THE DEVELOPMENT OF THE PROFESSIONAL EDUCATION PROCESS USING STATISTICAL TECHNIQUES ANALYSIS OF QUESTIONNAIRES

At the beginning, author briefly presents the Polish Armed Forces cadre’s professional military education (PME) development system that includes PME development of logistic officers conducted at the Military Academy of Land Forces. A practical method of continuing development of the educational process based on statistical analysis of customer’s satisfaction survey data was described. Additionally, using the example, presented appropriate actions taken to improve the PME process.

Keywords: lifelong learning, logistic branch officers’ training, on-going development of education process, quality management.

1. Introduction

Current and potential challenges, which officers of the combat service support will face in the near future, can predict new refined requirements in the broad aspect of readiness to achieve objectives.

A reorganization of the logistical support is being continued in Western Armies (in the field of combat service support) aimed at creating new organizational structures in the management system as well as personnel readiness.

The newest project, by the Headquarters Department of the U.S. Army, titled: „Commissioned Officer Professional Development and Career Management”, is an outstanding example of personnel management. It describes how the scope of new principles of personnel development and management were worked out [1].

Similar action was also taken in the Polish Armed Forces, where the new system of professional personnel development has been in place since (the 1st of July 2004) [7]. The fundamental assumptions of this pamphlet are resulting from minimum qualifying requirements established in art. 36 of the pragmatic law as it pertains to the appointing of individual official posts. [8]

The detailed course of study and curriculum was established in decision No. 276/MON (14 of September 2004) regarding the system of professional personnel development in the Polish Armed Forces (Log Official MON, 2004, No. 12, item 130). It details the minimum qualifying requirements ranging from official postappointments to individual full-time steps and preparation for performing official duties in specific official posts, to main canons of improving the system.

All forms of professional personnel development will be conducted in military education units (for officers in military academies and higher officers’ schools, and for non-commisioned officers in the active army in non-commisioned officers training centres). The specialist courses, before assuming official posts in an area, will be organized outside the system of military education.

The complements of this system are study and specialist courses conducted in-country, consistent with the equivalent forms of national education and training.

This system of professional development should enable active-duty soldiers in the course of their military service to meet all qualifications predicted in post description cards, based on models from individuals’ military education.

Postgraduate study and specialist courses also fit into the system of professional development. Postgraduate study - au-thentificated by a diploma from the appropriate college: Operating-Tactical Study from the National Defence Academy (NDA) and the Academy of the Navy (AON), Operating-Strategic Study at NDA, and the Defensive Politics Study at NDA.

According to the above decision, the Military Academy of Land Forces (MALF) was tasked to provide over 50 specialist courses designed for officers. The list of courses, targets and training tasks, organizational assumptions, thematic scope of the training courses (syllabus) and the course schedule are published in the programme-organizational guidelines of courses organized at MALF [9].

A few specialist courses are planned at MALF for officers of the logistical personal branch at the captain and lieutenant level.

The cornerstones of syllabus assumptions, in the above-mentioned specialist courses, were required qualifications and duties reflected in post description cards (PDC) to which attendees can be appointed after successful completion. It is necessary to understand that candidates trained, e.g. for a company commander, can serve in various logistical companies: in the general logistical personal group - maintenance, supplies, training, command and control, logistical courses; in the material personal group - of keeping, storing, supplying petrol, oil and lubricants (POL), and long-range pipelines; the transport and troop movement personnel groups; the adjustment of the move and finally, the technical personnel group and the maintenance and recovery company.

Of course, it isn’t so that the number of PDC is the same as the number of posts of commanders of the above-mentioned companies. For instance, the post of commander of the maintenance and recovery company (mrcoy), or the supply company (scoy), incorporate at least a dozen different PDCs. Their diversity comes from setting the specificity role of the sub-units in upper structures e.g.: of the armoured cavalry brigade, the mechanized brigade (MB), of the assault-storm brigade, the artillery brigade or the logistical brigade. Attendees’ qualifications and duties were based on the PDC of commanders mrcoy and mcoy of MB.

In the Combat Logistics Support Department (CLSD) of the Command and Control Institute MALF (substantially responsible for the implementation of the above courses) undertook the research project with the purpose of improving the quality of the logistics training course.

General assumptions and the current state of the research will follow.
2. General assumptions of research

The mission of the CLSD as described in the MALF’s charter embraces the accomplishment of educational tasks, training and research in a range of command skills, logistics control and signal sub-units, combat service support and in organizing armament and military equipment maintenance, all under modern battlefield conditions.

In accordance with its mission, the CLSD undertakes to implement the MALF development program priorities within the scope of its areas of responsibility with special emphasis on: permanent improvement in the quality of the didactics and increasing its role in the educational process; the constant development of scientific activity; continuous development and increasing the participation of computerization in the process of training and CLSD’s operations.

The college’s graduates demonstrate the quality of the didactics. The students, their practical skills, their creativity, their knowledge and their opinion of the college are creating the college’s image; not only in the academic environment but in its surroundings too. Because of that, word of mouth should be taken into consideration in processes relating to the college.

The above statement is the underlying reason for a permanent educational development project carried out by the CLSD. One should note that the aim of the project is not introducing the management system for quality training consistent with the ISO 9001 norm [6] and getting accreditation, but to put into practice management system for quality training consistent with the ISO 9001 norm requirements. In the case of a military university we can rate among its customers: studios and course candidates, studios and course auditors, the college staff, graduates, army units, Department of Science and the Cadre Department of Military Education.

Clearly combining requirements and concerns of all interested parties is not simple. Therefore, narrowing the circle of customers to attendees of officer specialty courses for logistical branch personnel to the level of lieutenant and captain was essential for the purposes of this plan. The corrective limitation is appropriate if we consider that our action is focused on first the assessment, and then the on-going improvement of the training process. This goal is similar in different colleges [5]. It is necessary to precisely evaluate its present state if we want to improve the quality of the training process. An appropriately developed questionnaire form is a crucial tool for getting the right feedback information from customers.

Two kinds of questionnaire forms were used in order to get feedback information (appropriate to courses): an introductory questionnaire form (utilized in the first days of the course the connection with) and a closing questionnaire form (utilized after graduation and containing attendees’ opinions, their impressions and their training service).

In terms of imposing requirements more often, every now and then they would extend the traditional technical competence of army unit commanders of an their basic capability. These capabilities include: individual initiative, leadership abilities, problem-solving skills, communication skills, teamwork skills, creativity and innovation as well as setting and accomplishing priorities (appropriate questions concerning this issue were also posed in the questionnaire form) [2].

The above-mentioned skills and characteristics of specialty course attendees from the personnel logistics branch exert an essential influence on the personal ranking of officers as well as affecting the quality of subsequent assignments based on the PDCs and from the job skills description.

The preliminary phase of the project included analysis of:

- completion of tasks assuring training effectiveness resulting from the Bolognese Process.

The realization of the above-mentioned will be achieved through:

- maintaining lasting improvement of the training effectiveness system in CLSD,
- full involvement of CLSD’s chief and subordinate department managers in maintaining and improving CLSD’s on-going training effectiveness system,
- conducting the permanent monitoring, measurement and analysis in accordance with the scope of ways and methods of improving the training quality assurance system, both among CLSD staff as well as attendees,
- regular review of current teaching aids in the form of “e-learning” materials and classroom instruction and established school curricula revision,
- cooperation with the college staff, command institutions of the Republic of Poland’s Armed Forces, military units, research- and development and industrial centers.

Effective improvement of educational services is closely related to the customers’ comprehensive understanding of the ISO 9001 norm requirements. In the case of a military university we can rate among its customers: studios and course candidates, studios and course auditors, the college staff, graduates, army units, Department of Science and the Cadre Department of Military Education.

According to the quality of education the following goals were established in CLSD:

- ensuring the high level of classes and how they are perceived, by students and future employers,
- scientific development – lasting increase in individuals’ qualifications, improvement in management of work and undertaking new tasks resulting from educational needs and the demand of future employers, i.e., army units,
- initiating, supporting and co-organizing internal efforts (in the college) and external projects (outside the college), to broaden attendees' knowledge within the scope of broadly understood innovations in the skills needed to command logistical sub-units and signals of contemporary battlefield conditions, combat service support and managing armament and military equipment maintenance,
- the implementation, monitoring, correction and improving the politics of quality,
satisfaction according to the following principles [4]:

The following received questionnaire surveys:
- attendees of specialty course No. 1025001 (of general-logistical company commanders) and attendees of specialty course No. 2030027 (lieutenants of the personnel logistics branch) - 2006 and 2007 r,
- a representative group of officers of the Army personnel logistics branch (the so-called “experts”) the majority of which were representatives of rungs of Army logistics organizational structures (military rank ranging from captain to colonel, with tenure in the service from 12 to 36 years).

3. Results of the implementation of the project

Carefully designed questionnaire forms are a crucial tool for permanently improving the training process in the CLSD. These forms ensure the acquisition of appropriate feedback information from customers, in this case from attendees of specialty courses of the personnel logistics branch taught in MALF and of the logistics managerial personnel “employers” of the Army.

While developing the questionnaire forms, special attention was given to ensuring that the basic purpose for administering questionnaire forms of this type, that is, measuring the degree to which the training service provided by the CLSD is fulfilling customers’ expectations, was met. The group developing the questionnaires was expanded to include not only CLSD staff, but also specialists from the Training Technology Department of MALF as well.

The reliability of results of the completed survey and the credibility of respondents’ answers were ensured by designing questions for the questionnaire form used to measure customer satisfaction according to the following principles [4]:

a) the questions were short and concise – thereby increasing the probability that they will be read completely and with sufficient attention,
b) questions were formulated clearly and precisely, and in each:
   - the most important concepts were defined,
   - specialized jargon was avoided,
   - pronouns were avoided where it might not be clear to what they referred,
   - double negatives were avoided,
   - confusing adverbial structure was avoided,
c) the fact that questions concerning possible aims might not translate into actual future behaviours at was taken into consideration,
d) wording such as “depending on” that is commonly used to reply to hypothetical questions, thereby making it difficult for respondents to answer, was limited,
e) only questions directed to actual persons were asked,
f) only questions concerning one problem were being asked, they avoided hook questions that ask about several issues at a time,
g) in closed questions replies were formulated individually,
h) a complete list of replies providing for all possible situations were to be included in the list of possible replies,
i) loaded questions that would steer respondents into being sympathetic or disapproving towards the question’s subject were not included in the questionnaire form,
j) also taken into consideration was the fact that although something might make sense when designing the questionnaire form that does not mean that it would make sense to the one being polled.

3.1. Research recapitulating courses

Research recapitulating courses was carried out with attendees of specialty course No. 1025001 (for general-logistics company commanders) and with auditing participants of specialty course No. 2030027 (for lieutenants of the personnel logistics branch) - of edition 2007. Getting feedback on their opinions and their impressions is the fundamental reason for performing a questionnaire survey among participants who have completed training service courses. This feedback is essential input information for the on-going improvement of the continuing education process. An essential element dealing with the thematic assessment of the questionnaire form for a delivered educational service was introduced in fig.1.

Results of questionnaire forms are subjected to a statistical analysis. Assessments of the course were rated among popular indicators on the basis of a long-standing training practice: the degree of the topicality of the subject matter introduced, the scope of knowledge of a given subject matter, format of classes. Rates allowing an assessment of customer satisfaction were also found to be essential to analysis access to the Internet, and the adaptability or willingness to participate in professional development “at a distance”. Action modifying the course syllabus will apply to the next editions of the course, depending on analysis results.

The main emphasis was put on singling out those subjects which are not useful, in the opinion of the course participants, to their professional practice. Such topics (subjects) are removed from the educational courses offered and replaced by those resulting from the needs and expectations of a given group of customers.

In the literature of the field, the assessment based on an analysis of the usefulness of the subject is known as the “statistical control of the process”. The rationale of this method consists in establishing borders to the natural changeability of the process, then identifying measurements whose value remains outside these borders. When these measurements are upset, we say that the process is unreliable. We are referring to subjects which were judged into the way running away, in using results of polls to the assessment then from stayed, and the program of the training course needs revising. Such action is required and acceptable around item 8 ISO 9001 norms - Measurements, analysis and improvement. Using statistical methods should, consistent with this norm, aid the organization in demonstrating the ability of processes to achieve planned results [3].

Practical application of a statistical analysis algorithm to the results of the poll was introduced as an example of analysis of the questionnaire forms from attendees who took part in course No. 2030027. 32. 22 subjects participated in the assessment. A five-point scale was applied to individual subjects. An overall comparison of poll results was outlined in table No. 1, where columns from 1 to 22 introduced a number of points which received the given theme from the participant of a course (1-32).
1. To what extent did training fulfill your expectation?¹

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2. How do you assess individual topics of the training course?

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<th>No</th>
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Tab. 1. The list of results of the summary questionnaire of 2030027 course

<table>
<thead>
<tr>
<th>No of the participant</th>
<th>Number of points received by participant</th>
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<td>31</td>
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<tr>
<td>32</td>
<td>4 4 2 4 4 4 4 4 4</td>
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<tr>
<td>Average, ( X _r )</td>
<td>3.75 4.34 2.56 4.10 3.97 4.16 4.03</td>
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<tr>
<td>Stand. deviat., ( S )</td>
<td>0.88 0.75 0.91 0.79 0.82 0.85 0.78</td>
</tr>
<tr>
<td>Average value from ( X _r ), ( \Psi )</td>
<td>3.998</td>
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<tr>
<td>Average value from ( S _r ), ( \bar{S} _r )</td>
<td>0.807</td>
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Four last rows contain averages outlined for the of allotted points from the table of right subjects (\( X \_r \)), value of standard deviation (\( S \)), mean value for the course (\( \Psi \)), mean value of standard deviation (\( \bar{S} \_r \)). Above value was outlined taking standard relations.

Testing lines were outlined in the aim of more distant analysis of results of the poll for \( X \_r \), the bottom testing line - \( DLK\_x\bar{S} \), the upper testing line - \( GLK\_x\bar{S} \) and the average line - \( \bar{S}LK\_x\bar{S} \) from relations:

\[
DLK\_x \bar{S} = \Psi - 1.5 \cdot S \_r
\]
Individual subjects of the course are judged in two stages. First whether the average number of points ($X_{sr}$) calculated for the given subject is smaller than border worth outlined for points ($DLK_{sr}$) is tested. Then the standard deviation value of points is tested ($S$). The following decisions accepted depending on the results of analysis:

- to leave the subject: $DLK_{s\nu} < X_{sr} \leq GLK_{s\nu}$ $\land$ $DLK_s < S < GLK_s$,
- remove the subject: $X_{sr} \leq DLK_{s\nu} \land DLK_s < S < GLK_s$,
- corection of the subject: $X_{sr} < DLK_{s\nu} \land GLK_s < S$.

Of course one possibility is still left - replacing the subject - but it is resulting from analysis of the clause 4 of the questionnaire form concerning offered changes in the future edition of the course.

3.2. Desired features and abilities of logistics personnel

The employers (unit commanders) frequently expect levels of technical competence beyond the standard definitions of their subordinate personnel. It was decided to identify the most essential features and skills, which characterize the logistical personnel should be characterized in order to improve their abilities through training. In the “preliminary”, questionnaire form directed to attendees of logistics courses as well as to logistics managerial personnel “experts” included this question, among others:

What skills of a course participant should determine when somebody should be singled out to attend the logistics course?

The following skills were suggested: leadership, organizational, teamwork, negotiating, self-presentation, self instruction, analytical, and various others.

Moreover, the question was asked: what characteristics of the participant should determine when somebody should be singled out to attend the logistics course?

The following features were suggested: creativity, ease of communication, responsibility, efficiency, regularity, dynamism, adaptability to new situations, assertiveness, and various others.

The results of the desired skills assessment according to a weighted scale were depicted in fig. 4. The “experts” as well as “participants in a course” put organizational abilities first (82% - “experts” and 76% - “participants in a course”). In the next places are: leadership skills, teamwork and analytical. The “Experts” put analytical skills in second place (36%). Teamwork ability took third place with only a slightly smaller score of (34%) and fourth place is occupied by leadership skills (31%). In the assessment of “participants in a course” second and third place, include: leadership skills with the score (42%) and teamwork (40%).

However, among the most desirable features, responsibility, efficiency (appropriately: “experts” - the 65% and the 39%, “participants in a course” - the 58% and the 41%) were marked out.
4. Summary

In dynamically changing conditions of the logistics officers service, the fact of the possibility of improving their professional skills appropriate to the needs and requirements of the service is one of the most important interests of the service. That being so, continuously improving training programs through suppliers of educational services, also by the CLSD, allows for fulfilling attendees’ and employers’ requirements and results in a good image for the contractor.

It seems that one of the most widespread ways of examining the customer’s satisfaction, that is, conducting a survey, can serve very well to continuously improve the instructional service, as achieved in CLSD with very good results. Sine qua non is using the right methodology for obtaining results and systematically building one’s own knowledge bases based on questionnaire surveys. The fact that this method is characterized by relatively low costs for the realization should be underlined and as well as the fact that it is very susceptible to computer analysis.

5. References


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