



## **Actions Strengthening Air Defense Forces Specialty Students' Innovativeness on Example of General Tadeusz Kościuszko Military University of Land Forces**

Zbigniew GROBELNY<sup>1</sup>, Marian KOPCZEWSKI<sup>2</sup>, Jacek NARLOCH<sup>3</sup>, Paweł OLBRYCHT<sup>4\*</sup>

<sup>1</sup> General Tadeusz Kościuszko Military University of Land Forces, Wrocław, Poland; zbigniew.grobelny@awl.edu.pl, ORCID: 000-0002-6743-7632

<sup>2</sup> General Tadeusz Kościuszko Military University of Land Forces, Wrocław, Poland, marian.kopczewski@awl.edu.pl, ORCID: 0000-0002-0402-0477

<sup>3</sup> General Tadeusz Kościuszko Military University of Land Forces, Wrocław, Poland, jacek.narloch@awl.edu.pl, ORCID: 000-0001-5222-7512

<sup>4</sup> General Tadeusz Kościuszko Military University of Land Forces, Wrocław, Poland, pawel.olbrycht@awl.edu.pl, ORCID: 0000-0001-8362-5644

\* Corresponding author

DOI: <https://doi.org/10.37105/sd.124>

### **Abstract**

---

This article aims to identify the degree of innovation of General Tadeusz Kościuszko Military University of Land Forces (MULF) military students in their education process, which set the education of future leaders, including officers of Air Defense Forces (ADF), as one of their priorities. In the research process, qualitative research methods were used, including the analysis of literature sources (content analysis technique) and a case study. It also employed a quantitative method, including a diagnostic survey, carried out using the survey technique. The main research tool was questionnaires developed by the co-authors, addressed to military students, who received a promotion for the first officer's rank about a month after the survey. The empirical results show that: the respondents almost unequivocally indicated that they like to work as a team. However, the progress in creativity at the moment of officer promotion is noticeable, the most important feature of teachers according to respondents are soft skills and that significance is increased due to increasing the service quality of officers.

### **Keywords**

---

Air Defense Forces, creativity, innovation, managers, military students, safety

Submitted: 13.05.2021 Accepted: 16.08.2021 Published: 31.12.2021

This work is licensed under the Creative Commons Attribution International License (CC BY). <http://creativecommons.org/licenses/by/4.0/>





## 1. Introduction

The terms "innovation" and "innovativeness" appear particularly interesting in the contemporary public, including educational discourse (Breivik-Mayer et al., 2020).

In Poland and other European countries, various documents, programs, and competitions also indicate the importance of innovation in the development of enterprises or scientific institutions. What is essential is that the primary way to implement these priorities should be adequate quality education (Dhillon, 2006).

The observation and analysis of contemporary pedagogical practice in military universities allows for a rather paradoxical opinion that there has been some overproduction of innovative solutions. Nowadays, it is difficult to indicate a university (Divinagracia & Divinagracia, 2012) or an officer training center, which would not emphasize various aspects of innovativeness in its image (Swanson et al., 2019). On the one hand, this overproduction raises hopes for positive changes in Polish education. However, on the other hand, it gives rise to a justified need to look more critically at the quality of innovative solutions. The analysis of the content of innovation projects published on websites in Poland makes it possible to state that the solutions proposed there are sometimes devoid of a solid theoretical basis, fail to make new contributions, and do not fit into the vision of university or military development. Nevertheless, they promote the use of novelty, but only in terms of technology. This state of affairs is not favorable since commanders-teachers' great potential for innovation, which could be used in a better way, is being wasted (Suslov et al., 2020).

Innovation is a special kind of change. J. Schumpeter considers innovation to be the introduction of new products, new production methods, finding new markets, gaining new sources of raw materials and introducing new organization (Knossala, 2014).

According to P. Drucker (1992), innovations are creative changes in the social system, economic structure, technology and nature. They may also appear as an idea, conduct, or thing that is new because it is qualitatively different from the previous ones, which is essential in ADF. Business innovations are products and services and activities aimed at bringing them to buyers and convincing them of their utility (Cai & Tang, 2021).

Therefore, innovativeness means an approach of people characterized by an attitude to change, a desire to improve the existing state, thus seeking and introducing something new. In English, there is also the word 'innovate' meaning action consisting of introducing changes. These changes are innovations, which is consistent with the definition given by J. Schumpeter. In the process of innovation transfer, universities play a significant role. Such are the expectations of industry, society and state administration, and employees, graduates, and students of universities (Tinmaz & Yakin, 2015).

The direct effects of innovation are related to improving the performance of a company in all its areas (Walder, 2014). Innovations enable increased productivity, reducing material and energy consumption, shortening execution time, improving work quality and safety, producing new properties, etc.

Developing radical innovations is a creative activity connected with searching for new solutions – it is an effect of innovativeness, creativity, discovery skills of their creators, as well as the ability to learn, and knowledge resources and managing them in the organization (Aleksanyan, 2020).

As a feature, innovativeness may refer to individuals, groups of people, and organizations, as well as to the region, industry sector, or the entire economy, mainly in the Armed

Forces. The term economy innovativeness is understood as the ability and willingness of entrepreneurs to look for and introduce new solutions, conduct research, create new products, implement new technological processes and organizational solutions aimed at improving and developing products, thus strengthening the competitiveness of the economy towards other countries. The general objectives of the state innovation policy are primarily (Santerek, 2016):

- increasing the level of innovation of the state and its regions,
- improving citizens' standard of living,
- improving the competitiveness of the economy through promoting knowledge as the most crucial factor of economic growth, creating an institutional system of innovation development, ensuring proper cooperation of all participants of the innovation system, and promoting innovativeness among enterprises.

The outlined situation encourages a new discussion on the place and role of innovative activity in military universities. The activities and research will be focused mainly on strengthening the links between pedagogical theoreticians and practitioners on supporting, promoting, and disseminating innovative activities of teachers, educators, and employees of uniformed services. Their scope covers the issues of pedagogical – leadership – innovation of their bachelor and master theses, conducted academic classes with students devoted to modern trends in education (Jamieson & Shaw, 2020), analysis of the content of the subject literature, and – what is particularly valuable cognitively – practical experience gained/being gained in the course of implementation of pedagogical innovations, practical in training areas.

Based on the analysis of literature sources, it can be observed that the research on the innovativeness of military students has been present in the international scientific discourse for many years. An example of this are, among others, publications by S. Griffin (2016) (on the theory of military research on innovation, C. Lee (2019) (on innovation in the use of technology in the US Armed Forces), P. Haun (2020) (on the effectiveness of the US Air Force) or L. M. Burke II (2020) (in the field of methodology and models of innovation research in the Armed Forces). However, there is a lack of publications relating to the research on the perception of military students in terms of the degree of their innovativeness, acquired in the education process. Therefore, this article fills this gap.

## **2. Research methodology**

The presented research expertise is a specific view on the issue of innovation in relation to students of military universities, (which is also MULF) are the essential social group determining the future development of the Armed Forces of each country (Krawczyk & Showalter, 2020). It is the students, within the framework of subsequent stages of their professional career, who will contribute to strengthening the innovativeness of the state and regions, organizations, including military ones, and to the enhancement of competitiveness, which will result in the improvement of management and the standard of living of citizens (Suslov et al., 2020).

This study was carried out based on an analysis of a survey on innovation among students, especially ADF specialties.

Innovativeness is a critical element in 21st-century organizations that aim to accelerate growth. It becomes necessary to search for new products, new technologies, or new organizational forms in the integrated development of military organizations' innovative activities. Their future seems to be young people students, graduates of military universities,

representatives of "Generation Y", who have "tamed" technological innovations and actively use digital media and technologies.

The contemporary dynamics of changes in the command management and educational environment requires improvement in the aspect of shaping the personal qualities of graduate – officers, who will foster the development of innovativeness of his/her actions. Therefore, the research methodology aimed at solving the research problem: What is the degree of innovation of military students acquired in the education process at MULF? The main hypothesis was adjusted to the main problem and took the form of an assumption stating that military students acquire a high degree of innovativeness in the education process in MULF.

It should be noted that all methodological assumptions are based on the MULF case study.

### **3. Characteristics of respondents (research sample)**

Within the framework of the conducted research, a quantitative research method in the form of a diagnostic survey carried out with the use of auditory survey techniques was used to examine how graduates of military studies perceive and assess their level of innovativeness and creativity. The research tool was a paper questionnaire sheet. The respondents were military students of MULF, who received a promotion for the first officer's rank about a month after the survey.

The purpose of the survey was to explore the level of innovativeness of in-service officers whose task is to protect the state against external threats, i.e., inviolability of borders and indivisibility of territory. The size of the research sample (101, 48 in the ADF specialty) was chosen using the targeted method, i.e., from among military graduates. The general population (N) in this case included all military students of MULF graduating education in 2019, when the survey was conducted. The survey was auditorium-based and was conducted with the use of paper survey sheets as a research tool.

Before the survey sheets were completed, the respondents were familiarized with the survey methodology. While creating the survey's methodological assumptions, it was based on research on student innovation, carried out in 2016 in technical universities, presented in the report *Działania rozwijające kreatywność i innowacyjność studentów* (Santerek, 2016).

In general, students as a research group (research sample) were selected because they were starting their officer's careers after five years of studies in which, in addition to acquiring the so-called hard (content-related) skills, they were also equipped with the so-called soft skills, including innovativeness.

Before analyzing the respondents' answers, it should be pointed out that although the vast majority of them answered the questions asked, due to the deficiencies (including the statistical part), the information on the percentage distribution of each answer did not concern all of the analyzed questionnaires (101), but the number of respondents who answered a given question (N). as a comparison, 897 respondents took part in the 2016 survey, but it should be noted that it was carried out in a total of 18 universities (Santerek, 2016).

The questions in the survey (17 in total) were mostly of a closed nature, including those of an equivocal nature (with the possibility to choose several answers) and a disjunctive nature (with the possibility to choose one answer).

To illustrate the results of the analysis of individual questions more effectively, different types of graphs were used:

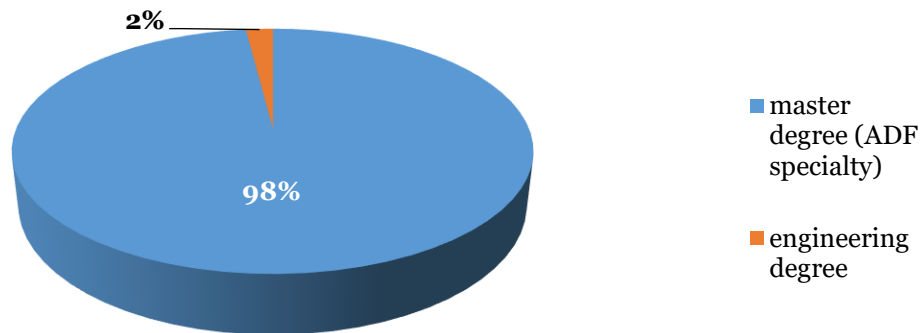
- quantitative distribution of the number/categories of individual answers;
- the percentage of the number/categories of individual answers, including the number of respondents.

In each case the number of respondents who answered a given question ("N") was given.

#### 4. Research results – the analysis of respondents’ answers in surveys

##### 4.1 The analysis of statistical part

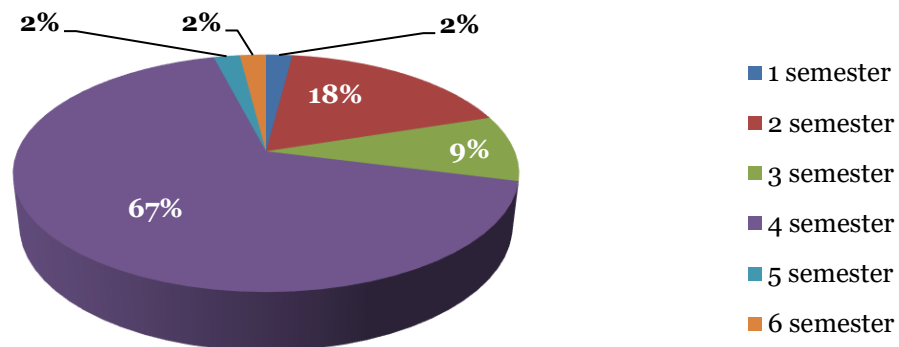
The first of the respondents' characteristics taken into account was the type of their studies. The question was answered by 98% of people and its result is presented in Figure 1.



**Figure 1.** Characteristics of the studied population in relation to the type of studies (N=98). Own work.

The research results showed that among the surveyed second-year students the vast majority were master degree students.

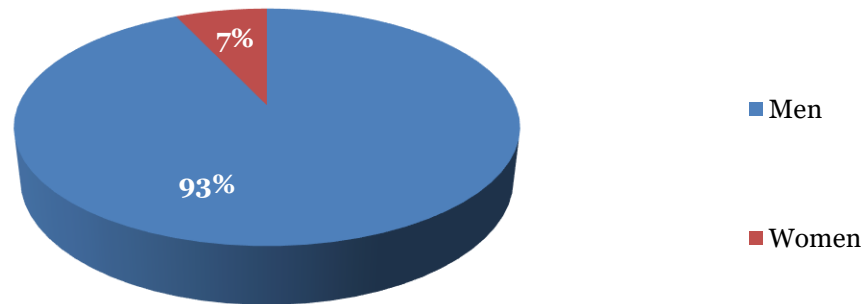
The third of the respondents' characteristics was their current semester of studies. The question was answered by 95%, and its result is shown in Figure 2.



**Figure 2.** Characteristics of the studied population in relation to the type of studies (N=96). Own work.

The survey results showed that among the surveyed second-cycle students, the majority of them were students of the 4th semester, which in the case of master degree studies meant the last semester of studies.

The fourth feature of the respondents was gender. The question was answered by 98% of the respondents and its result is presented in Figure 3.

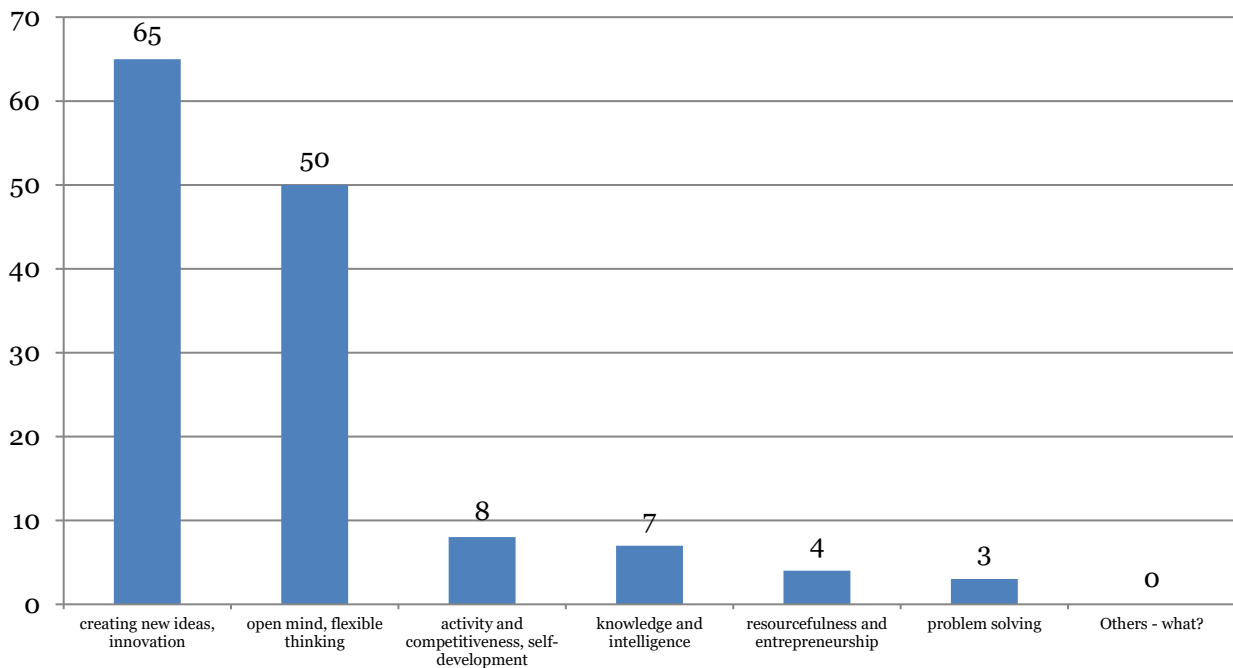


**Figure 3.** The characteristics of the studied population in relation to gender (N=98). Own work.

The research results showed that most of the surveyed second-degree students were men.

#### 4.2 Analysis of responses from the main part of the survey

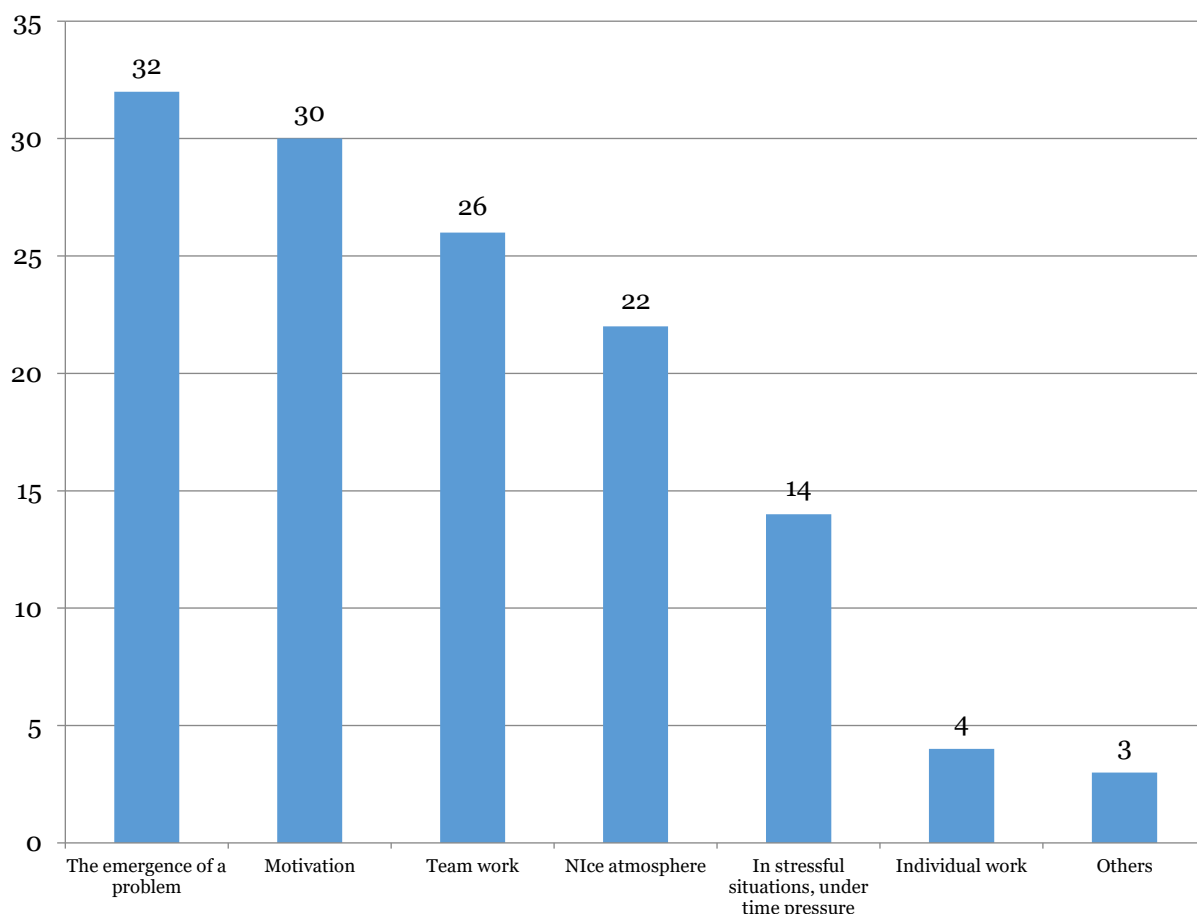
In the first question of the survey, the respondents were asked to indicate the features they associate with creativity. The question did not specify the number of answers allowed and was answered by all of the respondents. The results in quantitative form are presented in Figure 4.



**Figure 4.** Quantitative scale of responses to question 1: 'In your opinion, creativity is:' (N=101). Own work.

The results of the research showed that by far the most frequently indicated features associated with the notion of creativity were the creation of new ideas, innovativeness, open-mindedness and flexible thinking. It constitutes a set of features related to proactive activity resulting in the willingness to implement one's own initiatives.

In the second question of the questionnaire, the respondents were asked to indicate circumstances conducive to innovativeness. This question also did not specify the number of answers allowed. The question, as before, was answered by all the respondents and the results in quantitative form are presented in Figure 5.

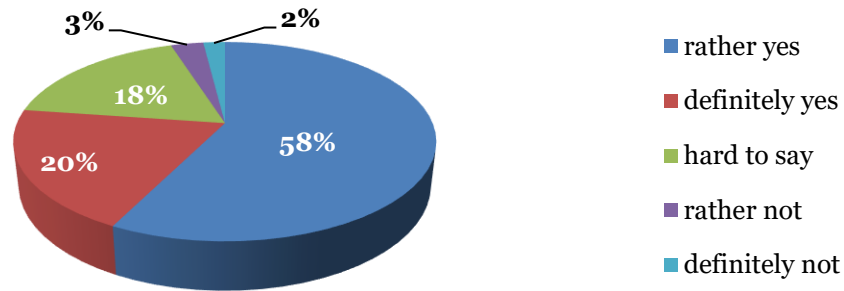


**Figure 5.** Quantitative scale of responses to question 2: 'What circumstances are the most conducive to creativity and innovation?' (N=101). Own work.

The results of the research showed that, in contrast to the previous question on associations with creativity, in the case of circumstances, the four leading response factors proved to be relatively similar in quantitative terms. In the opinion of the respondents, the most important factors favoring creativity and innovation were the emergence of a problem, motivation, team work, and a nice atmosphere. The three answers in the category "others" were related to openness to innovation, appropriate organizational culture, and freedom of expression.

The third question of the survey concerned the respondents' feeling in terms of their own conviction about the effectiveness of action to solve problems. This question was again answered by 100% of people and the percentage results are presented in Figure 6.

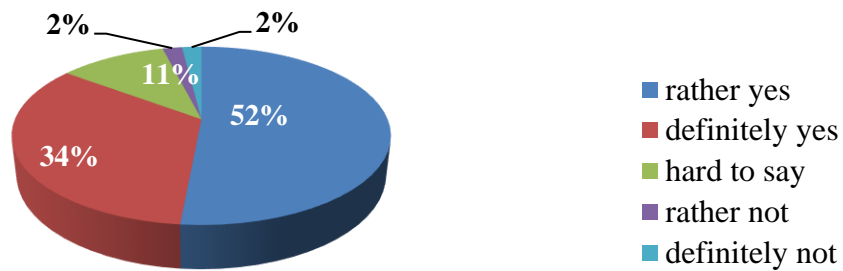




**Figure 6.** Percentage scale of responses to question 3: 'Do you always work with a high degree of certainty that you are on the right track to solve a particular problem?' (N=101). Own work.

The research results indicated that most respondents positively referred to their own feelings of effectiveness in solving problems. Differentiation is particularly visible after the percentage statement of positive (rather yes and definitely yes) and negative (rather not and definitely not) categories of 78% and 5%, respectively.

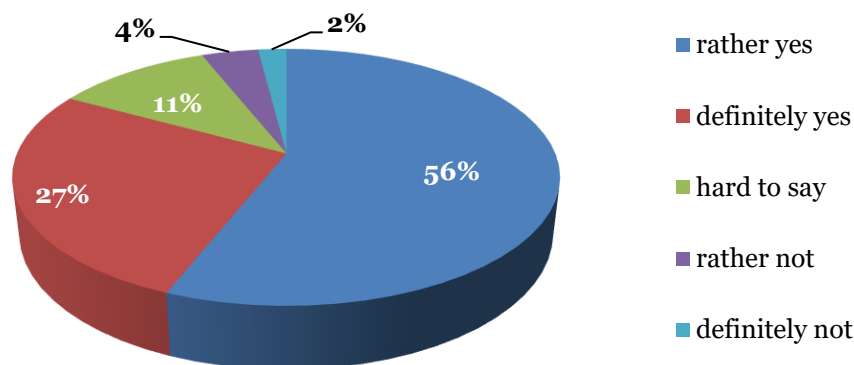
The fourth question of the survey asked the respondents whether a step-by-step approach to problem solving is effective. The question was answered by 99% of the respondents. Figure 7 displays the percentage results.



**Figure 7.** The percentage scale of responses to question 4: 'Do you feel that the logical step-by-step method is best for solving problems?' (N=100). Own work.

The results of the research showed that, as in the case of question 3, most respondents expressed a positive opinion, this time in terms of their belief that using the step-by-step method in action is the best method of solving problems. The difference between the positive and negative categories was even greater, as the percentage was 86% and 5%, respectively.

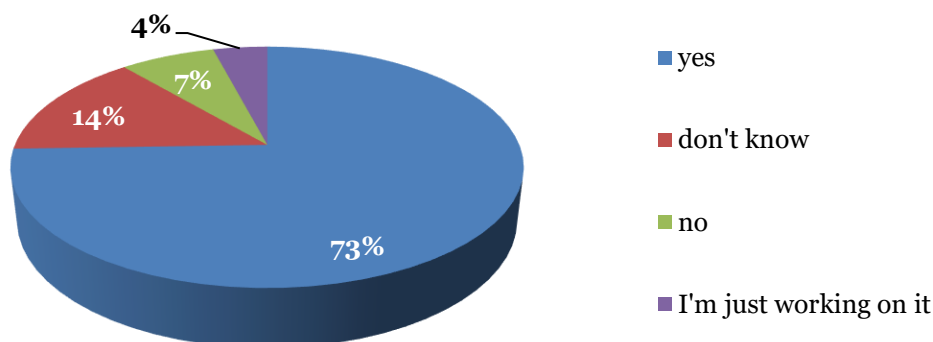
The fifth question of the questionnaire concerned the respondents' assessment of whether team work allows them to change the behavior of other people by expressing their own opinions. This question was answered by 99% of the respondents. The percentage results are presented in Figure 8.



**Figure 8.** The percentage scale of responses to question 5: 'When working in a group, do you occasionally express opinions that change others' way of thinking?'. Own work.

The results of the research showed that, once again, the respondents in the vast majority expressed a positive/negative attitude to the content of the question – 83% and 6%, respectively. This means that in their opinion, team work aimed at solving a given problem requires the exchange of opinions.

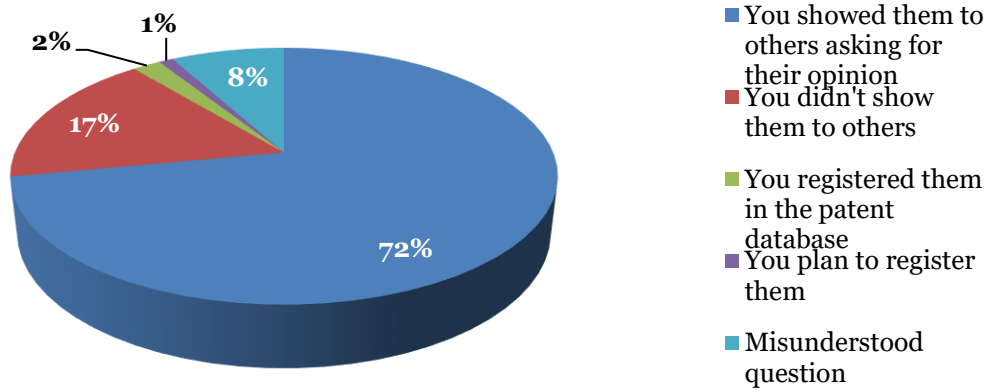
The sixth question of the survey was whether they created a solution to a difficult problem, which they later implemented. This time, all the respondents also answered, and the percentage results are presented in Figure 9.



**Figure 9.** The percentage of responses to question 6: 'Have you ever come up with a solution to a difficult problem that you later implemented?'. Own work.

The results of the research proved that the most of the respondents (73%) came up with a solution to the problem, which they then used in practice. This is a positive sign of their analytical thinking capacity.

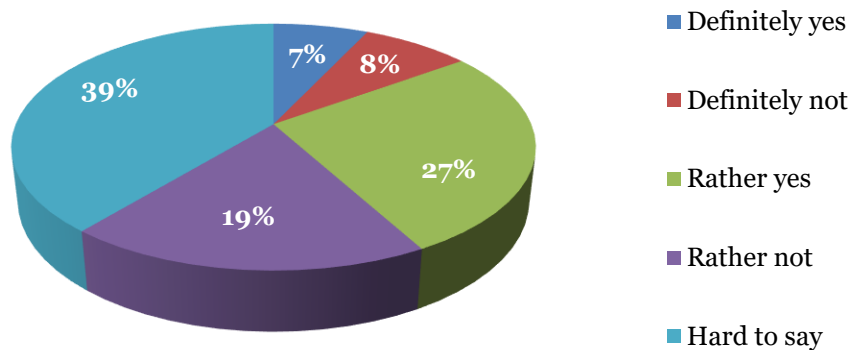
Question 7 was a reference to the previous question. It concerned the respondents who marked the affirmative answer in question 6. This time, they were asked about their willingness, or lack of thereof, to popularize the created problem solutions. As many as 81% of the people surveyed answered the question. However, it should be noted that 8% of them misinterpreted its content, answering it despite the negative answer in question 6. Figure 10 displays the results of the percentage answer.



**Figure 10.** The percentage of responses to question 7: 'Have you ever come up with a solution to a difficult problem that you later implemented?'. Own work.

The results showed that most respondents (72%) presented the results of their analyses to other people for consultation, while 17% did not do so. However, only 2% of the respondents were active in making their research results valid by registering them in the patent database, and 1% declared that they planned to do so.

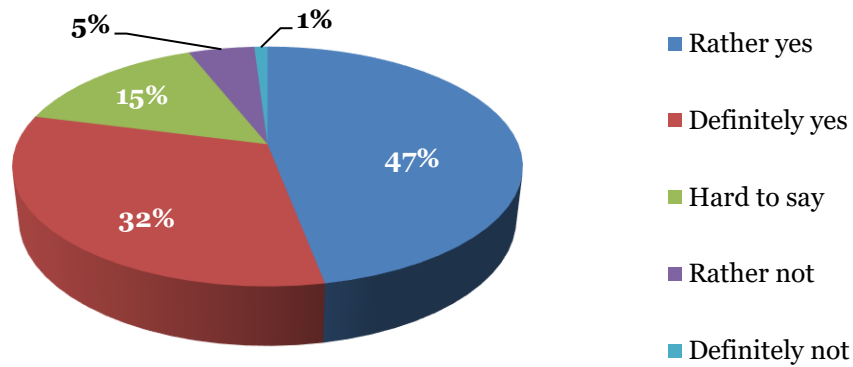
The question 8 asked the respondents whether in their opinion the best ideas arise when they do not deal with anything particularly absorbing at the time. As many as 99% of the surveyed answered the question. The results are presented in a percentage scale in Figure 11.



**Figure 11.** The percentage scale of responses to question 8: 'Do you often think that the best ideas come when you are doing nothing special?' (N=100). Own work.

The results of the survey showed that for the first time in the survey, most of the respondents (39%) did not have a clear opinion on the matter. Small differences (8 p. p.) were noted between relatively not fully determined answers – both positive and negative (by marking the answers "rather yes" and "rather no – 27% and 19%, respectively).

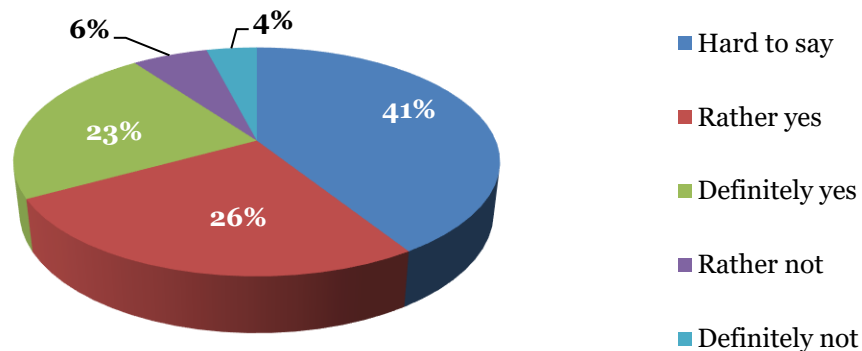
The ninth question concerned the respondents' opinion in terms of confirming or denying that they consider themselves as seeking creative solutions in their daily work. As many as 99% of the people answered the question. The results are presented in a percentage scale in Figure 12.



**Figure 12.** The percentage scale of answers to question 9: 'Are you trying to think out of the box and look for more creative ideas when solving tasks?'. Own work.

The results of the research showed that in total 79% (by summing up the affirmative answers) of them confirmed their creative way of acting. As in the case of the answers to question 6, it, therefore, proves their high degree of analytical thinking and creativity in solving problems.

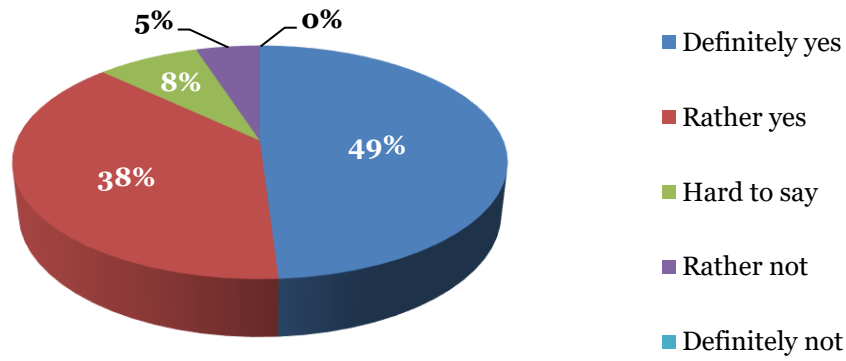
Question 10 addressed whether in the respondents' opinion it is more interesting to create new ideas or to provide information about the idea to others. The question was answered by 95% of the respondents. The results are presented in a percentage scale in Figure 13.



**Figure 13.** The percentage scale of responses to question 10: 'Is it more interesting to come up with new ideas or communicate an idea?'(N=96). Own work.

The research results indicated that similarly to the answers to question 8, the majority of respondents (41%) did not have a clear opinion on the matter at hand. However, a total of 49% of them responded (by summing up the affirmative answers) that in their opinion it is more interesting to come up with an idea than to provide information about it. Therefore, as in the case of answers to question 6, it proves the high potential of the respondents and the level of willingness to document the results of their analyses that needs to be improved.

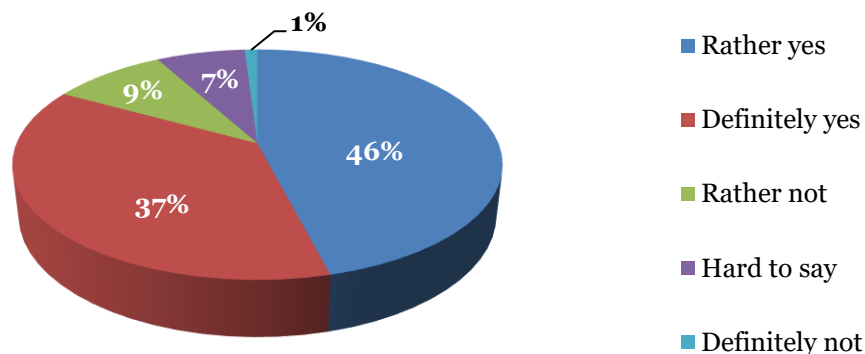
Question 11 addressed whether in the respondents' opinion it is more interesting to create new ideas or to provide information about the idea to others. The question was answered by 99% of the people surveyed. The results in percentage scale are presented in Figure 14.



**Figure 14.** The percentage of responses to question 11: 'Do you like working as a team?' (N=100). Own work.

The results showed that almost half (49%) of the respondents declared a strong willingness to work as a team, and 38% of them answered "rather yes", which gives a total of as much as 87%. Therefore, it shows a very high level of teamwork skills, shaped, among others, during the training process. It should translate into high efficiency of action during future service.

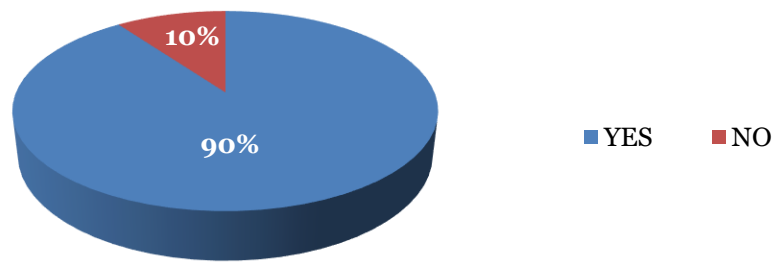
In question 12, the respondents were asked to indicate whether they like to break schemes in action. This question was answered by all respondents and the results are presented in a percentage scale in Figure 15.



**Figure 15.** The percentage scale of responses to question 12: 'Are you a person who likes to break schemes?'. Own work.

The results showed that, as in the case of the answers to the previous question, almost half (46%) of the respondents declared a strong willingness to break schemes, while 37% of them answered "rather yes", which amounted to the total of 83%. Again, similarly as in the case of answers to the questions 3-6, this indicates a high level of respondents' creativity.

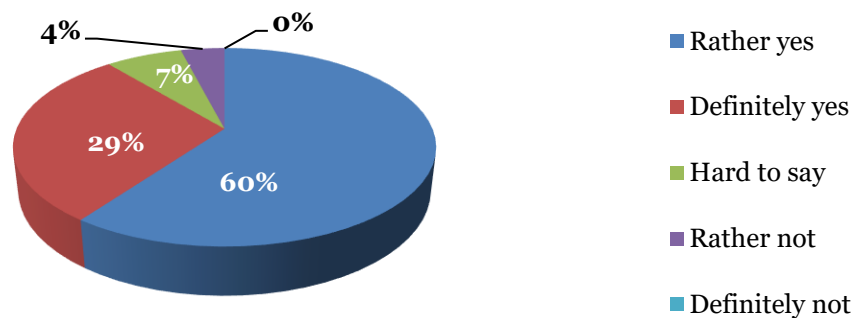
In question 13, the respondents' task was to determine whether they like to learn and develop. This question was answered by all respondents and the results are presented in a percentage scale in Figure 16.



**Figure 16.** The percentage scale of responses to question 13: 'Do you like to learn and develop?'. Own work.

The results showed that almost all of the respondents strive to learn and develop, which once again confirmed their high level of motivation for self-development.

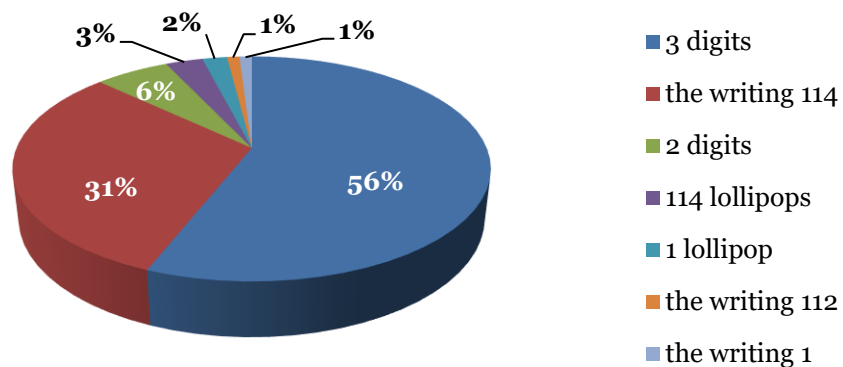
Question 14 asked respondents to indicate whether they acquire at least a few new skills during a year. This question was again answered by all respondents. The results in percentage scale are shown in Figure 17.



**Figure 17.** The percentage of responses to question 14: 'Do you acquire several new skills during the year?' (N=101). Own work.

The results of the survey showed that almost all respondents (89% of the answers "rather yes" and "definitely yes") declared that they acquire at least a few new skills during a year, which again confirmed their high level of innovativeness.

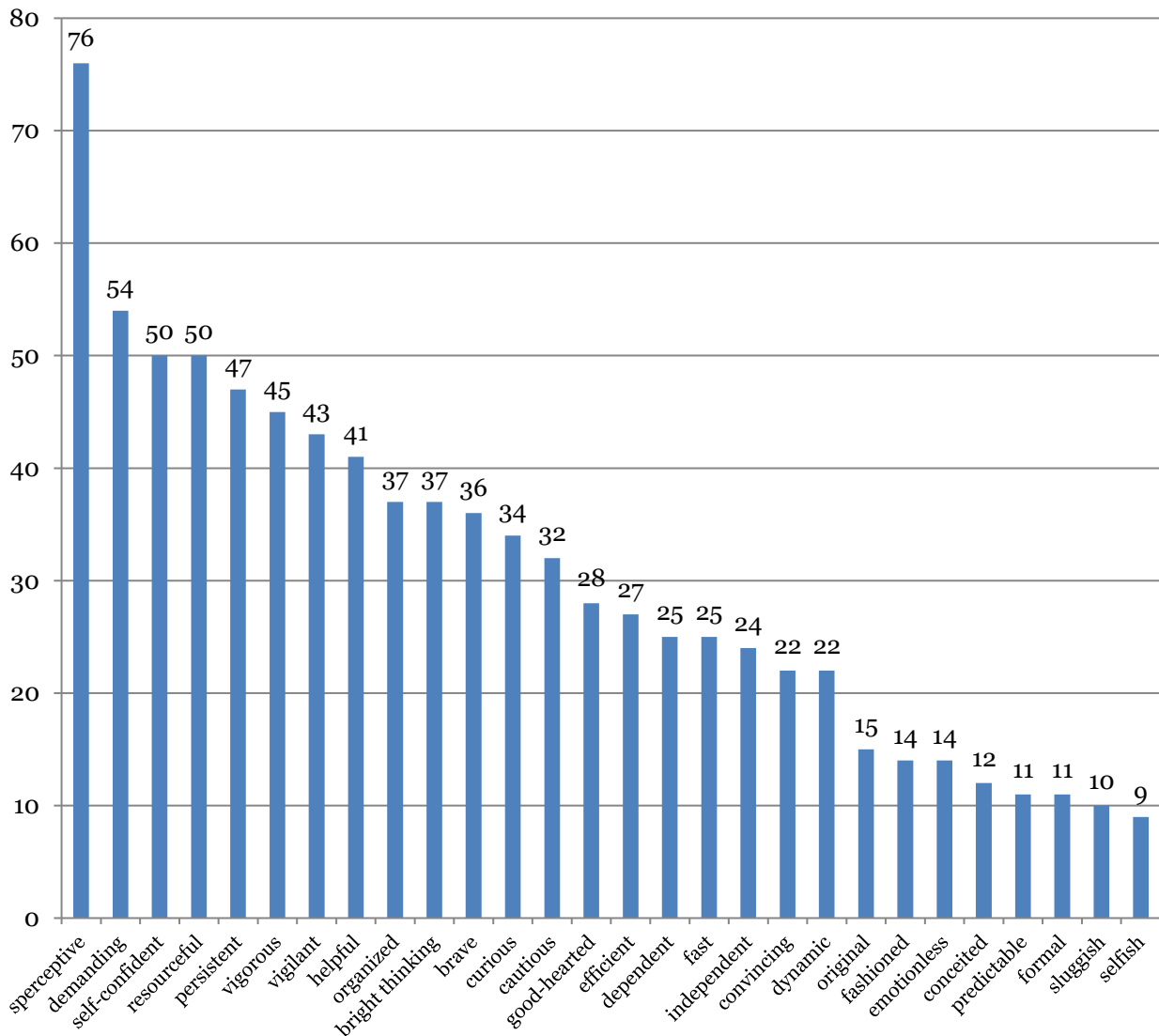
Question 15 of the survey included completing a task. The respondents were to solve a puzzle in order to test their quick-thinking skills. This question was answered by 96% of the respondents and the results are shown in a percentage scale in Figure 18.



**Figure 18.** The percentage of responses to question 15: 'Give a solution to the puzzle:'(N=97). Own work.

The results showed that the majority of respondents (53%) indicated the correct solution to the puzzle, which was the "3-digit" answer. In addition to the previously demonstrated high level of innovativeness and creativity, this fact also positively demonstrates their high level of quick-thinking skills.

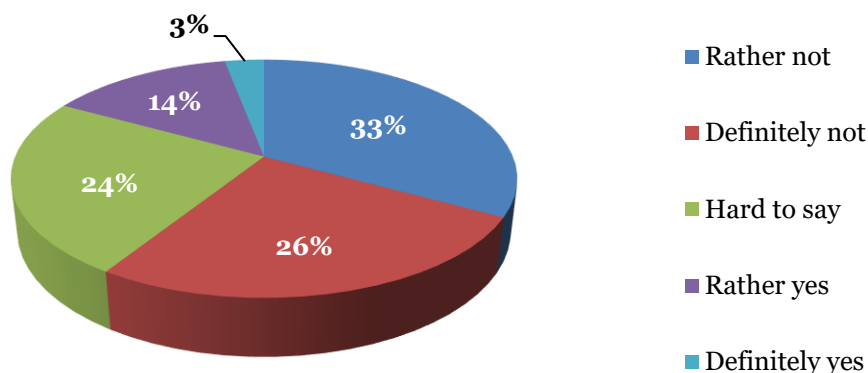
In the sixteenth question, the respondents were asked to choose from among possible answers ten characteristics which in their opinion best reflect their character. This question was answered by 99% of the respondents. The results are presented on a quantitative scale in Figure 19.



**Figure 19.** The quantitative scale of responses to question 16: 'Below there is a list of personality descriptors. Choose 10 that characterize you most' (N=100). Own work.

The respondents indicated a total of 851 traits. The results showed that as much as 88% (741) of them were positive features, which proves a very high level of their own positive perception. Only 10% were clearly negative traits and 2% indifferent. At the same time, it should be noted that the total sum of the indicated characteristics exceeded the allowed number (10 per 1 respondent), which resulted in a bad interpretation of the content of the question by 10% of the respondents who indicated more than 10 traits in their answers. This fact, however, did not negatively affect the reliability of the research results due to the relatively small number of errors.

The seventeenth question asked the respondents to indicate whether during their period of study, the lecturers rewarded ingenuity and innovative thinking. This question was answered by 98% of respondents. The results are presented in a percentage scale in Figure 20.



**Figure 20.** The percentage of answers to question 17: 'Is ingenuity and innovative thinking rewarded and appreciated in your studies?' (N=99). Own work.

The results showed that in this case, for the first time in a survey, the majority of respondents (59% of the total sum of answers "rather not" and "definitely not") indicated negative answers. It should be noted that it was undoubtedly influenced by the nature of their education, which, for professional soldiers, is much more hierarchical and formalized than at universities and civil faculties due to the specificity of service of uniformed services.

## 5. Synthesis of test results and conclusions

The overall assessment of the usefulness of the research carried out should be considered highly positive as most questions were answered by almost 100% of the respondents. The only exception to this rule were open-ended questions, which required an in-depth analysis and thus more time to answer.

In summarizing the nature of answers provided by the respondents, it should be noted that in most cases they were positive.

This was expressed in their recognition of the essence of innovativeness and creativity, their high assessment of their own level, and the increase in their level after completing their education during military studies in relation to the period preceding them.

The respondents (currently officers) almost unequivocally indicated that they like to work as a team, break schemes in action, and constantly strive for self-development, which will certainly positively affect the quality of their service. At the same time, it demonstrates the desired direction of shaping future university officers as regards educational content, since, as the respondents indicated, the evident progress in creativity and innovativeness at the moment of officer promotion is noticeable.

The respondents, as far as areas conducive to their development are concerned, appreciated, first, the possibility of learning foreign languages, management, and the possibility of implementing innovative solutions while creating their diploma theses.

Based on the content analysis of the results of the student innovation research from 2016 entitled *Działania rozwijające kreatywność i innowacyjność studentów*, a high degree of convergence of the respondents' own innovation assessment with military students



(including ADF specialty) of MULF can be observed. This is evidenced by, among others agreement on the willingness to learn, breaking patterns and taking on new challenges.

The research has shown that there is no doubt that the study of the level of students' innovativeness and creativity is necessary in the context of their future existence on the labor market. In the case of military universities, this significance is additionally increased due to increasing the service quality of future officers (including ADF specialty). These officers are to defend the Republic of Poland against external and especially by air threats, as well as (which results from the law of the Republic of Poland), among others, against the effects of natural disasters. Their service is directly related to ensuring the security of their homeland and its citizens.

In summary, the most important conclusions of the research are as follows:

1. The respondents almost unequivocally indicated that they like to work as a team.
2. The progress in creativity at the moment of officer promotion is noticeable.
3. The most important feature of teachers according to respondents are so-called soft competencies.
4. This significance is increased due to increasing the service quality of officers.

## Declaration of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

## References

1. Aleksanyan, A. (2019). Modern Problems of Innovative Education. *Bulletin of the Cherkasy Bohdan Khmelnytsky National University. Series Pedagogical Sciences*, 3(2019), 12–15. <http://doi.org/10.31651/2524-2660-2019-3-14-17>
2. Breivik-Mayer, M., Arntzen-Nordqvist, M., & Alsos, G. A. (2020). The role of incubator support in new firms accumulation of resources and capabilities. *Journal Innovation Organization & Management*, 22(3), 228–249. <http://doi.org/10.1080/14479338.2019.1684204>
3. Burke II Laurence, M. (2020). Methodologies and Models in Military Innovation Studies. *International Journal of Military History and Historiography*, 40(1), 110–134. <https://doi.org/10.1163/24683302-20190002>
4. Cai, Y., & Tang, R. (2021). School support for teacher innovation: Mediating effects of teacher self-efficacy and moderating effects of trust. *Thinking Skills and Creativity*, 41(2). <https://doi.org/10.1016/j.tsc.2021.100854>
5. Dhillon, B. S. (2006). *Creativity for Engineers*. Singapore.
6. Divinagracia, M. R. G., & Divinagracia, L. A. (2012). Students' Attitudinal Constraints towards Workplace Diversity – Managing Innovation in International Business Education. *Procedia – Social and Behavioral Sciences*, 40, 77-85. <https://doi.org/10.1016/j.sbspro.2012.03.164>
7. Drucker, P. (1992). *Innowacja i przedsiębiorczość*. Państwowe Wydawnictwo Ekonomiczne.

8. Griffin, S. (2016). Military Innovation Studies: Multidisciplinary or Lacking Discipline? *Journal of Strategic Studies*, 40(1–2), 196–224. <https://doi.org/10.1080/01402390.2016.1196358>
9. Haun, P. (2020). Peacetime military innovation through inter-service cooperation: The unique case of the U.S. Air Force and Battlefield Air Interdiction. *Journal of Strategic Studies*, 43(5), 710–736. <https://doi.org/10.1080/01402390.2018.1557053>
10. Jamieson, M. V., & Shaw, J. M. (2020). Teaching engineering innovation, design, and leadership through a community of practice. *Education for Chemical Engineers*, 31, 54–61. <https://doi.org/10.1016/j.ece.2020.04.001>
11. Knossala, R., Boratyńska-Sala, B., Jurczyk-Bunkowska, M., & Moczala, A. (2014). *Zarządzanie innowacjami*. Polskie Wydawnictwo Ekonomiczne S.A.
12. Krawczyk, K., & Showalter, D. (2020). Utilizing environmental remediation to teach research skills: An instructional case. *Journal of Accounting Education*, 51. <https://doi.org/10.1016/j.jaccedu.2020.100659>
13. Lee, C., (2019). The role of culture in military innovation studies: Lessons learned from the US Air Force's adoption of the Predator Drone, 1993–1997. *Journal of Strategic Studies*. <https://doi.org/10.1080/01402390.2019.1668272>
14. Santerek, K. (2016). *Działania rozwijające kreatywność i innowacyjność studentów*. Polska Akademia Nauk – Komitet Inżynierii Produkcji.
15. Suslov, D., Lopukha, A., & Markovchin, S. (2020). Problems of modern military education. *CITISE*, 1(23), 47–57. <https://doi.org/10.15350/24097616.2020.1.05>
16. Suslov, D., Yaroslavtseva, N., & Evdokimov, A. (2020). Innovation of military education: challenges and prospects. *CITISE*, 1(23), 135–146. <http://doi.org/10.15350/24097616.2020.1.13>
17. Swanson, E., McCulley, L. V., Osman, D., Lewis, N.S., & Solis, M. (2019). The effect of team-based learning on content knowledge: A meta-analysis. *Active Learning in Higher Education*, 20(1), 39–50. <https://doi.org/10.1177/1469787417731201>
18. Tinmaz, H., Yakin, Y. (2015). Tendencies of Engineering Students on Applying Technological Innovations. *Procedia – Social and Behavioral Sciences*, 176, 621–626. <https://doi.org/10.1016/j.sbspro.2015.01.519>
19. Walder, A. M. (2014). The Preliminary and Subsequent Stages to Integrating Pedagogical Innovation: The Crux of the Matter for the Innovator. *Alberta Journal of Educational Research*, 60(1), 22–42. <https://doi.org/10.11575/ajer.v60i1.55758>