

Methodological Approaches to the Design of Business Games and Definition of Marine Specialists Training Content

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ABSTRACT: Knowledge owned by marine specialists demand only in rare cases of extreme navigation situations. In this regard, the development of training game methods for actions in such situations is a very actual problem. The complex of professional business games is elaborated in the Baltic Fishing Fleet State Academy (BFFSA). The scenario of the business game is being developed in line with given objectives. For example, the main goal of the business game "Safety ensuring of shipping" is formation of abilities and skills for management processes of safety ensuring in the field of cargo transportation.

1 INTRODUCTION

The article discusses the methodological approaches to the development of conceptual designs of professional business games for seafarers, and proposes a method for determining the content of training and development of the specialists' professional competence both directly during games and after game analysis. Professional development of marine specialists supposes learning new theoretical knowledge and its actualization. However, in actual practice of navigation, many theoretical developments are not often in demand, and for this reason, a specialist not familiar with the relevant skills in the proper degree^[1].

Such a gap can be eliminated through "artificial / virtual" methods of knowledge actualization: training and business games. The effectiveness of these methods is proved into practice. But, if various kinds of training (for example, applying radar stations for ships passing, fire fighting, etc.) are used rather widely, business games didn't receive proper dissemination. The development of business games for maritime specialists requires high professionalism both from the developers themselves, and from teachers / experts, who lead the game and generate situations in the play activity of trainees.

2 PURPOSE AND TASKS OF THE BUSINESS GAME

Let's consider some methodological approaches to business games designing and usage of gaming methods to determine the content of training / development of maritime specialists' professionalism.

The main purpose of the business game is formation of abilities and skills of management of the processes of the cargo transportation safety^[2,3].

The following tasks are necessary to solve in order to achieve this purpose:

- determining professional preparedness of specialists to act in difficult circumstances and unusual situations;
- developing skills of analysis and decision-making during process of professional activity;
- study of integrative processes of marine engineer's professional preparedness formation;
- analysis of maritime safety ensuring problems and efficiency of fleet commercial operation.

3 THE BUSINESS GAME DESIGNING

Preliminary design of the business game "Ensuring the safety of maritime cargo transportation" is given in the Table 1.

Table 1. Scenario plan of the business (imitating) game "Ensuring the safety of maritime cargo transportation"

Plot	Episodes	Actions
1. Preparation for the game	<p>1.1. Instructing the game organizers and experts.</p> <p>1.2. Instructing the game participants, studying of regulations, systems of the game control and evaluation of participants actions.</p> <p>1.3. Determination of play groups and roles distribution.</p>	<p>Theme, goals, tasks, area of responsibility, regulations.</p> <p>Instructing, distribution and study of materials, etc.</p> <p>Clarification of the game governance, penalties and bonuses systems, etc.</p> <p>Formation of play groups and roles distribution.</p>
2. Incoming control of participants' knowledge and skills	<p>2.1. A participant's testing.</p> <p>2.2. Definition of testing results.</p>	<p>Presentation of a test card to a participant of the game.</p> <p>Explanation the task of testing and an evaluation procedure.</p>
3. A ship voyage planning	<p>3.1. Definition of initial information, its collection and analysis.</p> <p>3.2. Route selection of the voyage to the port of loading/unloading.</p> <p>3.3. Project and the ship cargo plan development according to the criteria of safety and effectiveness.</p> <p>3.4. Planning of ship stores, material and technical supply, crew completing and training for the voyage.</p> <p>3.5. Ship voyage planning.</p> <p>3.6. Planning safety actions.</p>	<p>A ship owner sends the ship's captain a telex containing instructions on the next voyage: ports of the ship loading/unloading, kind, type and quantity of cargo, special cargo characteristics, time for loading, loading/unloading rates, handling procedures of shipping documents, laytime calculation, etc.</p> <p>The captain of the ship distributes tasks to prepare the ship for the voyage.</p>
4. Loading the ship	<p>4.1. Coordination a cargo plan with stevedores and the action plan for work safety providing and environmental protection.</p> <p>4.2. Monitoring the condition status of cargo, its stowage in holds and storage, mounting, etc.</p> <p>4.3. Control of hydrometeorological conditions.</p> <p>4.4. Drawing up primary shipping documents.</p> <p>4.5. Drawing up protest letters in case of infraction of rules by stevedores in loading or delivery of cargo which has "defects", as well as of the ship structures</p>	<p>The head of the game and experts performing the roles of shippers, agents, inspectors, surveyors, stevedores, etc. generate introductory data oriented to the growing complexity of the situation.</p> <p>Situation of a conflict between the ship and the shipper regarding the quality of packaging and labeling cargo is created.</p> <p>The situation of the ship structures or cargo damage due to negligence of dockers (crane damage during loading operators) is initiated. Participants of the game execute the required documents (notices, protests and acts of damage, etc.) and try to find compromise solutions. Fixing knowledge and skills needed for solving professional problems and situations, definition of "gaps" in knowledge and skills.</p>
5. Issuing documents for cargo (Bills of Lading, cargo manifest, etc.)	<p>5.1. Issuing Bills of Lading, addition of remarks and laytime commencement.</p> <p>5.2. Drawing up permission for the ship to leave the port.</p>	<p>Experts initiate a conflict in terms of remarks including in the bill of lading, as well as in the act of laytime preparation. The situation when port authorities' claims concerning technical condition of the ship, etc. are simulated.</p>
6. Preparation of the ship for leaving the port	<p>6.1. Implementation of actions in accordance with the regulations for navigation safety.</p> <p>6.2. Definition the time of the pilot's arrival onboard, the required number of tugs, a weather forecast, navigation conditions, etc.</p> <p>6.3. Drawing up a statement of a fact the ship's readiness to a voyage.</p>	<p>Implementation of inspections in accordance with checklists. Diagnostics of technical means, etc.</p> <p>Discussing with the agent problems related to leave the ship at sea.</p> <p>Clarification the weather forecast and navigation conditions at the time of the ship leave.</p> <p>Filling in the logbook and other forms of documents.</p> <p>Experts initiate conflicts, complicate the situation. Simultaneous fixation of the captain's and his mate's errors as well as errors of experts.</p>
7. Analysis and summarizing	<p>7.1. Organization of discussing the game results of the game.</p> <p>7.2. Estimation of the working groups' actions in the game.</p> <p>7.3. Formation the block of "gaps" in the knowledge and skills of the players, typical mistakes and miscalculations.</p> <p>7.4. Final selection of learning content and development of professionalism of marine</p>	<p>Reports of the play groups leaders, self-evaluation of the actions of the game participants with an emphasis the attention on the occurred errors and the "gaps" in knowledge and skills, relation to the game and wishes.</p> <p>The experimental material accumulated during the game is systematized and processed in order it will be possible to carry out the procedure of training content selection, to build the system of</p>

	specialists.	subject knowledge and ways of their integration.
	7.5. Specification of the training programs for specialists for the postgame period.	Training programs are corrected according to the results of the game experiment if participants continue training in play groups.
	7.6. Consulting assistance to the participants of the game in development of their programs of self-development/self-designing.	Players receive consulting assistance, including assistance in development of the program of self-training and self-development if they continue studies independently.
	7.7. Development by the game organizers of the postgame activity program concerning the game and preparation of the report on the game simulation experiment	
8. Postgame activity concerning the game.	8.1. Processing the results of the game simulation experiment with a goal to determine dependences, rational methods of formation of the professional personality, knowledge integration and configurators building, etc.	Results of the experiment are processed taking into account the earlier obtained data from other experiments of the same direction, that allows to accumulate the empirical material.
	8.2. Conducting methodological seminars for teachers and experts.	Comparing the results, establishing dependences, confirmation of the previous results is considerable contribution to the development of
	8.3. Development the complex of purpose-oriented programs of vocational development of marine specialists and ways to adapt these programs to a person.	our theoretical representations about the subject of the study.

4 THE BUSINESS GAME CONDUCTING

The game provides simulating six directly linked to the game plots.

Participants get instructions and learn the game rules as a part of the first plot. At that time the head of the game, formulating goals of the game simulation experiment and analyzing the situation, notes existing substantial contradictions between the desirable and realizable, and thereby “running” problematization processes, goals setting and self-determinations.

The second plot provides preliminary estimates of participants’ readiness to the game. In case of unsatisfactory test results it is assumed that such a result helps to intensify the process of motivation of specialists for developing professionalism. “Gaps” in knowledge and skills found as the test results are eliminated by the head of the game decision. Thus, the compensatory function of education is realized, i.e. advices can be given to participants of the game and special literature for self-study may be recommended.

The third, fourth and sixth plots are extremely important because at these stages in reality many of the major issues of navigation safety ensuring and sea cargo transportation are solved. It is assumed that not only typical real situations are fulfilled at these stages, but complex non-standard situations that happen rarely in real activity are simulated too, because serious negative consequences can entail, in cases of such situations appearance, if adequate solutions will not be found by responsible specialists.

Thus, the task of the game head and experts playing roles of officials, who under certain conditions, can counteract the captain of the ship and other persons involved in the process of sea cargo transportation is to generate episodes and situations “provok-

ing” a conflict and thereby substantially complicating making a solution of professional tasks. At the same time, as “home prepared” tasks, as actions according to a present situation can be performed for generating game situations. It allows to implement the game variation into the real game situation, i.e. the structure of the game has many degrees of freedom. Thus, the game adapts depending on the goals and specific problems requiring the solution.

Game participants fix results of the analysis, calculations, decisions and the effect of these decisions. They take into account the specific conditions, professional experience of all participants of the game group. The experts record the work of groups and individuals in the each episode and plot. Their duties include clear fixating of errors, “gaps” in knowledge, abilities and skills of specialists and their ability to integrate with various kinds of knowledge for solving complex professional problems. In addition experts observe the behavior of game participants in difficult situations.

During the game experts and the head of the game analyze the activities of participants and estimate their performance, identify areas of knowledge and skills in which it is useful to hold substantive and methodological consultations. For example, our experience in business games shows that practically always there is a need for methodological consultations in a systematic approach methodology, a system analysis, designing without prototypes^[2], etc.

Decisions obtained for each plot are discussed by all participants of the game. Representatives of the play groups make reports, where the idea of the design decision is revealed, as well its motivation and implementation methods with evaluation of possible consequences of the decision implementation.

Speakers answer questions from experts and other participants of the game, fixing critical remarks and

opponents' suggestions. Final estimates for each plot are determined after the public discussion of the play groups' reports.

All working materials relating to the analysis of situations in each plot, developing design solutions, decisions' motivation and choice of the decisions implementing methods are given to the game head for the further examination in accordance with the objectives of the game simulation experiment.

Processing game results requires certain time. Therefore, it is possible to realize partially selection of the content of the training and professional development directly during the game, as it was mentioned above. But careful analysis of the game materials is held in the postgame period. In the process of such an analysis it is often possible to detect some important regularity, to get an understanding of some of the integration processes, interdisciplinary system links, and to evaluate the effectiveness of various knowledge integrating methods for professional problems solving^[3,4].

The experimental results allow to select the content of training and development of marine special-

Table 2. Matrix representation of the content selection scheme for marine specialists training and development

Plot or operation	Acts of activity	Subject knowledge	Skills and abilities
Ship's voyage planning.	Route selection of the voyage to the port of destination	Hydrometeorology and oceanography Navigation and sailing directions. Cyclones and anticyclones, sea currents. Aid to navigation, etc.	Be able: to find sources of information; to analyze synoptic chart data and long-term forecasts; to determine risk factors and their assessment correlated to concrete constructive and exploitations characteristics of the ship, its purpose; to evaluate the impact of the navigation conditions on the operating parameters of the ship; to find necessary documents, regulating cargo transportation, to apply them; to make the cargo plan showing the holds rotation during loading; to perform calculations of stowage; to calculate ship stability and sitting, bending moments and shear forces; to assess the impact of the extreme conditions on the longitudinal and local strength of the ship, etc.
Planning measures to ensure the safety of marine cargo Transportation	The project and plan of ship loading development.	The theory of the ship. Theoretical mechanics. Strength of materials.Regulations for the cargo transportation Requirements of the international convention (SOLAS, MARPOL), on load line mark, etc. Ship's stability at high angles of heel, local and general ship's longitudinal strength, ship's unsinkability. Requirements and recommended schemes of different cargo strap-ping. International Sea Law. International regulations related to navigation. Rules of technical exploitation. Fire safety rules. Navigation safety rules. Knowledge of rules and their application, knowledge of basic legal acts (territorial waters, economic	Be able: to find necessary document, to assess it's adequacy to the studied problem; to apply creatively legal acts, regulations, recommendations in order to solve practical problems; to present systemically whole range of measures to ensure the safety of maritime cargo transportation and to correlate everything with methods and means of these measures practical implementation. Fixation performance fact in the logbook.

ists on the higher qualitative level, as well as to find new plots of the game and new opportunities for the whole game.

5 THE TRAINING CONTENT SELECTION

An example of the training content selection and professional development of ships masters on the results of game simulating experiments is given in the Table 2. Matrix representation of the content selection scheme for marine specialists training and development allows to realize a deductive method of analysis of each plot, differentiation of activities and subject knowledge required for their implementation. Further, it is possible to determine what skills and abilities a specialist must have to solve professional problems and, therefore, what a specialist's skills and abilities it is necessary to develop to achieve a high level of professionalism.

zones, etc.)

Plot or operation	Acts of activity	Subject knowledge	Skills and abilities
Execution of shipping documents	Issuing the Bill of Lading	Commercial work in the merchant fleet, a notion of the Bill of Lading, its kinds, and functions; master's remarks to the Bill of Lading concerning cargo quality or it's packing, etc.	Be able: to issue the Bill of Lading correctly and formulate remarks (if there are any) in accordance with cargo insurer's recommendation; to champion / to protect the commercial interests of the ship owner or the charterer in the case of conflict with shippers; to formulate claims and to justify them; to prove invalidity of the claims to the ship.

6 CONCLUSIONS

Efficient usage of gaming methods for training and selection of training content is determined primarily by the fact that, if the game participants cannot find solution to any given situation, then the following processes are started:

- 1 self-disqualification, i.e. a game participant discover himself a lack of knowledge and became aware of the need of its replenishment;
- 2 motivation of new knowledge assimilation and further professional development;
- 3 selection of the content of personal-oriented compensatory and developed education;
- 4 development of new game plots and game trajectory correcting;
- 5 development of personal-oriented trajectories of specialists self-development and the organizational - pedagogical conditions of their realization.

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