, Honda 90 hp).

Place of research

The research took place in Constanta Maritime University. The institution has provided us in pursuit of research: nautical base lakeside Suitghiol, two Ypton 22 fully equipped boats, two supervision boats, a classroom, a video projector and its related technology.

Application intervention of study no.2

In this experiment we used crews of three subjects (a skipper and two crews) due to the use spinnaker. After selecting subjects were anthropometrical measured (body weight and height) and tested by a clinical psychologist with Prague and Raven tests to determine their level of intelligence and attention. This initial test was noted by "T1". After these tests subjects were divided into teams. In skipper posts were assigned the subjects with the highest values of intelligence and on crew posts were allocated other subjects by lot.

So evaluation of the subjects included in this study was conducted in four stages. In earlier intervention applied anthropometric measurements and psychological testing by Raven and Prague tests (T1). After two weeks of theoretical (2 theoretical classes) and practical (4 practical classes) repeated psychological testing and boat handling Ypton 22 trapezoidal course test (T2). After seven weeks of practical intervention (7 theoretical classes and 14 practical classes) subjects were tested again (T3) and after other seven weeks (7 theoretical classes and 14 practical classes) the final tests were made (T4). During training all the teams followed the same training. The second, third and fourth assessment were performed in order to use the ANOVA test, which better highlight team`s development during training and to highlight differences in progress between the teams.

The purpose of training was acquiring the best possible boat handling technique Ypton 22 to Constanta Maritime University students. In the T2, T3 and T4 subjects were tested by the Raven Progressive Matrices test Prague to be able to notice any changes in these indices during working hours.

Conclusions of study No.2

For statistical calculations ANOVA for independent samples was determined that there are statistical differences ($F(2, 15) = 25.29$) between skippers and crews (crew 1 and crew 2) at the level of intelligence, attention and technique.

Differences between tests T1, T2, T3 and T4 were highlighted using ANOVA test for dependent samples. There was a slight increase in attention which shows that **sailing influence attentional capacity of individuals** in that they are forced to adapt to the new environment which is constantly changing make the subjects to develop ability of distributive attention, that Prague test highlighted ($F(3, 15) = 26.73$). Technical training has increased both between crews values ($F(2, 10) = 273.37$) and between values obtained from crew stations. There is a steady increase in values technique. There is a greater increase at all stations between T3 and T4 than between T2 and T3 which can be explained by the increased workload and exercises used mainly on trapezoidal course.

After applying the Pearson correlation test was observed that the intelligence is related to the technical preparation on trapezoidal course (T2, $r = 0.9$, T3, $r = 0.87$, T4, $r = 0.95$).

Taking into account the analysis and interpretation of data were the following conclusions:

- The **intelligence directly affects the handling sailing boats**, subjects with higher level intelligence will be manning the higher the level of handling sailing boats ($r = 0.95, p < 0.05$). The hypothesis that "Subjects with a high level of intelligence will record superior technical indicators" was confirmed as Pearson correlation test application and according to statistical and mathematical analysis which highlights progress on crews and posts.

- Attention is improved from theoretical and technical sailing training ($F(3, 15) = 26.73, p < 0.05$); assumption that "**If over a period of 14 weeks is acting with a theoretical and practical program will be observed an improvement of attention**" also confirmed. The application program developed after completion of the first study helped craft handling optimization technique Ypton 22.

Study No. 3 - Study on optimization of Ypton 22 sailing boat handling technique.

Based on research assumptions we formulated the following **hypotheses**:

- If on a period of 14 weeks applies along with theoretical, technical and tactical program, mental training exercises will improve the experiment theoretical, technical and tactical knowledge;

- If on a period of 14 weeks applies along with theoretical, technical and tactical training program, real simulator exercises will improve the control group theoretical, technical and tactical knowledge;

- If apply two different training strategies, one based on mental training exercises in a group and one based on real simulator exercises in the other group, progress to the theory, technique and tactics tests are different;

- If the experiment group uses mental training exercises in the training process the results are better than those obtained in the control group that train using real simulator exercises.

The **purpose** of this study is to highlight the optimization of Ypton 22 sailing boat handling technique by using mental exercises in the experiment group and by application real simulator exercises in the control group.

The **study load**

In conducting this study we had performed the following **tasks**:

- Choice of subject assessment tests;
- Developing a trial technique adapted for the upwind-downwind course;
- Developing a theory (grille) test to determine the scale of a possible correlation with technical skills of each subject, adapted for the upwind-downwind course;

- Developing mental training exercises used in research;

- Developing real simulator exercises used in research;

- Choosing and using research methods;

- Selection and completion of the intervention applied;

- Conduct experimental study basically based on mental training exercises and real simulator exercises;
- Processing, analysis and interpretation of data;
- Drawing conclusions.

The study **subjects**

The number of students was selected from 28 of the 24 boys and 4 girls aged between 21 and 23 years. Being used boat Ypton 22 which is not an athletic class but a technical one, presence of girls did not influence the experiment data. Subjects were distributed into two groups, one experimental and one control

Research **methods**

To meet the goals and objectives of the study No.3 were used several research methods:

- Bibliographic study method was used to achieve scientific documentation regarding the information that provides the theoretical foundation of the study;
- The experimental method was used to determine the influence of the level of intelligence on the subject`s boat handling technique;
- Test method was used to assess the level of attention, intelligence and technical training of the subjects included in the study;
- Statistical and mathematical method was used after the experiment for interpreting the results of tests carried out in the initial, intermediate and final tests. Indicators used in interpreting the data were represented: the arithmetic mean, standard deviation, coefficient of variation, "t" test, ANOVA, Tukey HSD test and Pearson correlation test;
- Graphical method was used to highlight aspects of evolution observed in the tests applied in the studies;
- Teacher observation was used as a research method in the evolution of the educational subjects included in the experiment.

Tests of study No.3

Anthropometric tests

To assess the subjects anthropometric we measured weight and height. To assess body weight, subjects were dressed lightly and used an electronic balance for height we used a measurement of height, subjects were barefoot.

Psychological tests

We chose for this study the Raven Progressive Matrices test to test intelligence and Prague test for attention. The two tests were conducted in Constanta Maritime University by a clinical psychologist of Constanta Municipal Hospital. Was applied a test per day to not vitiate the results.

Ypton 22 handling **technique trial**

In addition to the testing and evaluation test used in the two experimental studies and described above we have made and used for this study the Ypton 22 handling technique trial on a upwind-downwind course.

Theoretical test on boat handling Ypton 22

This test is a grille test that has 18 questions with 4 possible answers. The test for assessing the level of theoretical preparation is correlated with the number of questions which meet the key points on the upwind-downwind sailing course.

Evaluation equipment

In this research used the following assessment tools:

- A calibrated digital scale Beurer GS27, with an error of 0.1 kg;
- Audio video camera GoPro V.2;
- An audio video camera Sony DCR-DVD110E MiniDVD;
- A mobile anemometer Silva ADC;
- A marine GPS, mobile, Lowrance Ifinder Go;
- A recorder Olympus VN 960;
- Two boats Ypton 22
- 20 Bluewave lifejackets, EN396, Manual;
- Two motor boats for assistance (60 hp Yamaha, Honda 90 hp).

Place of research

The research took place in Constanta Maritime University. **Application intervention** of study no.3

In this experiment we used crews of two subjects (one skipper and one crew). The 14 teams were distributed in groups. First was experiment group (7 teams) and second was control group (7 teams). The experiment group trained with mental exercises and the control group used real simulator exercises. These exercises were made 30 minutes at the beginning of each practical lesson.

After selecting subjects, they, were anthropometrical measured (body weight and height) and tested by a clinical psychologist with Prague and Raven tests to determine their level of intelligence and attention. This initial test was noted by "T0". After these tests subjects were divided into teams. In skipper posts were assigned the subjects with the highest values of intelligence and on crew posts were allocated other subjects by lot.

After two weeks of theoretical and practical training they repeated psychological testing and boat handling Ypton 22 upwind-downwind course test (T1). After seven weeks of practical intervention subjects were tested again (T2) and after other seven week the final tests were made (T3).

Conclusions of study No.3

Organizing, conducting study 3 and especially data analysis and interpretation revealed a number of issues concerning the educational process approach in sailing. The conclusions highlight the differences between the two strategies of training set for the experiment group and control group. Analyzing statistical calculation results of experiment group observed the following:

- Increased average purchases of theoretical knowledge, technique and tactics, for both the crew and the skipper from initial testing to final testing;
- Assumption that "

- If on a period of 14 weeks applies mental training exercises along with theoretical, technical and tactical program, will improve the experiment theoretical, technical and tactical knowledge" was validated (theoretical $F(2, 12) = 381.38$, $p < 0.05$; technical training $F(2, 12) = 73.67$, $p < 0.05$; tactical training $F(2, 12) = 299.62$, $p < 0.05$).

Analyzing the results of statistical calculations to control group observed the following:

- Increased average purchases of theoretical knowledge, technique and tactics, both the crew and the skipper and crew from initial testing to final testing;

- Assumption that "if on a period of 14 weeks applies real simulator exercises along with theoretical, technical and tactical training program, will improve the control group theoretical, technical and tactical knowledge" was validated (theoretical $F(2, 12) = 201.69$, $p < 0.05$; technical training $F(2, 12) = 175.34$, $p < 0.05$ tactical training $F(2, 12) = 27.07$, $p < 0.05$).

From the statistical independent t test is observed that the initial testing of the two groups on averages theory test results ($t = 1.12$, $p > 0.05$), technical ($t = 0.29$, $p > 0.05$) and tactical ($t = 0$, $p > 0.05$) are close in value.

Established at intermediate testing statistical difference in the tactics for the experimental group ($t = 3.38$, $p < 0.05$), the increase in the technical sample control group (but without being registered statistical difference ($t = -0.35$, $p > 0.05$)) and the level of theoretical control group increased to the experimental group ($t = -1.15$, $p > 0.05$). Widened growth at final testing statistical difference at a tactical level in the experimental group ($t = 12.23$, $p < 0.05$), from the technical to the control group ($t = 2.39$, $p < 0.05$), and the plan theoretically the two groups were balanced, we recorded a statistical difference ($t = 0.39$, $p > 0.05$).

Calculating Pearson correlation test showed a statistical correlation between the results of the skipper and crew of both study groups which may indicate major role in manoeuvring Ypton 22 sailing boat. Hypothesis that "

- If apply two different training strategies, one based on mental training exercises in a group and one based on real simulator exercises in the other group, progress to the theory, technique and tactics tests are different" confirmed. Hypothesis that " If the experiment group uses mental training exercises in the training process the results are better than those obtained in the control group that train using real simulator exercises " only partially confirmed the results of the testing strategy ($t = 4.62$, $p < 0.05$) are better in the experimental group and the technical results ($t = -0.90$, $p < 0.05$) in the control group is better that in experiment group.

Both groups observed positive changes in indices of theoretical, technical and tactical recorded statistical differences between test results.

Increase learning efficiency is observed both in the crew and individually.

The two strategies of training, the experimental group based on the mental training and the control group based on real simulator exercises, contributed almost equally to the optimization technique for handling sailing boats Ypton 22 to Constanta Maritime University students.

The **general conclusions** of the thesis

Following the scientific conclusions have been drawn both theoretical and practical.

Theoretical conclusions:

- Foreign literature abounds in works that deal with the technology side of sailing especially in the recreational boating;
- The number of publications about competitive side of sailing is low;
- Treating topics related to ways of teaching sailing at beginner level are reduced in number.
- Only Romanian language book written on the sailing didactics subject is "Yachting" of A., Butucaru and E. Butucaru, edited by publisher Stadion in 1971.

Practical conclusions:

- Intelligence level directly affects the handling sailing boats, higher level intelligence will be manning the higher the level of handling sailing boats.
- Attention is improved after specific training in yachting.
- Using two work systems in teaching sailing produce different results in learning Ypton 22 sailing boat handling;
- Mental training exercises are more effective than real simulator training on tactical;
- Real simulator exercises are more effective than mental training on technical training;

Proposals and recommendations

Following the results of research studies and the conclusions drawn above, are the following recommendations regarding the optimization technique for handling keel boats:

- To improve the system of teaching sailing and get a good technique background is recommended to be used mental training exercises alongside real simulator exercises, this will enhance orientation on sailing course and to facilitate quick decision-making and simultaneously to improve the technique of handling sailing boats;
- To improve results for crew is recommended that subjects with the highest index of intelligence to occupy the post of skipper and the subject with the highest index of attention to occupy the post of tactician.

We propose that future studies should:

- Investigate the role of attention on the development of competitive tactics;

- Investigate the influence of the degree of motivation and emotion in learning yachting;
- To resume experiments in the present work to determine the evolution of technical training of performance groups in Romania sailing clubs.