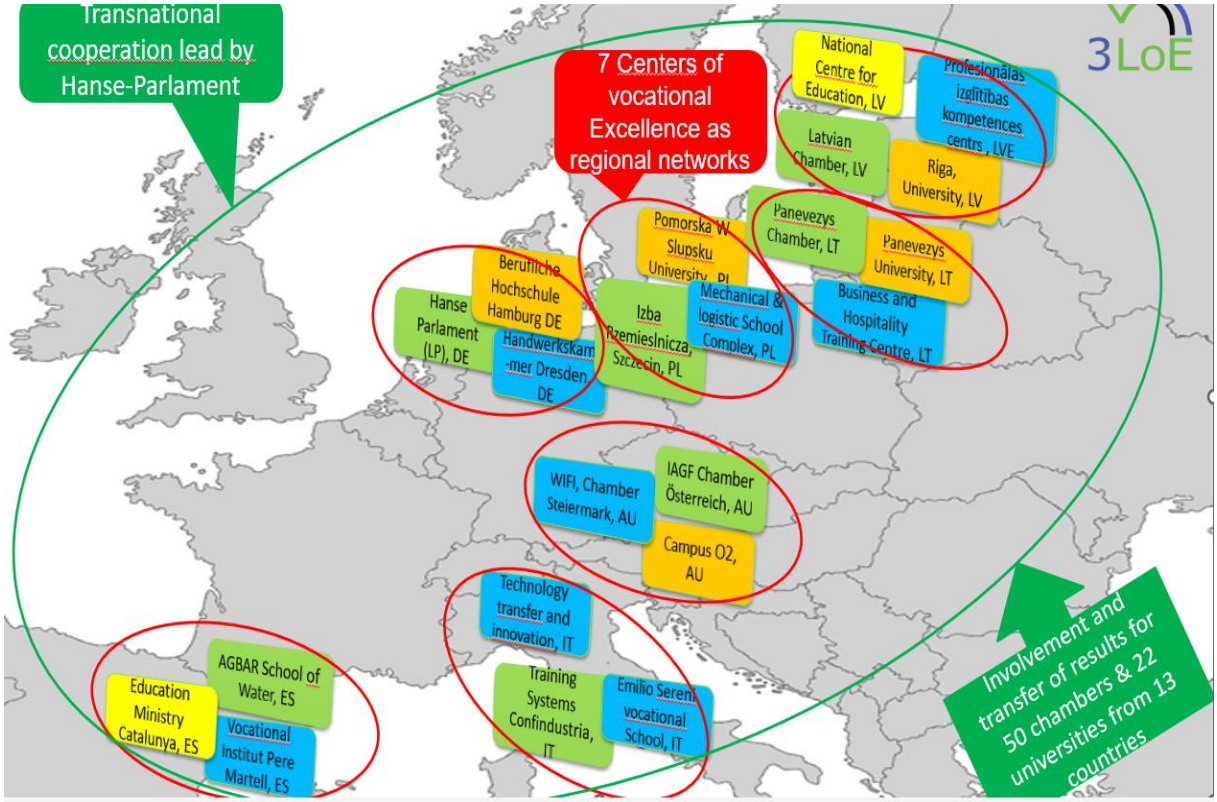
Result 3.6

Five-year Technician training „Ecologic Solutions in Logistics”

Partner



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1 Summary of the Project and Introduction

About the 3LOE project

Around 99% of all EU businesses are SMEs, creating up to 70% of all jobs. In general, SMEs have good growth prospects for the future and are particularly well equipped to solve environmental problems and to enhance the green economy. However, in most of the project countries, SMEs are confronted with a shortage of skilled workers and young entrepreneurs. This shortage of skilled workers is even more alarming taking into account that due to aging of current entrepreneurs, a large and growing number of companies will have to be handed over to the next generation. Furthermore, young specialists and entrepreneurs often lack the qualifications and skills needed in order to respond to contemporary developments in the fields of energy, climate and environmental protection. The following problems have been identified in SMEs working in the fields of green economy, energy and environmental protection:

- Blatant and growing shortage of skilled workers.
- Large qualification deficits, especially in the Green Economy.
- Loss of attractiveness and low qualification of school-based VET.
- Low rates of further training and insufficient orientation of offers to SME needs.
- Ageing of entrepreneurs and increasing shortage of young people (demographic change).
- Failure of business transfers and low rates of business start-ups.
- Low innovation rates and insufficient productivity.
- Not enough cooperation between universities and SMEs and a lack of teaching geared to SME needs.
- Comparably low internationalization of SMEs and vocational training providers.
- Lack of national level support for SMEs”.

To meet these challenges, work-based learning and new paths in vocational training must be provided through cooperation between educational institutions, economic chambers and SMEs. University graduates are often well-qualified in theory, but lack practical knowledge, skills and abilities that are crucial for SMEs. For this reason, VET reforms must also involve higher education, and should implement dual bachelor's degree programs that combine a bachelor's degree with vocational training and on-sight work in companies.

In the 3LOE project, an innovative and complex project structure with 22 project partners from 7 countries as well as 60 associated partners from 13 countries was designed. In each country, centers of vocational excellence (COVEs) in Green Economy will be established, managed and their permanent continuation ensured. A transnational cooperation of the centers will be developed, extended to 60 education stakeholders from 13 countries and operated permanently in an institutionalized form. The centers will offer a wide range of dual education measures in vocational training, further education and higher education, that are being developed, tested and evaluated in the project. These educational measures on EQF levels 3-7 focus on Green Economy, Digitalization and Entrepreneurship. Furthermore, vocational and educational consulting and innovation support for SMEs will be developed and implemented. In total,

seven Train-the-Trainer programs will be developed and implemented permanently by the project partners. All results will be transferred to the 60 associated partners together with implementation advice.

The objectives and aimed outcomes of the 3LOE project can be summarized as following:

1. Foundation of a three-level Center in each project country

1.1 Building the "Green Economy" skills alliance for qualifications in SMEs with educational and economic actors from the 7 project countries; development of information and cooperation tools.

1.2 Expansion of the skills alliance to the 60 associated partners from 13 countries, comprising chambers of commerce, SME associations, as well as universities of applied sciences/colleges.

1.3 Development, testing and evaluation of a curriculum and teaching materials for Train the Trainer courses for personnel and center management (vocational schoolteachers, trainers in SMEs and lecturers in further and higher education institutions).

1.4 Evaluation of the construction and operation of the seven centers of Excellence and of the transnational cooperation.

1.5 Development of business and financing plans and ensuring the long-term continuation of the seven centres and transnational cooperation.

1.6 Development, consulting and introduction of political strategy program.

2. Implementation and realization vocational training

2.1 Development and implementation of a tool for vocational and qualification counselling as well as a training for consultants and teachers to use the tool.

2.2 Implementation of the dual system, so that work-based learning is put into practice in the project countries.

Preparation and transfer of curricula and examination regulations for dual vocational training for different professions and implementations in Poland, Lithuania, Latvia and Spain.

Development, test and implementation Trainings for teachers to conduct dual vocational training as well as Training of trainers in SMEs.

2.3 Development political concept for the training and integration of young people with learning difficulties for young people with learning difficulties (EQF level 3).

Development, test and implementation of a dual vocational training "Specialist for Building Insulation".

2.4 Development, testing and evaluation of education programme, teaching materials and examination regulations for the provision of sector-specific qualifications already during the initial vocational training for stronger learners. Implementation in the dual system, so that work-based learning is put into practice in the project countries.

2.5 Development and implementation five-year technician training „Ecologic Solutions in Logistics".

3. Implementation and realization of further vocational training

3.1 Development and implementation of concepts and instruments for the management of continuing vocational training.

3.2 Development, test and implementation of a Train-the-Trainer program for teachers to conduct further training.

3.3 Development and implementation of a concept "SME-fair digitalization" as well as development, test and implementation of two train the trainer programs "Basic and advanced digital skills".

3.4 Transfer and implementation of four further trainings Energy Saving and Renewable Energies.

3.5 Preparation, transfer and implementation of six further trainings in the Green Economy.

3.6 Development, testing and evaluation of different training programs and teaching material for owners, managers and qualified workers of SMEs (EQF level 5 and 6). The trainings are specifically tailored to SME needs and different qualification levels and combine the transfer of technical, professional and management know-how.

- Training Enterprise and Entrepreneurship in Green Economy

- Training Energy Service Manager

- Trainings vocational Master Carpenter and Electric

- Training Construction Technician

- Training Service Technician

- Training Sustainability in foodservice industry

3.7 Development of regulations for new continuing education occupational profiles with a focus on the green economy.

3.8 Development of an integration program for the unemployed (EQF level 4) in order to be able to place the unemployed in permanent jobs through further training seminars and a further training qualification.

4. Implementation and realization of higher education

4.1 Preparation and transfer of curricula, evaluation and examination regulations for two existing dual Bachelor degree programs "Management of Renewable Building Energy Technology" and "Business Administration for SMEs".

4.2 Development and beginning of implementation of new dual Bachelor degree programs

- Business Administration & Sustainable Management of SMEs

- Entrepreneurship and Innovation in Green Economy

- Logistics - Green Supply Chains

- Service technician

- Tutorial “Sustainable management Climate neutrality for companies”

4.3 Development, test and implementation of four study modules (EQF level 6) on SME management in the Green Economy sector, which will be carried out in the dual study system and integrated into existing Bachelor degree programmes.

4.4 Development and implementation of concept for innovation promotion Solutions for manageable R&D tasks of SMEs and conducting manageable R&D projects for SMEs-

4.5 Development, testing and implementation of Training program for university lecturers and SME advisors.

5. Dissemination, transfer and use of the project results

5.1 Development of a concept and summary evaluation of the dissemination results of all partners

5.2Transfer of all educational measures to 60 educational institutions in 13 countries and needs-oriented implementation consultations as well as realization of a bundle of measures for further dissemination of the project results.

5.3 Further dissemination activities such as presentations online, at third-party events, press releases and conferences.

5.4 Book with all results of the project and distribution via book trade.

For each of the three levels of educational measures there will be:

- Target-group-specific educational programs.
- Curricula, teaching materials, etc. developed in a leading role by the educational institutions of the respective level, whereby the educational institutions of the other levels (in particular universities) participate in an advisory and supportive manner.
- Representatives of the participant target groups involved in the development work.

All educational measures will be tested with the respective target groups under different national conditions in the countries, evaluated and completed on the basis of the evaluation results with application notes.

About Five-year Technician training „Ecologic Solutions in Logistics”

The 3LoE project aims to promote work-based learning through the introduction of dual vocational training at different educational levels (EQF 3-6), especially in countries that have used school-based vocational training until this point in time. In the case of dual vocational education up to 75% of the entire training period is spent in companies.

Zespół Szkół Mechanicznych i Logistycznych w Słupsku (Poland) implements a five-year dual technician training “Ecologic Solutions in Logistics”, realising a fundamental element of further vocational training (second stage). It is assumed that after the completion of the training, trainees will take up further education, enrolling in, for example, dual Bachelor studies “Logistics – Green Supply Chains” at Pomeranian University in Słupsk.

In Poland, a five-year "Ecologic Solutions in Logistics" technician training program was developed, evaluated and implemented in line with national conditions and specific needs. Following the development of the curriculum, teaching materials and examination regulations, implementation began in autumn 2021 with 31 students. The first three years of the five-year training programme were completed during the project period; the two further years of training will be carried out after the end of the project. The training has been so successful and is held in such high regard by companies and young people that the realisation of further training courses has begun in 2022 and 2023.

2 Curriculum[1]

2.1 Introduction

The introduction of a specialisation in ecological studies as part of the 3LOE project at the Mechanical and Logistics School Complex in Słupsk is a key initiative, both for the future of education and environmental protection. In the face of increasing environmental challenges and changing legal standards, sustainable logistics practices are becoming increasingly important. Ecologistics, as a new course of study, prepares students to effectively manage logistics processes in a way that minimizes negative environmental impacts. Through this specialization, students gain unique skills that make them stand out in the job market and also contribute to global efforts to protect our planet.

The aim of introducing ecologistics is first and foremost to promote sustainability through education and practice. Through this specialization, future logisticians will be able to implement innovative solutions that reduce CO2 emissions, optimise resource consumption and reduce waste. Education in environmentalism also increases environmental awareness among young people, which translates into more responsible and informed decisions in the future. As a result, graduates will not only be excellently prepared to work in dynamic market sectors but will also be key players in environmental and sustainability efforts.

The implementation of the 3LOE project and the introduction of an environmental science specialisation is therefore a step towards a modern, responsible education that responds to the needs of the modern world. It is an investment in the future that brings both economic and social benefits, contributing to building a more sustainable and greener economy.

Ecologistics, also known as green logistics, is an approach to logistics management that focuses on minimising the environmental impact of logistics activities. The main areas of focus of green logistics are:

- Transport optimisation: Reducing greenhouse gas emissions by using more efficient modes of transport, planning routes, and promoting intermodal transport.
- Waste management: Effective waste management, including waste reduction, recycling and proper storage.
- Sustainable packaging: Using packaging that is environmentally friendly, recyclable or biodegradable, and minimizing packaging.
- Renewable energy: Using energy from renewable sources in logistics processes, such as warehouses and distribution centers.
- Energy efficiency: Implementing technologies and practices that increase energy efficiency in logistics operations.

[1] Prepared by Zespół Szkół Mechanicznych i Logistycznych w Słupsku

The specialisation in environmentalism prepares students to identify and implement green solutions in logistics, which is not only beneficial for the environment, but also brings tangible economic and social benefits. As a result, graduates will be able to meet the challenges of today's world by combining logistical efficiency with environmental responsibility.

2.2 Benefits for students

1. Increased competitiveness in the labour market: Students specialising in environmental science gain unique skills and knowledge that are increasingly sought after by employers, especially in logistics and environmental sectors.

2. New career opportunities: This specialisation opens the door to a variety of career paths, such as green logistics, waste management, recycling, and the design and implementation of sustainable logistics systems.

3. Economic savings: Students learn how to implement green solutions that can lead to significant savings for companies, for example by optimising transport routes or reducing energy consumption.

4. Environmental awareness: Environmental education increases students' awareness of environmental problems and how to solve them, which promotes more responsible decisions and lifestyles.

5. Practical skills development: The environmental science curriculum often includes practical projects and collaborations with companies, allowing students to gain valuable experience and be better prepared for professional realities.

6. Social responsibility: Specialising in environmentalism shapes future leaders who are aware of their responsibility towards society and the environment, which can lead to positive change on a larger scale.

7. Up-to-date and future-oriented education: The curriculum is in line with the latest trends and market requirements, ensuring that graduates are well prepared for the challenges of the future and can contribute to shaping a more sustainable world.

8. Creativity and innovation: Environmentalism requires a creative approach to problems and innovative solutions. Students are encouraged to think outside the box and develop new, more effective ways of managing logistics in an environmentally sustainable way.

9. Better understanding of global challenges: Students learn about global environmental challenges such as climate change, pollution and resource depletion. As a result, they are better prepared to take actions that can contribute to solving these problems.

10. Development of analytical skills: Specialising in environmental science often involves analysing data on emissions, resource consumption and energy efficiency. Students develop analytical skills that are valuable in many professional fields.

11. Networking: Students have the opportunity to network with industry professionals, which can be helpful for future careers. Networking with experts and attending industry events allows students to build valuable professional relationships.

2.3 Curriculum Ecological Logistics

1. Cross-Sectional Functions of Contemporary Logistics

- **Description**: This topic covers the various functions of modern logistics, including supply chain management, inventory control, transportation, and warehousing. It highlights how these functions are interconnected and their role in the efficiency of logistics operations.
- **Key Areas**: Supply chain management, inventory management, transportation logistics, warehousing operations, integration of logistics functions.
- **Objectives**: To understand the comprehensive functions of modern logistics and their impact on overall operational efficiency. Students will gain insight into how different logistical processes interact and contribute to successful logistics management.

2. The Essence of Ecological Orientation in Logistics - Definition of Ecological Logistics

- **Description**: This topic introduces the concept of ecological logistics, defining it and explaining its importance. It focuses on how ecological considerations are integrated into logistics practices to promote sustainability.
- **Key Areas**: Definition of ecological logistics, principles of sustainable logistics, integration of environmental considerations.
- **Objectives**: To provide a clear understanding of what ecological logistics is, including its principles and how it is applied in practice to enhance sustainability in logistics.

3. The Significance of Ecological Logistics in the Economy and in the Activities of Logistics Firms

- **Description**: This topic explores the role and importance of ecological logistics within the broader economy and its impact on logistics companies. It examines how adopting ecological practices benefits firms and the economy as a whole.
- **Key Areas**: Economic benefits of ecological logistics, impact on logistics firms, contribution to economic sustainability.
- **Objectives**: To understand the economic significance of ecological logistics and its advantages for logistics firms and the overall economy. Students will learn how ecological practices can lead to business and economic benefits.

4. Ecological Logistics as a Response of Enterprises to Environmental Crisis

- **Description**: This topic examines how ecological logistics serves as a strategic response for companies facing environmental crises. It discusses the proactive measures and strategies that companies implement to mitigate their environmental impact.
- **Key Areas**: Environmental crises, strategic responses, sustainable practices, crisis management.
- **Objectives**: To understand how ecological logistics can be utilized as a response to environmental challenges and the strategies companies use to address these crises effectively.

5. Selected Indicators of Ecological Logistics

- **Description**: This topic focuses on various metrics and indicators used to measure the effectiveness and performance of ecological logistics practices. It includes discussions on key performance indicators (KPIs) relevant to ecological logistics.
- **Key Areas**: Performance indicators, sustainability metrics, ecological impact assessments.
- **Objectives**: To learn about different indicators used to evaluate the effectiveness of ecological logistics and how to apply these metrics in practice.

6. Stages of Development of Ecological Logistics in an Enterprise

- **Description**: This topic outlines the stages involved in the development and implementation of ecological logistics within a company. It covers the process from initial assessment to full integration of ecological practices.
- **Key Areas**: Development stages, implementation strategies, integration of ecological practices.
- **Objectives**: To understand the phases of developing and integrating ecological logistics within an enterprise and to gain skills in managing this process.

7. The Essence of Physical Goods Circulation in the Economy

- **Description**: This topic addresses the role of physical goods circulation in the economy, including the flow of goods through supply chains and its impact on economic efficiency.
- **Key Areas**: Goods circulation, supply chain dynamics, economic impact of goods flow.
- **Objectives**: To comprehend the importance of physical goods circulation in the economy and how it affects overall economic efficiency and logistics operations.

8. The Scale of the Waste Problem in Poland

- **Description**: This topic examines the magnitude of the waste issue in Poland, including statistics and trends related to waste generation, management, and disposal.
- **Key Areas**: Waste statistics, waste management practices, trends in waste generation.
- **Objectives**: To understand the scale of the waste problem in Poland and the challenges associated with managing and mitigating waste.

9. Characteristics and Classification of Waste

- **Description**: This topic covers the various types of waste, their characteristics, and classification methods. It provides an overview of different waste categories and their implications for waste management.
- **Key Areas**: Waste types, classification methods, characteristics of different waste streams.
- **Objectives**: To gain knowledge about different types of waste, how they are classified, and the implications for effective waste management.

10. Technologies and Operational Techniques for Waste Collection, Transport, and Storage

- **Description**: This topic discusses the technologies and methods used in the collection, transportation, and storage of waste. It covers various operational techniques and technological advancements in waste management.
- **Key Areas**: Waste collection technologies, transport methods, storage techniques, technological advancements.
- **Objectives**: To understand the technologies and techniques involved in waste management and how they contribute to efficient and effective waste handling.

11. Basic Operational Techniques for Internal Management of Waste Storage Facilities

- **Description**: This topic explores the fundamental operational techniques used for managing waste storage facilities. It covers aspects such as waste segregation, inventory management, and safety protocols.
- **Key Areas**: Waste segregation, storage facility management, safety measures, operational procedures.
- **Objectives**: To understand and apply basic techniques for effectively managing waste storage facilities, ensuring both operational efficiency and compliance with safety standards.

12. Technologies and Operational Techniques for Preliminary Waste Processing

- **Description**: This topic focuses on the technologies and methods used in the initial stages of waste processing. It includes discussions on sorting, shredding, and other pre-treatment processes that prepare waste for further recycling or disposal.
- **Key Areas**: Sorting technologies, shredding techniques, preliminary processing methods, waste pre-treatment.
- **Objectives**: To gain knowledge of the technologies and techniques involved in preliminary waste processing and their role in improving recycling efficiency.

13. Managing Waste Through Optimization of Recirculation Processes

- **Description**: This topic examines how optimizing recirculation processes can enhance waste management practices. It focuses on strategies for improving waste recirculation and reducing waste generation.
- **Key Areas**: Recirculation strategies, process optimization, waste reduction techniques.
- **Objectives**: To learn how to optimize waste recirculation processes and apply strategies to improve overall waste management effectiveness.

14. Logistically Integrated Waste Management - Structural Model of a Recycling Enterprise

- **Description**: This topic covers the structural model of a recycling enterprise, focusing on how logistics can be integrated into waste management processes. It includes designing efficient recycling systems and logistical coordination.
- **Key Areas**: Recycling enterprise structure, logistics integration, recycling processes, system design.
- **Objectives**: To understand how to design and implement a structurally integrated recycling enterprise, incorporating logistics into the waste management process.

15. Ecological Balance in Logistics Systems

- **Description**: This topic explores how to achieve and maintain an ecological balance within logistics systems. It includes the assessment of environmental impacts and the implementation of sustainable practices.
- **Key Areas**: Environmental impact assessment, sustainable logistics practices, ecological balance maintenance.
- **Objectives**: To learn how to assess and maintain ecological balance in logistics systems and implement practices that contribute to environmental sustainability.

16. Designing Products Oriented Towards Recycling

- **Description**: This topic focuses on the principles of designing products with recycling in mind. It includes techniques for creating products that are easier to recycle and have a lower environmental impact.
- **Key Areas**: Eco-design principles, recyclable materials, product lifecycle analysis, recycling-friendly design.
- **Objectives**: To understand how to design products that facilitate recycling and reduce environmental impact, incorporating eco-design principles.

17. Environmental Management Systems (EMS) - Overview of Global Standards and Norms

- **Description**: This topic provides an overview of global environmental management standards and norms. It covers the principles and requirements of various EMS standards and their application in different contexts.
- **Key Areas**: EMS standards, global norms, implementation principles, regulatory requirements.
- **Objectives**: To familiarize students with global EMS standards and norms, and understand their role in environmental management.

18. Global Standards and Norms for Environmental Management

- **Description**: This topic delves into specific global standards and norms related to environmental management. It includes detailed discussions on the most widely adopted standards and their implications.
- **Key Areas**: ISO 14001, EMAS, environmental performance standards, certification processes.
- **Objectives**: To provide detailed knowledge of global environmental management standards and norms, including their requirements and impact.

19. Environmental Management Systems (EMS) - Implications for Logistics

- **Description**: This topic examines how implementing Environmental Management Systems (EMS) affects logistics operations. It includes discussions on integrating EMS practices into logistics and their impact on operational efficiency.
- **Key Areas**: Integration of EMS in logistics, impact on logistics operations, benefits and challenges.
- **Objectives**: To understand the implications of EMS for logistics, including how to integrate environmental management practices into logistics operations and the associated benefits.

20. Problems of Ecological Logistics in Municipal Solid Waste Management

- **Description**: This topic addresses the specific challenges associated with managing municipal solid waste from an ecological logistics perspective. It covers

issues such as waste collection, processing, and disposal in urban environments.

- **Key Areas**: Municipal solid waste management, ecological challenges, waste collection and processing, urban waste issues.
- **Objectives**: To identify and understand the ecological challenges in municipal solid waste management and explore strategies for effective waste management in urban settings.

21. Issues in Ecological Logistics for End-of-Life and Damaged Vehicles

- **Description**: This topic addresses the challenges associated with managing the ecological aspects of end-of-life and damaged vehicles. It includes issues related to dismantling, recycling, and disposal of automotive parts and materials.
- **Key Areas**: Vehicle dismantling, recycling of automotive parts, environmental impact, disposal methods.
- **Objectives**: To understand the ecological challenges in managing end-of-life and damaged vehicles and to explore effective methods for dismantling, recycling, and disposing of automotive components.

22. Issues in Ecological Logistics for Used Electronic Devices and Household Items

- **Description**: This topic focuses on the ecological logistics challenges related to used electronic devices and household items. It covers the processes of collection, recycling, and disposal of these items, as well as the environmental impact.
- **Key Areas**: E-waste management, recycling of electronic devices, disposal of household items, environmental impact.
- **Objectives**: To gain insights into the specific challenges and best practices for managing used electronic devices and household items from an ecological logistics perspective.

23. Reverse Logistics and Its Role in Supply Chain Management

- **Description**: This topic explores the concept of reverse logistics and its importance in supply chain management. It includes processes related to the return, recycling, and reuse of products.
- **Key Areas**: Reverse logistics processes, supply chain integration, product returns, recycling and reuse.
- **Objectives**: To understand the role of reverse logistics in supply chain management and how it contributes to sustainability and efficiency in logistics.

24. Competitive Advantages of Implementing Reverse Logistics

- **Description**: This topic examines how reverse logistics can provide competitive advantages to companies. It includes discussions on cost savings, customer satisfaction, and environmental benefits.
- **Key Areas**: Competitive advantages, cost benefits, customer satisfaction, environmental impact.
- **Objectives**: To identify the competitive advantages of reverse logistics and how its implementation can lead to cost savings, enhanced customer satisfaction, and improved environmental performance.

25. Best Practices in Implementing Reverse Logistics

- **Description**: This topic covers the best practices for implementing reverse logistics effectively. It includes strategies for optimizing processes, managing returns, and integrating reverse logistics into overall supply chain operations.
- **Key Areas**: Optimization strategies, return management, integration with supply chain, process improvement.
- **Objectives**: To learn about the best practices for implementing reverse logistics and how to apply these practices to improve efficiency and sustainability in logistics operations.

26. Product Life Cycle (Eco-Design)

- **Description**: This topic explores the concept of product life cycle management with a focus on eco-design. It covers how products are designed with their entire lifecycle in mind, including disposal and recycling.
- **Key Areas**: Eco-design principles, product lifecycle analysis, sustainable product development.
- **Objectives**: To understand how eco-design principles can be applied to product development to enhance sustainability throughout the product life cycle.

27. Reverse Logistics in the Disposal of Hazardous Waste

- **Description**: This topic examines the role of reverse logistics in managing and disposing of hazardous waste. It includes strategies for safely handling and recycling hazardous materials.
- **Key Areas**: Hazardous waste management, reverse logistics processes, safety measures, recycling techniques.
- **Objectives**: To understand how reverse logistics can be applied to the disposal of hazardous waste, focusing on safety and effective recycling methods.

28. Stakeholder Management in Ecological Logistics Systems

- **Description**: This topic addresses the management of stakeholders involved in ecological logistics systems. It covers strategies for engaging with various stakeholders and addressing their concerns and expectations.
- **Key Areas**: Stakeholder identification, engagement strategies, communication, conflict resolution.
- **Objectives**: To learn effective strategies for managing stakeholders in ecological logistics systems and to address their needs and concerns.

29. Business Models for Sustainable Development in Logistics Services

- **Description**: This topic explores different business models that promote sustainable development in logistics services. It includes discussions on how companies can integrate sustainability into their business strategies.
- **Key Areas**: Sustainable business models, integration of sustainability, strategic development.
- **Objectives**: To understand various business models that support sustainable development in logistics services and how to incorporate these models into business strategies.

30. Sustainable Development: Areas and Instruments for Improving Quality of Life

- **Description**: This topic covers the concept of sustainable development and its impact on improving the quality of life. It includes discussions on different areas of sustainability and instruments for achieving sustainable development goals.
- **Key Areas**: Sustainable development principles, quality of life improvements, sustainability instruments.
- **Objectives**: To gain knowledge about sustainable development principles and how they contribute to enhancing the quality of life through various instruments and practices.

31. Eco-Innovations in Logistics and Transport

- **Description**: This topic explores innovations in logistics and transport that promote environmental sustainability. It includes new technologies and practices that reduce environmental impact and enhance efficiency.
- **Key Areas**: Green technologies, sustainable practices, innovation trends, impact on logistics and transport.
- **Objectives**: To understand the role of eco-innovations in logistics and transport, and how these innovations contribute to reducing environmental impact and improving operational efficiency.

32. Ecology in Urban Logistics

- **Description**: This topic focuses on the integration of ecological principles into urban logistics. It addresses challenges and strategies for managing logistics in urban environments with an emphasis on sustainability.
- **Key Areas**: Urban logistics challenges, sustainable urban transport, ecological impact, urban planning.
- **Objectives**: To learn about the ecological considerations and strategies for managing logistics within urban areas to promote sustainability and reduce environmental impact.

33. Cities - Innovative and Green

- **Description**: This topic examines the concept of "green cities" and innovations that contribute to making cities more sustainable. It includes case studies of cities that are leading the way in environmental initiatives and green practices.
- **Key Areas**: Green urban development, innovative environmental practices, case studies of sustainable cities.
- **Objectives**: To explore how cities can become more innovative and green through sustainable practices and technological advancements.

34. Green Supply Chains

- **Description**: This topic covers the concept of green supply chains, which focus on reducing environmental impact throughout the supply chain. It includes strategies for integrating sustainability into supply chain management.
- **Key Areas**: Green supply chain principles, sustainability practices, supply chain integration.
- **Objectives**: To understand how to develop and implement green supply chains, and the benefits of incorporating sustainability into supply chain management.

35. Differences Between Traditional and Green Supply Chains

- **Description**: This topic compares traditional supply chains with green supply chains, highlighting the differences in practices, processes, and impacts. It focuses on how green supply chains address environmental concerns.
- **Key Areas**: Comparison of supply chain models, environmental impacts, green practices vs. traditional practices.
- **Objectives**: To identify and understand the key differences between traditional and green supply chains, and how green practices contribute to sustainability.

36. Causes and Elements of Green Supply Chain Development

- **Description**: This topic explores the reasons behind the development of green supply chains and the elements that constitute them. It includes discussions on drivers of green supply chain practices and their components.

- **Key Areas**: Drivers of green supply chains, key elements, implementation strategies.
- **Objectives**: To understand the factors driving the development of green supply chains and the essential components involved in creating and managing them.

37. Effects of Transportation Infrastructure Development on Sustainability

- **Description**: This topic examines the impact of transportation infrastructure development on sustainability. It includes analysis of how infrastructure changes can support or hinder sustainable development goals.
- **Key Areas**: Infrastructure development, sustainability impacts, balancing growth with environmental considerations.
- **Objectives**: To analyze how the development of transportation infrastructure affects sustainability and explore ways to align infrastructure growth with sustainable practices.

38. Impact of Transportation Infrastructure Development on the Environment

- **Description**: This topic focuses on the environmental effects of developing transportation infrastructure. It includes discussions on pollution, habitat disruption, and other environmental impacts associated with infrastructure projects.
- **Key Areas**: Environmental impact assessment, pollution, habitat disruption, mitigation strategies.
- **Objectives**: To understand the environmental consequences of transportation infrastructure development and identify strategies for minimizing negative impacts.

39. Trends and Challenges in Sustainable Transport Development

- **Description**: This topic explores current trends and challenges in the field of sustainable transport. It includes emerging technologies, policy developments, and practical issues faced in achieving sustainable transport solutions.
- **Key Areas**: Sustainable transport trends, technological advancements, policy challenges, practical solutions.
- **Objectives**: To stay informed about the latest trends and challenges in sustainable transport and to explore solutions for addressing these challenges.

40. Sources of Renewable Energy and Their Utilization

- **Description**: This topic covers various sources of renewable energy and the methods for utilizing them. It includes discussions on solar, wind, hydro, geothermal, and biomass energy sources.
- **Key Areas**: Renewable energy sources, utilization methods, energy efficiency, environmental benefits.

- **Objectives**: To understand different types of renewable energy sources, their applications, and the benefits of using renewable energy to support sustainable practices.

41. Solar Energy

- **Description**: This topic covers the principles and applications of solar energy. It includes the technology behind solar panels, their integration into energy systems, and their environmental benefits.
- **Key Areas**: Solar panel technology, photovoltaic systems, solar thermal energy, benefits and limitations.
- **Objectives**: To understand the technology and applications of solar energy, and assess its role in sustainable energy systems and its environmental impact.

42. Wind Energy

- **Description**: This topic explores wind energy as a renewable resource. It includes discussions on wind turbine technology, wind farm design, and the impact of wind energy on the environment.
- **Key Areas**: Wind turbine technology, wind farm design, energy generation, environmental impact.
- **Objectives**: To gain knowledge of how wind energy is harnessed and its applications, including the benefits and challenges of wind energy systems.

43. Hydropower

- **Description**: This topic focuses on hydropower as a renewable energy source. It covers the principles of hydroelectric power generation, types of hydropower plants, and their environmental effects.
- **Key Areas**: Hydroelectric power generation, types of hydropower plants, impact on ecosystems.
- **Objectives**: To understand the mechanisms of hydropower generation, evaluate the types of hydropower systems, and assess their environmental implications.

44. Energy from Waves and Tidal Movements

- **Description**: This topic examines the use of ocean waves and tidal movements as sources of renewable energy. It includes technology for capturing wave and tidal energy, and their potential for sustainable energy generation.
- **Key Areas**: Wave energy technology, tidal energy systems, environmental impact, energy potential.

- **Objectives**: To explore the technologies for harnessing energy from ocean waves and tidal movements, and evaluate their potential and challenges for sustainable energy.

45. Geothermal Energy

- **Description**: This topic covers geothermal energy, focusing on its generation and utilization. It includes geothermal power plants, direct use applications, and the benefits and limitations of geothermal energy.
- **Key Areas**: Geothermal power generation, direct use applications, resource management, environmental impact.
- **Objectives**: To understand geothermal energy technologies, their applications, and the environmental considerations associated with their use.

46. Biomass and Biofuels

- **Description**: This topic explores biomass and biofuels as renewable energy sources. It includes the types of biomass, methods for converting biomass into biofuels, and their applications in energy systems.
- **Key Areas**: Biomass types, biofuel production processes, energy applications, environmental benefits.
- **Objectives**: To learn about biomass and biofuels, their production methods, and their role in renewable energy systems and sustainability.

47. Potential for Renewable Energy Development in Poland

- **Description**: This topic examines the opportunities and challenges for developing renewable energy sources in Poland. It includes an analysis of Poland's renewable energy potential, policies, and future prospects.
- **Key Areas**: Renewable energy potential in Poland, policy frameworks, development challenges, future prospects.
- **Objectives**: To assess the potential for renewable energy development in Poland and understand the policy and practical considerations involved.

48. Industry 4.0

- **Description**: This topic covers the concept of Industry 4.0 and its impact on manufacturing and logistics. It includes discussions on smart technologies, automation, and data-driven decision-making.
- **Key Areas**: Smart technologies, automation, Internet of Things (IoT), data analytics.
- **Objectives**: To understand the principles of Industry 4.0, its technologies, and how it transforms manufacturing and logistics through automation and data integration.

49. Information Systems in Ecological Logistics

- **Description**: This topic explores the role of information systems in managing ecological logistics. It includes the use of software and technology for tracking, managing, and optimizing environmental logistics processes.
- **Key Areas**: Logistics management software, data tracking, process optimization, environmental impact.
- **Objectives**: To understand how information systems support ecological logistics, including tracking, management, and optimization of logistics processes.

50. The Concept of “Cleaner Production”

- **Description**: This topic introduces the concept of "cleaner production" and its principles. It covers strategies for reducing waste, emissions, and resource use in production processes.
- **Key Areas**: Cleaner production principles, waste reduction, emission control, resource efficiency.
- **Objectives**: To understand the principles of cleaner production, and how to apply strategies to make production processes more sustainable and efficient.

51. Analysis of the Activities of Wodociągi Słupsk

- **Description**: This topic involves a detailed analysis of the operations of Wodociągi Słupsk, a local water utility company. It focuses on their waste management practices, sustainability efforts, and overall environmental impact.
- **Key Areas**: Waste management practices, sustainability initiatives, operational efficiency, environmental impact.
- **Objectives**: To understand the waste management strategies employed by Wodociągi Słupsk and evaluate their effectiveness in promoting sustainability.

52. Analysis of the Activities of the Waste Disposal Plant in Bierkowo

- **Description**: This topic explores the operations of the Waste Disposal Plant in Bierkowo. It includes an examination of their waste processing methods, environmental policies, and challenges faced in waste management.
- **Key Areas**: Waste processing techniques, environmental policies, operational challenges, efficiency assessment.
- **Objectives**: To gain insights into the waste management practices of the Bierkowo plant and assess their contributions to sustainable waste disposal.

53. Natural Resources and Waste in Economic Development: Sustainable Logistics

- **Description**: This topic examines the relationship between natural resources, waste management, and economic development. It focuses on how sustainable logistics can support economic growth while managing resources and waste responsibly.
- **Key Areas**: Resource management, waste impact on economy, sustainable logistics practices, economic growth.
- **Objectives**: To explore how sustainable logistics can be integrated into economic development strategies, focusing on efficient resource use and waste management.

54. Waste Recycling Systems: The Essence of Recycling

- **Description**: This topic delves into waste recycling systems, including the processes and technologies involved. It highlights the importance of recycling in waste management and environmental conservation.
- **Key Areas**: Recycling processes, technologies, recycling benefits, waste management strategies.
- **Objectives**: To understand the principles and systems of recycling, and how these contribute to effective waste management and environmental protection.

55. Designing Products with Recycling in Mind

- **Description**: This topic focuses on eco-design principles for creating products that are easier to recycle. It includes strategies for designing products with their end-of-life recycling in mind.
- **Key Areas**: Eco-design principles, recyclable materials, design for disassembly, end-of-life considerations.
- **Objectives**: To learn about designing products that facilitate recycling and minimize environmental impact at the product's end of life.

56. Ecological Aspects of Sustainable Transport Policy: Green Logistics

- **Description**: This topic explores the ecological aspects of sustainable transport policies, emphasizing green logistics practices that reduce environmental impact. It includes strategies for integrating sustainability into transport systems.
- **Key Areas**: Sustainable transport policies, green logistics practices, environmental impact reduction.
- **Objectives**: To understand how sustainable transport policies contribute to environmental conservation and to explore green logistics strategies.

57. Ecological Logistics of Used Packaging

- **Description**: This topic examines the ecological aspects of managing used packaging. It covers recycling, reusing, and reducing packaging waste, as well as the environmental benefits of effective packaging management.
- **Key Areas**: Packaging waste management, recycling practices, environmental benefits, reduction strategies.
- **Objectives**: To understand the challenges and solutions in managing used packaging from an ecological perspective.

58. Ecological Logistics from the Supply Chain Perspective

- **Description**: This topic focuses on how ecological logistics integrates into the broader supply chain. It includes strategies for incorporating sustainability throughout the supply chain and its impact on overall logistics management.
- **Key Areas**: Supply chain sustainability, ecological logistics integration, impact on supply chain operations.
- **Objectives**: To explore how ecological logistics practices can be applied throughout the supply chain to enhance sustainability.

59. Ecological Logistics vs. Reverse Logistics: Terminological and Methodological Issues

- **Description**: This topic addresses the differences and overlaps between ecological logistics and reverse logistics. It includes a discussion on terminological distinctions and methodological approaches for each.
- **Key Areas**: Definitions, terminology, methodological differences, integration challenges.
- **Objectives**: To clarify the distinctions and intersections between ecological logistics and reverse logistics, and understand their respective methodologies.

60. Economic Systems and the Natural Environment: Basic Interactions

- **Description**: This topic explores the interactions between economic systems and the natural environment. It covers how economic activities impact the environment and how environmental considerations can shape economic policies.
- **Key Areas**: Environmental impact of economic activities, economic-environmental interactions, policy implications.
- **Objectives**: To understand the relationship between economic systems and the environment, and explore how economic policies can support environmental sustainability.

61. Pro-Ecological Management Systems

- **Description**: This topic examines management systems designed to promote environmental sustainability. It includes the principles and practices of pro-ecological management systems and their implementation in organizations.
- **Key Areas**: Pro-ecological management principles, implementation practices, benefits and challenges.
- **Objectives**: To learn about various pro-ecological management systems and how they can be effectively implemented to promote sustainability.

62. Closed-Loop Supply Chain Concept: The Idea of Circular Economy

- **Description**: This topic introduces the concept of closed-loop supply chains and the circular economy. It includes strategies for creating systems where resources are continually reused, recycled, and minimized.
- **Key Areas**: Closed-loop supply chains, circular economy principles, resource reuse, recycling strategies.
- **Objectives**: To understand the principles of closed-loop supply chains and circular economy, and explore how these concepts contribute to sustainability.

63. Closed-Loop and Open-Loop Systems: Concepts and Applications

- **Description**: This topic explores the differences between closed-loop and open-loop systems. It covers the concepts and applications of both systems in the context of ecological logistics and resource management.
- **Key Areas**: Closed-loop systems, open-loop systems, application scenarios, benefits and limitations.
- **Objectives**: To understand the concepts of closed-loop and open-loop systems and their applications in managing resources and waste.

64. Case Studies of Ecological Logistics Solutions

- **Description**: This topic involves analyzing real-world case studies of ecological logistics solutions. It includes examining successful practices and identifying lessons learned from various implementations.
- **Key Areas**: Case study analysis, successful practices, lessons learned, implementation challenges.
- **Objectives**: To gain insights from real-world examples of ecological logistics solutions and understand their practical applications and outcomes.

65. Processes of Recycling Waste Materials in the Economy: Problem Description

- **Description**: This topic describes the processes involved in recycling waste materials within the economy. It covers the challenges and solutions related to recycling and the role of recycling in waste management.

- **Key Areas**: Recycling processes, economic impact, challenges, solutions.
- **Objectives**: To understand the processes and challenges associated with recycling waste materials and their significance in the economy.

66. Preventive Actions in Ecological Logistics: Rational Management of Residues

- **Description**: This topic focuses on preventive measures in ecological logistics to manage residues effectively. It includes strategies for minimizing waste and improving residue management practices.
- **Key Areas**: Preventive actions, residue management strategies, waste minimization.
- **Objectives**: To explore preventive measures for managing residues and improving sustainability in ecological logistics.

67. Organization and Evaluation of the Ecological Logistics Department in a Company

- **Description**: This topic covers the organization and evaluation of an ecological logistics department within a company. It includes best practices for structuring the department and assessing its performance.
- **Key Areas**: Department organization, performance evaluation, best practices.
- **Objectives**: To learn how to effectively organize and evaluate an ecological logistics department to ensure it meets sustainability goals.

68. Ecological Logistics Systems in Companies and Supply Chains

- **Description**: This topic examines the implementation of ecological logistics systems within companies and their integration into supply chains. It includes strategies for optimizing ecological logistics practices across different levels.
- **Key Areas**: Implementation strategies, supply chain integration, system optimization.
- **Objectives**: To understand how to implement and optimize ecological logistics systems within companies and throughout supply chains for improved sustainability.

2.4 Teaching Methods for Specialization in Ecological Solutions in Logistics

1. Lectures and Presentations

• Description: Traditional lectures and multimedia presentations provide foundational knowledge on key concepts and theories in ecological logistics.

• Objectives: To deliver theoretical knowledge and introduce core topics to students.

- Application: Use visual aids, slides, and videos to enhance understanding of complex subjects and ensure that students grasp fundamental principles.

2. Case Studies

- Description: Analysis of real-world examples and case studies relevant to ecological logistics.
- Objectives: To apply theoretical knowledge to practical scenarios and understand real-life applications and challenges.
- Application: Present detailed case studies of successful and unsuccessful ecological logistics implementations, encouraging students to analyze and discuss their outcomes.

3. Group Discussions and Debates

- Description: Facilitated discussions and debates on ecological logistics topics encourage critical thinking and engagement with course material.
- Objectives: To stimulate critical thinking, enhance understanding through peer interaction, and develop argumentation skills.
- Application: Organize debates on current issues in ecological logistics, such as waste management policies or green logistics strategies, and encourage group analysis.

4. Workshops and Seminars

- Description: Interactive sessions focusing on specific aspects of ecological logistics, such as recycling technologies or green supply chains.
- Objectives: To provide hands-on experience and practical insights into specialized topics.
- Application: Conduct workshops with guest experts or practitioners to demonstrate real-world applications and technologies.

5. Field Visits

- Description: Visits to relevant facilities, such as recycling plants, waste management centers, or companies practicing sustainable logistics.
- Objectives: To offer practical exposure to industry practices and operational challenges.
- Application: Organize tours of local environmental facilities and companies, allowing students to observe and interact with professionals in the field.

6. Simulations and Role-Playing

- Description: Simulation exercises and role-playing scenarios to mimic real-world logistics problems and decision-making processes.
- Objectives: To provide a practical understanding of logistics operations and decision-making in a controlled environment.
- Application: Use simulation software or role-playing games to model ecological logistics scenarios, such as waste management or supply chain optimization.

7. Research Projects

- Description: Independent or group research projects on specific topics within ecological logistics.
- Objectives: To develop research skills, encourage in-depth exploration of topics, and apply theoretical knowledge.
- Application: Assign research projects that require students to investigate and present findings on ecological logistics issues or innovations.

8. Problem-Based Learning (PBL)

- Description: A student-centered approach where learners tackle complex, real-world problems related to ecological logistics.
- Objectives: To enhance problem-solving skills and apply knowledge to practical situations.
- Application: Present students with a logistics problem or case that requires them to research, analyze, and propose solutions.

9. Guest Lectures

- Description: Inviting industry experts and professionals to share their knowledge and experience in ecological logistics.
- Objectives: To provide students with insights from experienced practitioners and current industry trends.
- Application: Arrange for guest lectures on specialized topics such as circular economy practices or innovative recycling technologies.

10. Interactive Online Platforms

- Description: Utilizing online tools and platforms for collaborative learning and engagement.
- Objectives: To enhance learning through digital resources and foster interaction among students.
- Application: Use online forums, discussion boards, and virtual classrooms to facilitate discussions, share resources, and collaborate on projects.

11. Assignments and Problem Sets

- Description: Structured assignments and problem sets to reinforce learning and assess student understanding.
- Objectives: To test comprehension of course material and provide practical exercises related to ecological logistics.
- Application: Design assignments that require analysis of logistics data, development of recycling plans, or evaluation of sustainability strategies.

12. Critical Reviews of Literature

- Description: Review and critique of academic papers and industry reports on ecological logistics.
- Objectives: To develop analytical skills and deepen understanding of current research and best practices.
- Application: Assign literature reviews that require students to summarize, critique, and discuss recent research findings and their implications for ecological logistics.

13. Hands-On Laboratory Work

- Description: Practical laboratory sessions focusing on environmental testing, material analysis, or recycling processes.
- Objectives: To provide practical experience with environmental testing methods and recycling technologies.
- Application: Set up lab exercises where students can perform tests on waste materials, analyze recycling processes, or explore environmental impacts.

14. Integrated Projects

- Description: Comprehensive projects that integrate multiple aspects of ecological logistics, such as designing a sustainable supply chain or developing a waste management strategy.
- Objectives: To apply interdisciplinary knowledge and develop comprehensive solutions to complex logistics problems.
- Application: Guide students through projects that require integrating concepts from various topics covered in the course, culminating in a detailed presentation or report.

Each of these teaching methods aims to build a comprehensive understanding of ecological logistics, combining theoretical knowledge with practical skills and real-world applications.

No.	Compulsory education classes	Year										Number of hours per week in a fiveyear teaching period	Number of hours in a five-year teaching period
		I		II		III		IV		V			
		I period	II period	I period	II period	I period	II period	I period	II period	I period	II period		
General subjects													
1	Polish language	3	3	3	3	3	3	3	3	4	4	**16**	**480**
2	Foreign language	2	2	2	2	2	2	3	3	3	3	**12**	**360**
3	Second foreign language	2	2	2	2	2	2	1	1	1	1	**8**	**240**
4	Fine arts	1	1									**1**	**30**
5	History	2	2	2	2	2	2	1	1	1	1	**8**	**240**
6	Social sciences							1	1	1	1	**2**	**60**
7	Basics of entrepreneurship			1	1	1	1					**2**	**60**
8	Geography	1	1	1	1	1	1	1	1			**4**	**120**
9	Biology	1	1	1	1	1	1	1	1			**4**	**120**
10	Chemistry	1	1	1	1	1	1	1	1			**4**	**120**
11	Physics	1	1	1	1	1	1	1	1			**4**	**120**
12	Mathematics	2	2	2	2	3	3	3	3	4	4	**14**	**420**
13	Computer Science	1	1	1	1	1	1					**3**	**90**
14	Physical education	3	3	3	3	3	3	3	3	3	3	**15**	**450**
15	Education for safety	1	1									**1**	**30**
16	Educational lessons	1	1	1	1	1	1	1	1	1	1	**5**	**150**
	Total hours	**22**	**22**	**21**	**21**	**22**	**22**	**20**	**20**	**18**	**18**	**103**	**3090**
Extended and complementary subjects													
1	English	1	1	1	1	1	1	1	1	1	3	**6**	**180**
2	Mathematics in Logistics					1 u	1 u	1 u	1 u	1d	3d	**4**	**120**
3	Geography in logistics									1d	1d	**1**	**30**
4	German in logistics									1d	1d	**1**	**30**
	Total hours	**1**	**1**	**1**	**1**	**2**	**2**	**2**	**2**	**4**	**8**	**12**	**360**
	Total hours (year):	**1**		**1**		**2**		**2**		**6**			
Subjects in vocational theoretical education													
1	Occupational health and safety	1	1									**1**	**30**
2	Professional English					1	1	2	2			**3**	**90**
3	Basic logistics	2	2									**2**	**60**
4	Warehouse management	2	2	1	1	1	1					**4**	**120**
5	Inventory management	2	2	1	1	1	1					**4**	**120**
6	Asset protection			1	1	1	1					**2**	**60**
7	Transport process planning			2	2	1	1	1	1			**4**	**120**

8	Transport Process Documentation			1	1	1	1	2	2			**4**	**120**
	Total hours	**7**	**7**	**6**	**6**	**6**	**6**	**5**	**5**	**0**	**0**	**24**	**720**
Subjects in practical vocational education													
1	**Ecological Solutions in Logistics (groups)**	**1**	**1**	**1**	**1**	**2**	**2**	**2**	**2**			**6**	**180**
2	Organization of warehouse work (groups)	2	2	3	3	1	1					**6**	**180**
3	Organization of transport processes (groups)			2	2	2	2	4	4			**8**	**240**
4	Customer and contractor service (groups)	1	1	1	1	1	1	2	2			**5**	**150**
5	Additional skills									7		**3,5**	**105**
6	Specialization internship										7	**3,5**	**105**
	Total hours	**4**	**4**	**7**	**7**	**6**	**6**	**8**	**8**	**7**	**7**	**32**	**960**
	Total number of hours of vocational training	**11**	**11**	**13**	**13**	**12**	**12**	**13**	**13**	**7**	**7**	**56**	**1680**
	Total number of professional education hours per year:	**11**		**13**		**12**		**13**		**7**			
	Weekly number of hours of compulsory education in a year	**34**		**35**		**36**		**35**		**27**		**167**	
1	Religion/ethics	1	1	1	1	1	1	1	1	1	1	**5**	**150**
2	Education for family life	0,5	0,5	0,5	0,5							**1**	**30**
3	Professional counselling									0,5	0,5	**0,5**	**10**
	Weekly hours of educational activities	**35,5**		**36,5**		**37**		**36**		**28**		**173,5**	**190**

Summarizing the above framework teaching plan, which will be in effect from the school year 2021/2022, students will receive the following number of hours of education in a five-year cycle:

- 3090 hours of general education
- 360 hours of additional and extended education
- 720 hours of theoretical vocational training (42%)
- 960 hours of practical vocational training (58%)

The students will therefore receive a total of 1680 hours of vocational training. Within the project, we increased the proportion of practical teaching from 50-50 to a proportion of 60-40. In addition, we introduced a new specialization "ecological solutions in logistics" of 180 hours. We have created a completely new curriculum for the profession of logistics technician, along with reorganization of the teaching process,

changing individual subjects and assigning them specific competencies and qualifications in accordance with the core curriculum.

3 Implementation[2]

The pilot training cycle started in the 2021/2022 school year and included the introduction of a specialisation in green solutions in logistics. The curriculum focused on key aspects of environmentalism, such as:

- Sustainability in logistics
- Recycling and waste management technologies
- Application of green practices in the supply chain.

As a result of the success of the pilot and the positive reception from students, teachers and the logistics industry, it was decided to make the programme a permanent part of the school's educational offer. The specialisation of green solutions in logistics has become an integral part of the logistics technician profession, enabling students to acquire modern skills adapted to current market requirements. For the 2024/2025 school year, the number of pupils covered by the ecology specialisation in each class is as follows:

- 1st class: 45 students
- 2nd class: 31 students
- 3rd class: 44 students
- 4th class: 32 students

Conclusions and Future Plans

1. positive effects of implementation

Increase in Interest: The introduction of the ecology specialisation has contributed to an increase in the number of students interested in the logistics technician profession, which now also includes ecological aspects.

Student and Employer Satisfaction: The programme has gained recognition from both students, who value the practical skills associated with environmentalism, and employers, who see the added value in sustainability.

2 Continuation and development

Permanent Integration: The programme will continue as an integral part of the logistics technician education. It is planned to regularly update the programme content in response to changing market needs and technological advances in the field of environmentalism.

[2] Prepared by Zespół Szkół Mechanicznych i Logistycznych w Słupsku

Programme development: In the future, it is envisaged that additional modules will be developed to introduce students to new areas of green solutions in logistics and to introduce new teaching methods and technologies.

Summary

The implementation of the specialisation in ecological solutions in logistics at the Mechanical and Logistics School Complex in Słupsk has been a success, which has contributed to the enrichment of the educational offer and increased interest among students. The programme is an important step towards modern and sustainable logistics education and will be continued and developed in the coming years.

4 Evaluation Concept[3]

4.1 Overview

The 3LoE project aims to promote work-based learning through the introduction of dual vocational training at different educational levels (EQF 3-6), especially in countries that have used school-based vocational training until this point in time. In the case of dual vocational education up to 75% of the entire training period is spent in companies.

Zespół Szkół Mechanicznych i Logistycznych w Słupsku (Poland, PP5) implements a five year dual technician training "Ecologic Solutions in Logistics", realising a fundamental element of further vocational training (second stage). It is assumed that after the completion of the training, trainees will take up further education, enrolling in, for example, dual Bachelor studies "Logistics – Green Supply Chains" at Akademia Pomorska w Słupsku (Pomeranian University in Słupsk, PP6).

4.2 The Aim of the Evaluation

The general aim of the study is to evaluate the effectiveness of the implementation of the five-year technician training, realised within the Project titled "Three-level Centres of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy" (3LoE). The conclusions of the evaluation research will contribute to improving the quality, and especially the effectiveness of trainings, show the limitations of the training model, and indicate the direction for further activities and curriculum revision (if necessary).

A training management cycle can be divided into three major steps: *curriculum design (planning), implementation, and evaluation*. The evaluation is the final step of the training management cycle. Evaluation of any training is one of the main components of a training programme/ curriculum. The results of the training evaluation are reflected in the next phase of training planning to improve future training programmes/ curricula. Training evaluation provides useful information for:

- trainers – to gain insight into the effectiveness of activities, with a view of improving activities planned throughout the training course;
- management – to gain insight into the effectiveness of the training, with a view of improving curricula.

What is an Evaluation?

Several definitions of evaluation have been offered, and the following are some of those most commonly used:

> An evaluation is the systematic and objective assessment of an ongoing or completed project, program or policy, its design, implementation and results. The aim

[3] Developed by Pomeranian University in Słupsk (Akademia Pomorska w Słupsku)

is to determine the relevance and fulfillment of objectives, development efficiency, effectiveness, impact and sustainability[4].

A program evaluation is the systematic collection of information about the activities, characteristics, and outcomes of programs to make judgments about the program, improve program effectiveness, and/or inform decisions about future programming.[5]

There are many different types of evaluations depending on the object being evaluated and the purpose of the evaluation.

Perhaps the most important basic distinction in evaluation types is that between *formative* and *summative* evaluation. Formative evaluations strengthen or improve the object being evaluated - they help form it by examining the delivery of the program or technology, the quality of its implementation, and the assessment of the organizational context, personnel, procedures, inputs, etc. Summative evaluations, in contrast, examine the effects or outcomes of some object - they summarize it by describing what happens subsequent to delivery of the program or technology; assessing whether the object can be said to have caused the outcome; determining the overall impact of the causal factor beyond only the immediate target outcomes; and, estimating the relative costs associated with the object.

Formative evaluation includes several evaluation types:

- *needs assessment* determines who needs the program, how great the need is, and what might work to meet the need
- *evaluability assessment* determines whether an evaluation is feasible and how stakeholders can help shape its usefulness
- *structured conceptualization* helps stakeholders define the program or technology, the target population, and the possible outcomes
- *implementation evaluation* monitors the fidelity of the program or technology delivery
- *process evaluation* investigates the process of delivering the program or technology, including alternative delivery procedures

Summative evaluation can also be subdivided:

- *outcome evaluations* investigate whether the program or technology caused demonstrable effects on specifically defined target outcomes.
- *impact evaluation* is broader and assesses the overall or net effects -- intended or unintended -- of the program or technology as a whole.
- *cost-effectiveness and cost-benefit analysis* address questions of efficiency by standardizing outcomes in terms of their dollar costs and values secondary analysis reexamines existing data to address new questions or use methods not previously employed.

[4] Source: Glossary of Key Terms in Evaluation and Results Based Management.
[5] Source: Patton, M.Q. (1997). Utilization-focused Evaluation: The New Century Text (3rd ed.). Thousand Oaks, CA: Sage.

- *meta-analysis* integrates the outcome estimates from multiple studies to arrive at an overall or summary judgement on an evaluation question[6].

4.3 Five Steps of Training Evaluation

The processes of dual vocational training evaluation can be divided into five steps:

1. identification of the purposes of evaluation;
2. selection of the evaluation methods;
3. design of the evaluation tools;
4. data collection data;
5. analysis of results and drafting of the results report. and analyse and report results.

Step 1: Identification of the Purposes of Evaluation

Before developing evaluation systems, the purposes of evaluation must be determined. These will affect the types of data and the data collection methods. The most common reason for evaluating dual vocational trainings is to determine their effectiveness. Evaluation can help one learn from experience of past trainings. Evaluations also help to learn which elements of the program/ curriculum, i.e. activities and methods in a training were successful, and which were not, and whether the program/curriculum as a whole fulfils its goals. It also sets the ground for improvement, including all necessary changes to program/curriculum and training methods.

The following purposes of evaluating trainings are:

- To determine whether the objectives of the training were achieved.
- To assess the degree to which the training met the expectations of participants.
- To see how the knowledge and skills learned in the training are put into practice.
- To assess the results and impacts of the training programs/ curricula.
- To assess the effectiveness of the trainings and individual activities, in particular as regards professional qualifications of participants and the skills acquired by trainees that can be used by them in their work.
- To assess whether the training programs/ curricula were properly implemented.
- To identify the strengths and weaknesses of the trainings in general.
- To assess whether the training programs/ curricula were suitable in terms of the training contents, timing, participants and other aspects.
- To find the weak points of the training programs/ curricula and suggest solutions for improvement.

[6] Souce: Patton, M.Q. (1997). Utilization-focused Evaluation: The New Century Text (3rd ed.). Thousand Oaks, CA: Sage.

Step 2: Selection of the Evaluation Method

One of the most commonly used methods for evaluating training programs is the four levels of evaluation by D. L. Kirkpatrick. According to his concept, capacity development is realized by the four sequential steps:

1. **Reaction** - evaluation on this level measures how participants react to the training program. It is important to get a positive reaction. Although a positive reaction may not ensure learning, if participants do not react favorably, they probably will not be motivated to learn.
2. **Learning** - evaluation on this level measures the extent to which participants change attitudes, improve knowledge, and/or increase skills as a result of attending the training program. One or more of these changes must take place if a change in behaviour is to happen.
3. **Behaviour** - evaluation on this level measures the extent to which change in participants' behaviour has occurred because of attending the training program. In order for change to take place, four conditions are necessary:
    - The person must have a desire to change.
    - The person must know what to do and how to do it.
    - The person must work in the right climate.
    - The person must be rewarded for changing.
4. **Results** - evaluation on this level measures the final results that occurred because the participants attended the training program. Examples of the final results include increased production, improved quality and decreased costs. It is important to recognize that these results are the reason for having some training programs. (Source: *Kirkpatrick (2006) Evaluating Training Programs)*

In the present setting, the evaluation is extended beyond the program/curriculum assessment to also include the implementation and the effects of the implementation of the technician training realised at PP5. Therefore, the evaluation also includes the assessment of the outcomes important for teachers/ instructors, school managers (headteachers) and other stakeholders, such as the local university (PP6), local companies or authorities. Since different parties perform different roles in the trainings, the evaluation scope will differ accordingly.

Step 3: Design of the Evaluation Tools

Various evaluation tools can be selected depending on the purposes and methods of evaluation:

- Questionnaires
- Surveys
- Tests
- Interviews
- Focus group discussions
- Observations

- Performance records

From the perspective of the evaluation of the implementation of technician training (WP3 A9.2), the most suitable evaluation tool is the written questionnaire, consisting of both closed and open-end questions. The inclusion of the two types of questions provides both quantitative, but also qualitative (more in-depth) insights into the effectiveness of the training.

The questionnaire is probably the most common form of evaluating training programs to evaluate the expectations (initial evaluation) as well as reactions of participants and trainers who took part in the training (midway or final evaluation).

In the current project, in order to evaluate technician training "Ecologic solutions in Logistics", the questionnaire tool will be used:
- at the beginning of the training (initial evaluation),
- in year 3 of the training (midway evaluation).

Such scheme of the evaluation is important for quality insurance of the training, since it gives an important insight into the progress that has been made, but also points to the elements of the training that can still be improved.

The parties involved in the evaluation using the questionnaire tool are:
- the participants (trainees),
- the trainers (teachers).

Initial evaluation is mainly aimed at analysing the expectations of participants, their motivation, and their educational background, while on the part of trainers, it mainly assesses their preparedness level and their evaluation of the program/ curriculum to be applied.

Midway evaluation aims at the assessment of the training, its progress, including the compliance of activities with the program/ curriculum, and the training methods applied. In particular, the evaluation focuses on the appropriateness of the content and methods used, usefulness of the training a whole and the effectiveness of training activities/ tools in gaining new knowledge/ skills.

Initial and midway evaluations set the important points of reference for the final evaluation of the trainings.

Step 4: Data Collection

To improve the effectiveness of questionnaire data collection, the following recommendations should be followed:

- *Choose the appropriate form of the questionnaire*. It is suggested that the electronic form of the questionnaire is used. This will allow automatic summary of

closed questions and will gather answers to open-ended questions in one database.

- *Keep responses anonymous,* as it allows the participants to feel open and comfortable to give comments that can help gather more reliable data, which in turn may be used to improve future programs/ curricula.

- *Distribute questionnaire forms in advance* – Depending on the object of analysis/ review and the scope of evaluation, questionnaires should be distributed a few days in advance so as to allow participants to familiarise themselves with the questions and to provide more in-depth answers to open-ended questions. Final assessment questionnaires should be distributed, if possible, in the final weeks of the training. This will allow for more generalised review of the entire training process.

- *Explain the purpose of the questionnaire and how the information will be used* - This will help improve the response rate and encourage participants to make comments that can be useful to improve future trainings.

- *Allow enough time for completing the questionnaire* – While initial evaluation does not require much time to complete, since it measures the initial state and the expectations, the final evaluation is more thorough and focuses on the training that has been completed throughout a\ period of three years. Therefore, participants need more time to acquaint themselves with the questions, and to recall essential information in the form of a feedback on the content, the methods applied and the effectiveness of the training in general.

- *Provide assistance*. If translation is necessary, questionnaires should be translated into the mother tongue of the participants. In the case of participants with disabilities, all necessary forms of support should be provided.

Step 5: Analysis of results and drafting of the results report.

The analysis of the data gathered may progress in a variety of ways. There are a number of statistical software programs available for such analyses. However, any analysis should be as simple as possible and limited to what is necessary to draw the required conclusions from the data. After knowing what kind of information will be relevant and useful to the primary users, the last step in evaluation process is to develop an evaluation report. In the present project, the report will be drafted on the basis of initial and midway evaluation. The conclusions of the report should be used to improve the training, its curriculum, its organisation, the training methods used, etc.

Figures should be used to present statistical and complex data fairly quickly and easily. *Pie charts* and *bar charts* are among commonly used figures. Bar charts work better when many categories are compared, and relative magnitude is to be shown.

Evaluation report outline

After knowing what kind of information will be relevant and useful to the primary users, you can develop an evaluation report outline. [7]

Summary
- Purpose of Evaluation
- Addressees of the Evaluation
- Major findings and recommendations

Training Description
- Training background
- Training goals/objectives
- Training participants
- Training activities (general overview)

Evaluation Design and Methods
- Purpose of the Evaluation
- Evaluation designs
- Data collection methods

Findings and Results
- Description of how the findings are organized (e.g., by evaluation questions, themes/issues)
- Results of analyses of quantitative and/or qualitative data collected

Recommendations
- Recommendations for action based on these conclusions, in particular in relation to the training program/ curriculum, methods used, etc.

Appendices
- Questionnaires pre/post tests

4.4 Data Sources

The conclusions of the evaluation research will contribute to improving the quality, and especially the effectiveness of training, show the limitations of the training model and indicate the direction for further activities. This may be particularly useful when the evaluation is undertaken at a point where quality improvement is still possible.

Dual technician training implemented by Zespół Szkół Mechanicznych i Logistycznych w Słupsku (PP5) is a five-year secondary level training. The training ends with A-level exam (Matura), which enables its participants to enrol in university courses. The training envisages a total of 1,680 hours of vocational training, with the remaining 3,450 hours being general education and additional extended education, as legally prescribed by the Polish law on education. Within the vocational training, 180 hours will be dedicated to a new subject that has been implemented under the 3LoE project called "Ecological Solutions in Logistics".

[7] Source: Manual on Training Evaluation. Project on Improvement of Local Administration in Cambodia

Evaluation of dual technician training is realised according to the following calendar:

- initial questionnaire: October/ November 2021
- midway questionnaire: February/ March 2024
- draft of the final report: 1 May 2024
- final report: 30.06.2024

According to the methodology presented above, two questionnaires will be administered:

Two written surveys (questionnaires) of participants:

- ➔ one at the beginning of the training (initial evaluation – see Appendix 1), and
- ➔ one at midway of the training (midway evaluation - see Appendix 2)

Participants will be asked to fill out questionnaires in the first weeks of the training, and in the middle of the training in the school year of 2023/2024. In the midway evaluation, participants will be able to assess the quality of training (to date) in its various aspects.

The current evaluation constitutes quality control of the training and the level of satisfaction of its participants. Satisfaction with the course and program content, activities, and thus the efficiency on the "level of response" is a prerequisite for proper motivation to learn and consequently to high efficiency to the next level.

The initial evaluation questionnaire is divided into two parts:

(1) evaluation of motivation to participate in the training,
(2) evaluation of the expectations of the participant.

The midway evaluation questionnaire is divided into three parts:

(1) evaluation of the motivation measured half-way through the training,
(2) evaluation of satisfaction with the training content,
(3) evaluation of the trainers and the organization of the training.

Two written surveys (questionnaires) of all trainers (teachers) participating in the training:

- ➔ one at the beginning of the training (initial evaluation – see Appendix 3)
- ➔ one at midway of the training (midway evaluation – see Appendix 4).

All trainers will be asked to fill out questionnaires in the first weeks of the training (initial evaluation), and half-way through the training (midway evaluation).

The initial evaluation is divided into two parts:

(1) evaluation of the training program/ curriculum,
(2) evaluation of the preparedness to carry out training activities.

The midway evaluation is divided into three parts:

(1) evaluation of the content of the training and its organisation,
(2) evaluation of the trainee's participation in the training,
(3) evaluation of the cooperation between the school and companies (if applicable).

NOTE: All questionnaires will be administered in the online form. PP5 must ensure timely distribution of the questionnaires (see table above), providing assistance to participants, if necessary (see above→ Step4: Data collection).

4.5 Appendix 1 SURVEY OF PARTICIPANTS[8] (INITIAL EVALUATION QUESTIONNAIRE)

Dear Participant,

The objective of the study is to evaluate your motivation and expectations related to dual technician training, realised by Zespół Szkół Mechanicznych i Logistycznych w Słupsku (PP5), within the Project "Three-level Centres of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy (3LOE)".

Please, take a few minutes and fill this his evaluation form. Your comments and suggestions will help us to improve the training. The questionnaire is anonymous. To fill out it takes you only a few minutes.

Thank you.

I Evaluation of motivation to participate in the dual technician training

Q1: Please indicate your level of agreement with the statements listed below.

1=Strongly Disagree; 2= Disagree; 3= Neither agree nor disagree; 4=Agree; 5=Strongly Agree

	Strongly Disagree				**Strongly Agree**
I feel motivated to participate in the training	1	2	3	4	5
I want to acquire new theoretical knowledge	1	2	3	4	5
I want to learn new practical skills	1	2	3	4	5
I am looking forward to my training in a company	1	2	3	4	5

Q2: Please indicate why you have enrolled in dual technician training. Please indicate three main reasons.

(a) I want to get a well-paid job,

(b) I want to have a good position in my (future) job,

(c) I want to establish my own business,

(d) I want to improve for my own satisfaction,

(e) I want to go to university,

[8] Please note that all questionnaires will be distributed in the online form.

(f) I want to attain recognised qualifications,

(g) I want to impress my colleagues/ family,

(h) other (please, specify what motivated you to enrol in dual technician training)…

Q3: Please indicate what/ who influenced your decision to enrol in dual technician training. Please indicate a maximum of three answers.

(a) My partner/ guardian asked me to continue education,

(b) I wanted to learn in the same school where my friends do,

(c) My friend encouraged me to take up the training,

(d) The training is legally required in my job,

(e) I had to continue education because it is compulsory till the age of 18,

(f) I followed the advice of job counsellor/ career adviser,

(g) The school has a good reputation,

(h) The training programme is interesting,

(i) other (please specify what/ who motivated you to enrol in dual technician training).

Q4: Do you have any other comments regarding your motivation to participate in dual technician training?

_____

_____

_____

II Evaluation of the expectations about the dual technician training for the participant

Q5: Please indicate your level of agreement with the statements listed below.

1=Strongly Disagree; 2= Disagree; 3= Neither agree nor disagree; 4=Agree; 5=Strongly Agree

	Strongly Disagree				**Strongly Agree**
The training objectives meet my expectations	1	2	3	4	5
The content seems well organized and easy to follow	1	2	3	4	5
The topics seem relevant to me	1	2	3	4	5

The training process is flexible	1	2	3	4	5
The training will improve my theoretical knowledge	1	2	3	4	5
The training will improve my practical skills	1	2	3	4	5
The training experience will be useful in my work	1	2	3	4	5
The training in the company will be beneficial	1	2	3	4	5
Overall, dual education system will be effective	1	2	3	4	5

Q6: Do you have any comments about your expectations about the dual technician training you enrolled in?

_____

_____

_____

IV General information

(1) Please indicate your gender

- ☐ Male
- ☐ Female
- ☐ Prefer not to answer

(2) Please indicate your age

- ☐ Younger than 18
- ☐ 18 - 24
- ☐ 25 - 34
- ☐ 35 – 44
- ☐ 45 - 54
- ☐ Prefer not to answer

(3) Please indicate your professional experience

- ☐ no professional experience
- ☐ 0-6 months
- ☐ 6-12 months
- ☐ 1-3 years
- ☐ 3-5 years
- ☐ 5-10 years
- ☐ more than 10 years

(4) Please indicate your educational background

- ☐ no formal education
- ☐ primary school
- ☐ junior high school
- ☐ vocational school
- ☐ high school
- ☐ technical high school
- ☐ college/ university (Bachelor's Degree/ Engineering Degree)
- ☐ college/ university (Master's Degree)

(5) Did you attend any additional courses/ trainings before you enrolled in this course?

- ☐ YES
- ☐ NO

(6) What additional courses/ trainings did you attend before you enrolled in this course?

_____

_____

_____

(7) Did you know anything about dual vocational or technician trainings before you heard about this training?

- ☐ YES
- ☐ NO

Thank you for your answers!

4.6 Appendix 2 SURVEY OF PARTICIPANTS[9] (MIDWAY EVALUATION QUESTIONNAIRE)

Dear Participant,

The objective of the study is to evaluate your satisfaction related to dual technician training, realised by Zespół Szkół Mechanicznych i Logistycznych w Słupsku (PP5), within the Project "Three-level Centres of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy (3LOE)".

Please, take a few minutes and fill this his evaluation form. Your comments and suggestions will help us to improve the training. The questionnaire is anonymous. To fill out it takes you only a few minutes.

Thank you.

I Evaluation of motivation to participate in the training

Q1: Please indicate your level of agreement with the statements listed below.

1=Strongly Disagree; 2= Disagree; 3= Neither agree nor disagree; 4=Agree; 5=Strongly Agree

	Strongly Disagree				**Strongly Agree**
I was motivated to participate in the training	1	2	3	4	5
Participation and interaction were encouraged	1	2	3	4	5
My creativity was encouraged	1	2	3	4	5
My initiative was highly evaluated	1	2	3	4	5

Q2: What did you like the most participating in dual vocational training programme?

_____

_____

_____

[9] Please note that all questionnaires will be distributed in the online form.

II Evaluation of the usefulness of training for the participant

Q3: Please indicate your level of agreement with the statements listed below.

1=Strongly Disagree; 2= Disagree; 3= Neither agree nor disagree; 4=Agree; 5=Strongly Agree

	Strongly Disagree				**Strongly Agree**
The training objectives have met my expectations	1	2	3	4	5
The content has been well organized and easy to follow	1	2	3	4	5
The topics have been relevant to me	1	2	3	4	5
The facilities for the training have been suitable	1	2	3	4	5
The training has improved my theoretical knowledge	1	2	3	4	5
The training has improved my practical skills	1	2	3	4	5
The training experience will be useful in my work	1	2	3	4	5
The training in the company has been beneficial	1	2	3	4	5
Dual education system has been effective	1	2	3	4	5
I will recommend dual technician training to others	1	2	3	4	5

Q4: Do you have any comments regarding the usefulness of dual technician training? Which part was the most useful? Which part should be improved?

_____

_____

_____

Q5: Please, answer these additional questions.

1=Strongly Disagree; 2= Disagree; 3= Neither agree nor disagree; 4=Agree; 5=Strongly Agree

After the completion of the training, I think …

will get a good job	1	2	3	4	5
will earn a lot of money	1	2	3	4	5
will feel more secure in my job	1	2	3	4	5

will get promoted	1	2	3	4	5
will be successful with setting my own business	1	2	3	4	5
will feel more empowered to take new responsivities	1	2	3	4	5
I will attain recognised qualifications	1	2	3	4	5
will do my job with greater satisfaction	1	2	3	4	5
other…					

Q6: How does participating in dual technician training programme prepare you to become a highly-skilled and highly-valued employee?

_____

_____

_____

III Evaluation of the trainers and the organization of the training

Q7: Please indicate your level of agreement with the statements listed below.

1=Strongly Disagree; 2= Disagree; 3= Neither agree nor disagree; 4=Agree; 5=Strongly Agree

	Strongly Disagree				**Strongly Agree**
The lecturers have been knowledgeable in their area of expertise	1	2	3	4	5
The lecturers have been good communicators	1	2	3	4	5
The feedback received from the trainers (teachers) has been useful	1	2	3	4	5
The content (i.e. tasks, activities) has been well organized and easy to follow	1	2	3	4	5
The topics have been relevant to me	1	2	3	4	5
The duration of training activities has been relevant	1	2	3	4	5
The teaching materials have been presented in an organized manner	1	2	3	4	5

Practical training in companies has been compatible with the theoretical content taught at school	1	2	3	4	5
The materials distributed have been helpful	1	2	3	4	5
The training process has been flexible	1	2	3	4	5
The overall atmosphere of the training has been encouraging	1	2	3	4	5

Q8: Which specific difficulties did you encounter while participating in dual technician training programme? Did the trainers try to help you with your difficulties? How?

_____

_____

_____

IV General information

(1) Please indicate your gender

- ☐ Male
- ☐ Female
- ☐ Prefer not to answer

(2) Please indicate your age

- ☐ Younger than 18
- ☐ 18 - 24
- ☐ 25 - 34
- ☐ 35 – 44
- ☐ 45 - 54
- ☐ Prefer not to answer

(3) Please indicate your professional experience

- ☐ no professional experience
- ☐ 0-6 months
- ☐ 6-12 months
- ☐ 1-3 years
- ☐ 3-5 years
- ☐ 5-10 years
- ☐ more than 10 years

Thank you for your answers!

4.6 Appendix 3 SURVEY OF TRAINERS
(INITIAL EVALUATION QUESTIONNAIRE)

Dear Trainer,

The aim of the study is to evaluate the training program/ curriculum, the organisation of the training as well as your preparedness to teach subjects in dual technician training, realised by Zespół Szkół Mechanicznych i Logistycznych w Słupsku (PP5), within the Project "Three-level Centres of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy (3LOE)"

Please take a few minutes to complete this evaluation form. The questionnaire is anonymous. The survey will help to improve the content/ organisation of Dual Technician Training.

Thank you.

I Evaluation of the content of the training and its organisation

Q1: Please circle the appropriate number to indicate your level of satisfaction

1 = very dissatisfied; 2=somewhat dissatisfied; 3= Neither satisfied nor dissatisfied; 4=somewhat satisfied; 5=very satisfied

	Very Dissatisfied				**Very Satisfied**
How do you evaluate the program/ curriculum of the training in general?	1	2	3	4	5
How do you evaluate the activities planned in the training in terms of their fulfilling the objectives outlined in the program/curriculum?	1	2	3	4	5
How do you evaluate the length of the training?	1	2	3	4	5
How do you evaluate the balance between theoretical and practical classes/activities?	1	2	3	4	5
How do you evaluate the organisation of the training?	1	2	3	4	5
How do you evaluate the availability of materials for the training?	1	2	3	4	5
How do you evaluate the degree of flexibility of the training?	1	2	3	4	5

Q2: What challenges do you envisage as regards the application of the program/ curriculum of the dual technician training? How could these challenges be mitigated?

_____

_____

_____

II Evaluation of the trainers' preparedness to run the trainings

Q3: Please indicate your level of agreement with the statements listed below.

1 = very dissatisfied; 2=somewhat dissatisfied; 3= Neither satisfied nor dissatisfied; 4=somewhat satisfied; 5=very satisfied

	Very Dissatisfied				**Very Satisfied**
How do you evaluate your understanding of the objectives of the training?	1	2	3	4	5
How do you evaluate your pedagogical skills to work with trainees?	1	2	3	4	5
How do you evaluate your subject-related competence to teach selected subjects/ supervise activities?	1	2	3	4	5
How do you evaluate your motivation to instruct trainees in the dual technician training?	1	2	3	4	5
How do you evaluate the assistance on the part of your colleagues in relation to the training?	1	2	3	4	5
How do you evaluate the assistance on the part of your school management in relation to the training?	1	2	3	4	5

Q4: What other issues would you like to raise in relation to your preparedness as a trainer in the training?

_____

Background information

(1) Please indicate your gender.

- ☐ Male
- ☐ Female
- ☐ Prefer not to answer

(2) Please indicate your age

- ☐ 18 - 24
- ☐ 25 - 34
- ☐ 35 - 44
- ☐ 45 - 54
- ☐ 55 - 64
- ☐ 65 or older
- ☐ Prefer not to answer

(3) Please indicate how long have you worked as a trainer?

- ☐ 6 months to less than 1 year
- ☐ 1 year to less than 3 years
- ☐ 3 years to less than 5 years
- ☐ 5 years to less than 10 years
- ☐ 10 years to less than 15 years
- ☐ 15 years or more
- ☐ Other

(4) What is the highest level of education you have completed?

- ☐ Vocational secondary education
- ☐ Professional higher education
- ☐ Bachelor's degree or equivalent qualification
- ☐ Master´s degree or equivalent qualification
- ☐ Other

(5) Did you receive additional training/ support in relation to dual technician training?

- ☐ YES
- ☐ NO

Thank you for your answers!

4.7 Appendix 4 SURVEY OF TRAINERS (MIDWAY EVALUATION QUESTIONNAIRE)

Dear Trainer,

The aim of the study is to evaluate the effectiveness of dual technician training, realised by Zespół Szkół Mechanicznych i Logistycznych w Słupsku (PP5), within the Project "Three-level Centres of Professional Excellence: Qualification, Entrepreneurship and Innovation in the Green Economy (3LOE)"

Please take a few minutes to complete this evaluation form. The questionnaire is anonymous. The survey will help to improve the content/ organisation of Dual Technician Training.

Thank you.

I Evaluation of the content of the training and its organisation

Q1: Please circle the appropriate number to indicate your level of satisfaction

1 = very dissatisfied; 2=somewhat dissatisfied; 3= Neither satisfied nor dissatisfied; 4=somewhat satisfied; 5=very satisfied

	Very Dissatisfied				**Very Satisfied**
How do you evaluate the program/ curriculum of the training after its completion?	1	2	3	4	5
How do you evaluate the activities in the training in terms of their fulfilling the objectives outlined in the program/curriculum?	1	2	3	4	5
How do you evaluate the length of the training?	1	2	3	4	5
How do you evaluate the balance between theoretical and practical classes/activities?	1	2	3	4	5
How do you evaluate the organisation of the training?	1	2	3	4	5
How do you evaluate the availability of materials for the training?	1	2	3	4	5
How do you evaluate the facilities available for the training?	1	2	3	4	5
How do you evaluate the degree of flexibility					

of the training?	1	2	3	4	5

Q2: What challenges did you encounter while realising the training? How did you mitigate those challenges?

_____

_____

_____

II Evaluation of trainees' participation in the training.

Q3: Please circle the appropriate number to indicate your level of satisfaction

1 = very dissatisfied; 2=somewhat dissatisfied; 3= Neither satisfied nor dissatisfied; 4=somewhat satisfied; 5=very satisfied

	Very Dissatisfied				**Very Satisfied**
How do you evaluate the trainees' knowledge at the beginning of the training?	1	2	3	4	5
How do you evaluate the trainees' knowledge at the end of the training?	1	2	3	4	5
How do you evaluate the progress made by the trainees in terms of the practical skills acquired?	1	2	3	4	5
How do you evaluate the trainees' engagement in the training?	1	2	3	4	5
How do you evaluate cooperation between trainees?	1	2	3	4	5
How do you evaluate trainees' work and learning organization?	1	2	3	4	5
How do you evaluate the readiness of trainees to work in the profession?	1	2	3	4	5

Q4: What methodological and/or organisational changes should be made to improve the training so that it better answers the needs of trainees?

_____

_____

_____

III Evaluation of the cooperation between the school and companies.

Q5: Please indicate your level of agreement with the statements listed below.

1=Strongly Disagree; 2= Disagree; 3= Neither agree nor disagree; 4=Agree; 5=Strongly Agree

	Strongly Disagree				**Strongly Agree**
The company has been engaged in the preparation of the program/ curriculum.	1	2	3	4	5
The company has been fully engaged in the realisation of the training.	1	2	3	4	5
The company followed the program/ curriculum closely.	1	2	3	4	5
Cooperation with the company has been smooth.	1	2	3	4	5

Q6: What improvements could be made in terms of cooperation between the school and the company while realising dual technician training?

_____

_____

_____

Background information

Please indicate your gender.

- ☐ Male
- ☐ Female
- ☐ Prefer not to answer

Please indicate your age

- ☐ 18 - 24
- ☐ 25 - 34
- ☐ 35 - 44
- ☐ 45 - 54
- ☐ 55 - 64
- ☐ 65 or older
- ☐ Prefer not to answer

Please indicate how long have you worked as a trainer?

- ☐ 6 months to less than 1 year
- ☐ 1 year to less than 3 years
- ☐ 3 years to less than 5 years
- ☐ 5 years to less than 10 years
- ☐ 10 years to less than 15 years
- ☐ 15 years or more
- ☐ Other

What is the highest level of education you have completed?

- ☐ Vocational secondary education
- ☐ Professional higher education
- ☐ Bachelor's degree or equivalent qualification
- ☐ Master´s degree or equivalent qualification
- ☐ Other

Thank you for your answers!

5 Evaluation Report[10]

5.1 Overview

The 3LoE project aims to promote work-based learning through the introduction of dual vocational training at various educational levels, including at first stage (EQF 3-4), especially in countries that have used school-based vocational training until this point in time. In the case of dual vocational education up to 75% of the entire training period is spent in companies. However, the exact percentage depends on the country and the individual agreement with a company.

The present evaluation report concerns the implementation of a five-year dual technician programme realised by Tadeusz Tański School of Mechanics and Logistics in Słupsk (PP5). The institution launched the dual system in September 2021, so the present evaluation concerns the initial phase and the mid-way phase of the evaluation (as in September 2024 the programme is only three years into realisation).

5.2 Evaluation concept: dates, addresses, design

The evaluation concept was submitted in 2021 as part of the evaluation cycle that aimed at providing a solid assessment tool for the evaluation of the programmes implemented at the first level of vocational training. The conclusions of the evaluation research will contribute to improving the quality, and especially the effectiveness of training, show the limitations of the training model and indicate the direction for further activities.

Evaluation of dual technician training is realised according to the following calendar:

- initial questionnaire: October/ November 2021
- midway questionnaire: February/ March 2024
- draft of the final report: 1 May 2024
- final report: 30.06.2024

According to the methodology presented in the Evaluation Concept document, four questionnaires were prepared:

Two written surveys (questionnaires) of **participants**:

- ☐ one at the beginning of the training (initial evaluation – see Appendix 1), and https://forms.gle/wTUpz6SNLTAprVGF6

- ☐ one at the end of the training (final evaluation - see Appendix 2) https://forms.gle/bifamo7UjES4muBz5

[10] Developed by Pomeranian University in Słupsk (Uniwersytet Pomorski w Słupsku

The initial evaluation questionnaire were divided into two parts:

(1) evaluation of motivation to participate in the training,
(2) evaluation of the expectations of the participant.

The midway evaluation questionnaire is divided into three parts:

(1) evaluation of the motivation measured half-way through the training,
(2) evaluation of satisfaction with the training content,
(3) evaluation of the trainers and the organization of the training.

Two written surveys (questionnaires) of all **trainers (teachers)** participating in the training:

- ☐ one at the beginning of the training (initial evaluation – see Appendix 3) https://forms.gle/zhT9Km3GU4AoPzKL7

- ☐ one at the end of the training (final evaluation – see Appendix 4). https://forms.gle/x2CwyCRRzBJpK1mT9

All trainers were asked to fill out questionnaires in the first weeks of the training (initial evaluation), and half-way through the training (midway evaluation).

The initial evaluation is divided into two parts:

(1) evaluation of the training program/ curriculum,
(2) evaluation of the preparedness to carry out training activities.

The midway evaluation is divided into three parts:

(1) evaluation of the content of the training and its organisation,
(2) evaluation of the trainee's participation in the training,
(3) evaluation of the cooperation between the school and companies (if applicable).

All questionnaires were administered in the online form. An example of an online questionnaire is shown in Chapter 4. The respective links to questionnaires are provided next to their description above.

NOTE: On account of the insufficient level of English language proficiency among students, the online questionnaires were translated and distributed in Polish. The Polish version is considered identical with the versions presented in Appendices 1-4.

5.3 Training description

Dual technician training implemented by Zespół Szkół Mechanicznych i Logistycznych w Słupsku (PP5) is a five-year secondary level training. The training ends with A-level exam (Matura), which enables its participants to enrol in university courses. The training envisages a total of 1,680 hours of vocational training, with the remaining 3,450 hours being general education and additional extended education, as legally prescribed by the Polish law on education. Within the vocational training, 180 hours will be dedicated to a new subject that has been implemented under the 3LoE project called "Ecological Solutions in Logistics".

Benefits for students:

Enhanced Competitiveness in the Job Market: Students gain unique skills in environmental science sought after by employers in logistics and environmental sectors.
Diverse Career Opportunities: Opens pathways in green logistics, waste management, recycling, and sustainable logistics system design and implementation.
Economic Savings for Companies: Teaches how to implement green solutions that optimize transport routes and reduce energy consumption, leading to significant cost savings.
Increased Environmental Awareness: Promotes understanding of environmental issues and responsible decision-making for a sustainable lifestyle.
Development of Practical Skills: Involvement in practical projects and collaborations with companies provides valuable real-world experience.
Emphasis on Social Responsibility: Shapes future leaders who are conscious of their societal and environmental responsibilities, driving positive change.
Up-to-Date, Future-Oriented Education: Aligns with current market trends and prepares graduates for future challenges in creating a sustainable world.
Encouragement of Creativity and Innovation: Fosters creative problem-solving and innovative approaches to environmentally sustainable logistics management.
Global Environmental Insight: Educates on global challenges like climate change and resource depletion, preparing students to contribute to solutions.
Enhanced Analytical Skills: Involves analyzing data on emissions and energy efficiency, developing valuable analytical abilities.
Networking Opportunities: Provides chances to connect with industry professionals, building valuable relationships for future careers.

The pilot training cycle started in the 2021/2022 school year and included the introduction of a specialisation in green solutions in logistics. The curriculum focused on key aspects of environmentalism, such as: Sustainability in logistics Recycling and waste management technologies Application of green practices in the supply chain. As a result of the success of the pilot and the positive reception from students, teachers and the logistics industry, it was decided to make the programme a permanent part of

the school's educational offer. The specialisation of green solutions in logistics has become an integral part of the logistics technician profession, enabling students to acquire modern skills adapted to current market requirements.

For the 2024/2025 school year, the number of pupils covered by the ecology specialisation in each class is as follows:
1st year - 45 students (starting 2024/2025)
2nd year - 31 students (starting 2023/2024)
3rd year - 44 students (starting 2022/2023)
4th year - 32 students (starting 2021/2022)

Training activities:

There were 68 different subjects planned for the entire programme. The content of the entire training can be summarised as follows:

The training program offers a comprehensive exploration of ecological logistics and sustainable practices within contemporary logistics operations. Designed to provide participants with in-depth knowledge and practical insights, it focuses on integrating ecological considerations into logistics and supply chain management. The training covers key themes, starting with an overview of modern logistics functions such as supply chain management, inventory control, transportation, and warehousing, emphasizing their interconnectivity and impact on operational efficiency.

Participants are introduced to ecological logistics, its principles, and its significance in promoting sustainability within logistics practices. The program explores the role of ecological logistics in the broader economy and its benefits for logistics firms, including economic sustainability and competitive advantages. It examines how ecological logistics serves as a strategic response to environmental challenges, encompassing crisis management and sustainable practices.

A significant portion of the training is dedicated to performance indicators and sustainability metrics used to measure the effectiveness of ecological logistics. It outlines the stages involved in developing and integrating ecological logistics within enterprises. The program analyzes the scale of waste issues, particularly in Poland, discussing types, characteristics, and classification of waste. It delves into technologies and operational techniques for waste collection, transportation, storage, and preliminary processing, and covers strategies for optimizing waste recirculation processes and designing products oriented towards recycling.

An overview of Environmental Management Systems (EMS) standards like ISO 14001 and EMAS is provided, detailing their principles, requirements, and applications. The training examines how EMS implementation affects logistics operations and contributes to sustainability. The concept of reverse logistics is explored, including

processes related to product returns, recycling, and reuse, and their integration into supply chain management. Participants identify benefits such as cost savings, customer satisfaction, and environmental impact reduction, along with best practices for implementation.

The program emphasizes designing products with their entire lifecycle in mind, focusing on recyclability and reduced environmental impact. It offers detailed coverage of renewable energy sources—solar, wind, hydro, geothermal, biomass, and biofuels—assessing their potential for development, particularly in Poland, and their applications in supporting sustainable practices.

Exploring Industry 4.0, the training examines how smart technologies, automation, and data-driven decision-making transform manufacturing and logistics. It looks at the use of information systems for tracking, managing, and optimizing environmental logistics processes. Participants are introduced to the concept of cleaner production, including waste reduction, emission control, and resource efficiency, and examine sustainable business models in logistics services and their role in improving the quality of life.

The program discusses integrating sustainability into supply chains and urban logistics to reduce environmental impact, analyzing how transportation infrastructure development affects sustainability and the environment. It introduces the concept of closed-loop supply chains and the circular economy, focusing on resource reuse and recycling strategies. The differences between traditional and green supply chains, as well as between closed-loop and open-loop systems, are explored.

Strategies for managing stakeholders in ecological logistics systems are examined, addressing their concerns and expectations. The training includes best practices for organizing and evaluating ecological logistics departments within companies. Participants analyze real-world case studies of ecological logistics solutions, highlighting successful practices and lessons learned. Challenges in managing municipal solid waste, end-of-life vehicles, used electronics, and packaging from an ecological logistics perspective are explored.

Current trends and challenges in sustainable transport are covered, including eco-innovations, policy developments, and infrastructure impacts. The training examines sustainable transport policies, green logistics strategies, and their ecological aspects. Strategies for preventive measures in ecological logistics to manage residues effectively and reduce waste generation are discussed. Participants gain an understanding of the relationship between economic activities and environmental impact, learning how to shape economic policies to support sustainability.

The overall objectives of the training are to equip participants with a comprehensive understanding of ecological logistics and sustainable practices in contemporary logistics and supply chain management; to develop skills in integrating ecological considerations into logistics operations, product design, waste management, and

energy utilization; to foster the ability to analyze and implement environmental management systems and sustainable business models; and to enhance awareness of the importance of stakeholder management, policy development, and innovation in promoting sustainability within the logistics and transportation sectors.

By the end of the training, participants will have gained in-depth knowledge of ecological logistics concepts, principles, and applications; practical insights into sustainable practices, waste management technologies, and renewable energy utilization; and skills to implement and manage ecological logistics systems and strategies effectively within their organizations. They will also understand global standards, policy implications, and the role of innovation in achieving sustainable development goals.

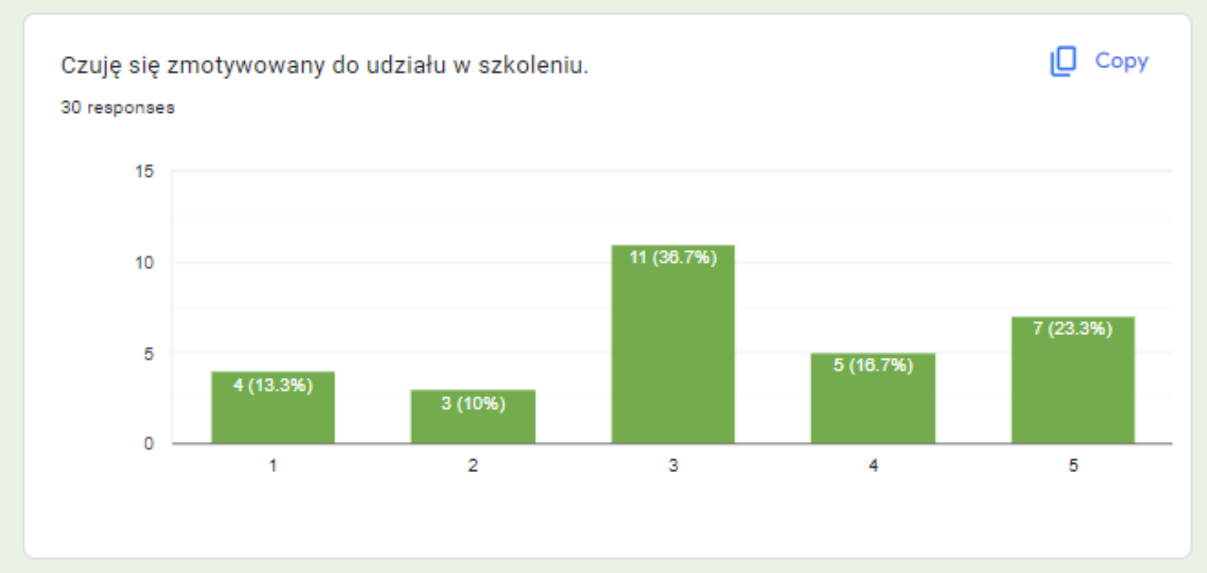
This training aims to empower professionals in the logistics and supply chain sectors to lead and contribute to sustainability initiatives, promoting environmental stewardship and operational excellence.

5.4 Findings and results

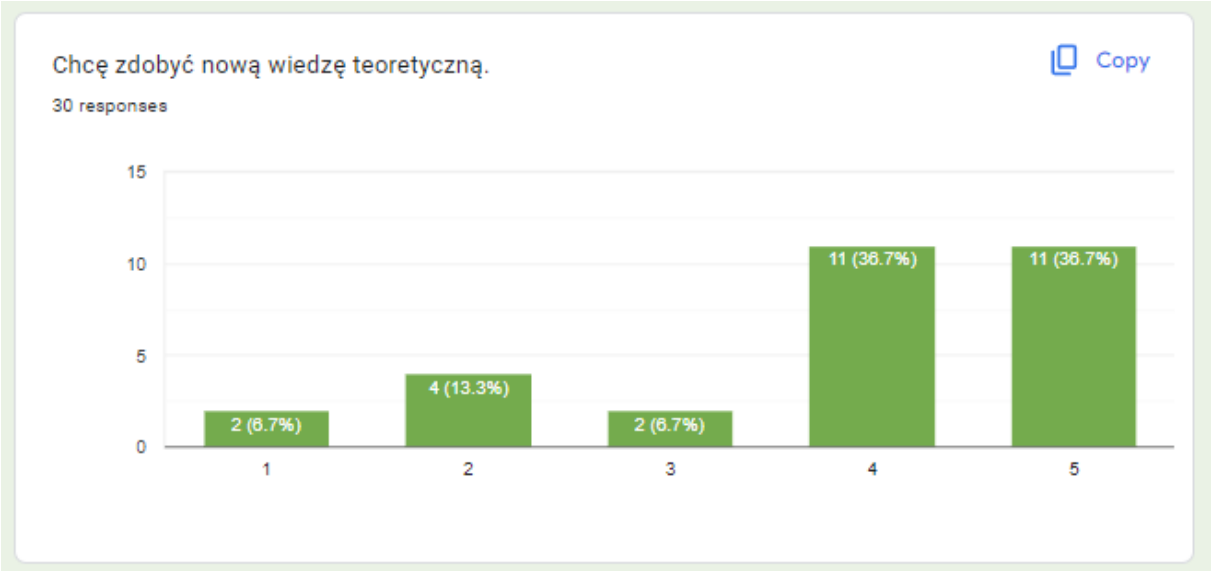
5.41 Initial survey for participants - results

Q1. Please indicate your level of agreement with the statements listed below.
1=Strongly Disagree; 2= Disagree; 3= Neither agree nor disagree; 4=Agree; 5=Strongly Agree

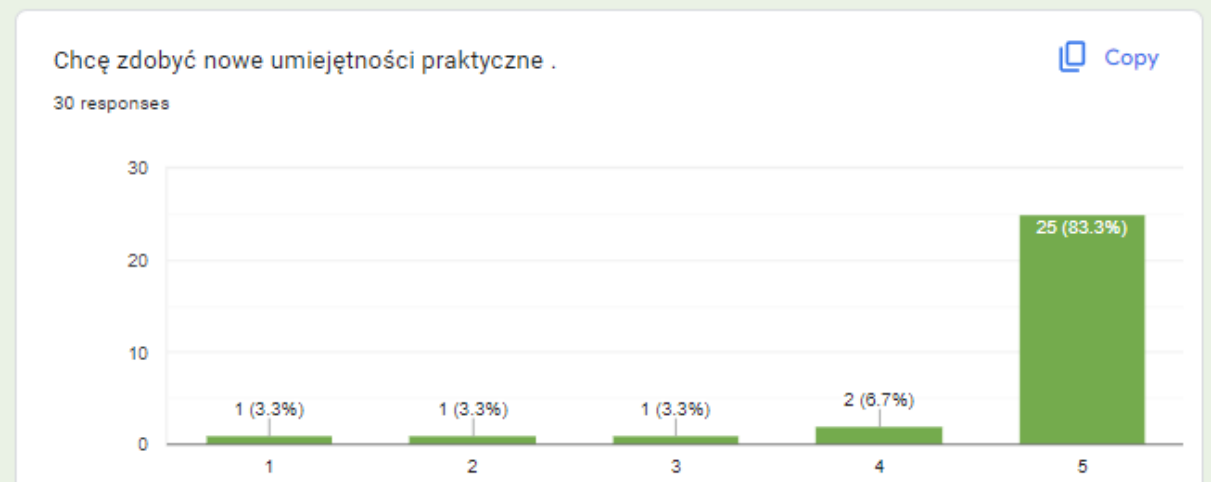
(1) I feel motivated to participate in the training



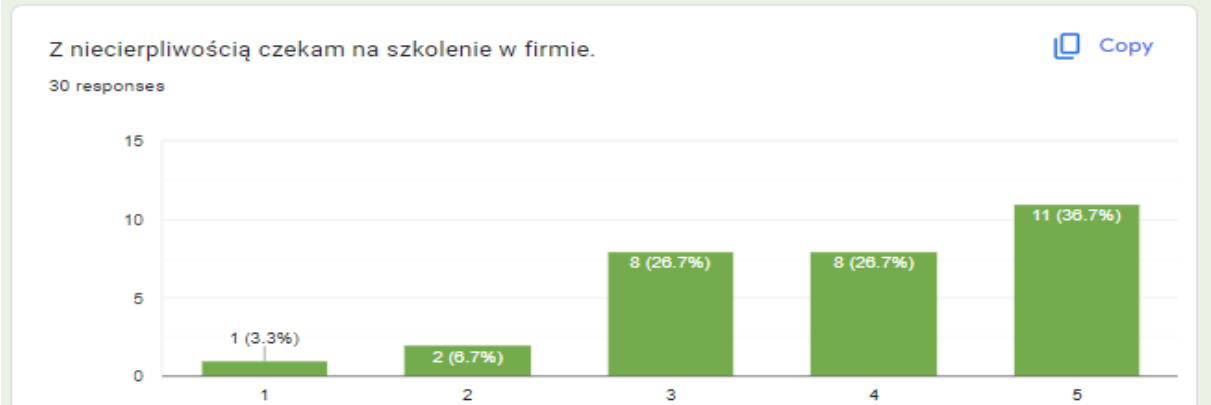
(2) I want to acquire new theoretical knowledge



(3) I want to learn new practical skills



(4) I am looking forward to my training in a company

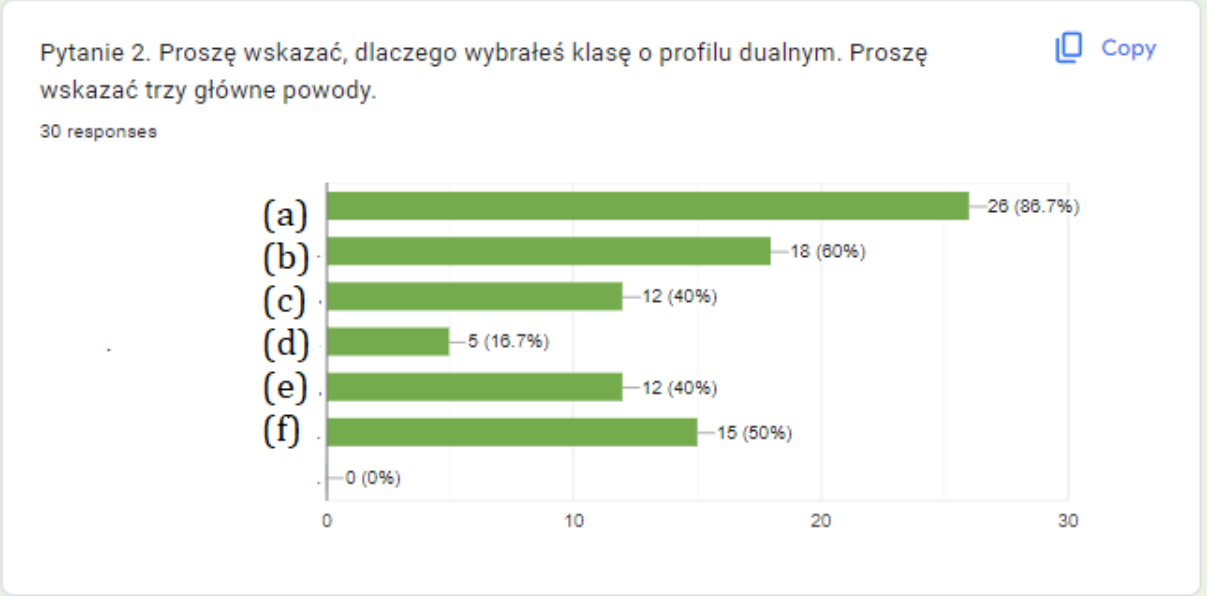


Findings:

- Students show moderate motivation to participate in the course, which may be consequent upon the fact that they do not have any experience with secondary school education, with as many as 36.6% having no opinion on the matter;
- The large majority of students are eager to participate in theoretical and practical training, with a much stronger preference (from among the two) towards practical skills (83% of the respondents think that the practical component is what they are looking forward to).
- Students are also eager to start their training in the company, with more than 60% of the respondents agreeing or strongly agreeing with the statement.

Q2: Please indicate why you have enrolled in dual technician training. Please indicate three main reasons.

(a) I want to get a well-paid job,
(b) I want to have a good position in my (future) job,
(c) I want to establish my own business,
(d) I want to improve for my own satisfaction,
(e) I want to go to university,
(f) I want to attain recognised qualifications,
(g) I want to impress my colleagues/ family,
(h) other (please, specify what motivated you to enrol in dual technician training)…



Findings:

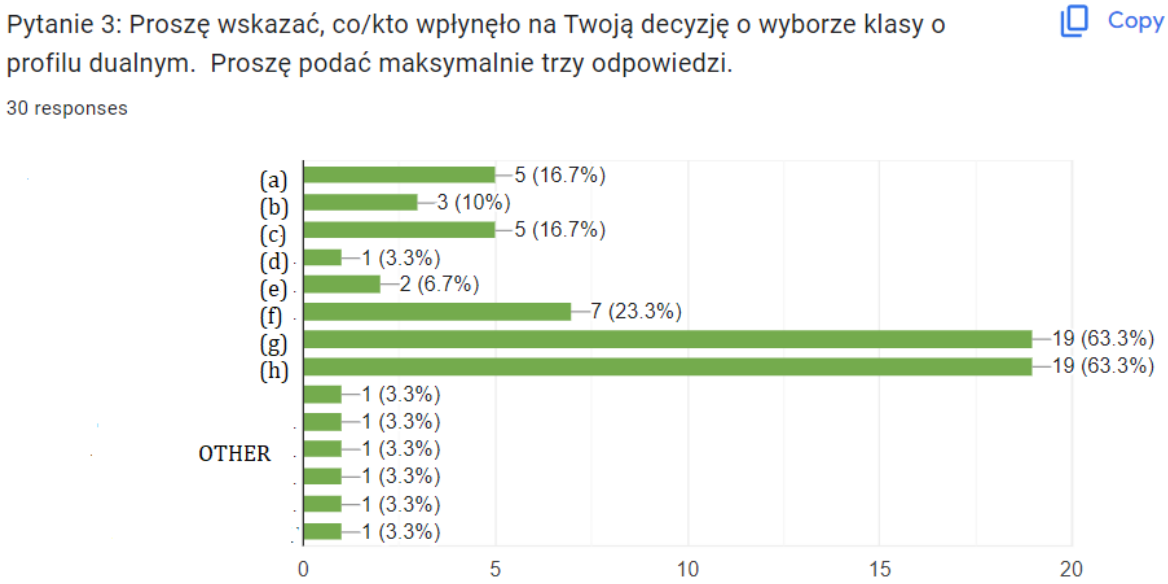
- The major motivation among students is the financial incentive, with the majority of the respondents (86.7%[11]) pointing to the well-paid job as the main motivator to take up a dual programme “Ecologic solutions in Logistics”

[11] The percentages do not add up because the respondents could choose more than one answer.

- The less frequent answers, yet related to equally strong motivators are: good position in their future job (60%), and the willingness to obtain recognised qualifications (50%).
- Less frequent answers, but still important motivators are linked to the willingness to continue education at university and the establishment of one's own business (40% each).

Q3: Please indicate what/ who influenced your decision to enrol in dual technician training. Please indicate a maximum of three answers.

(a) My partner/ guardian asked me to continue education,
(b) I wanted to learn in the same school where my friends do,
(c) My friend encouraged me to take up the training,
(d) The training is legally required in my job,
(e) I had to continue education because it is compulsory till the age of 18,
(f) I followed the advice of job counsellor/ career adviser,
(g) The school has a good reputation,
(h) The training programme is interesting,
(i) other (please specify what/ who motivated you to enrol in dual technician training).



Findings:

- The major driver for the students to choose the dual technician was linked to the fact that the school has a good reputation and that the training programme is interesting (63.3% each);
- The latter answer is especially interesting because it shows good promotion of the programme and the high degree of self-consciousness of young people in choosing their professional career;

- The role of the job counsellor cannot be underestimated, with as many as 7 (23.3%) students following their advice.
- among the OTHER answers were linked to the fact that (i) students wanted to set up their company consistent with the study profile; (ii) students wanted to study something interesting; (iii) students were motivated by their parent to choose the study programme.

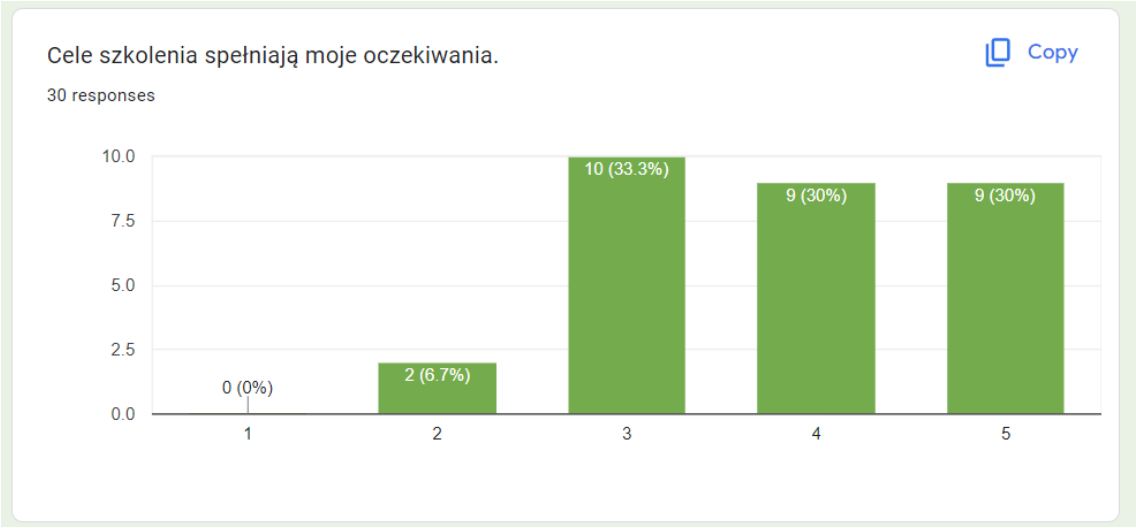
Q4: Do you have any other comments regarding your motivation to participate in dual technician training?

There were no additional comments to this question.

II Evaluation of the expectations about the dual technician training for the participant

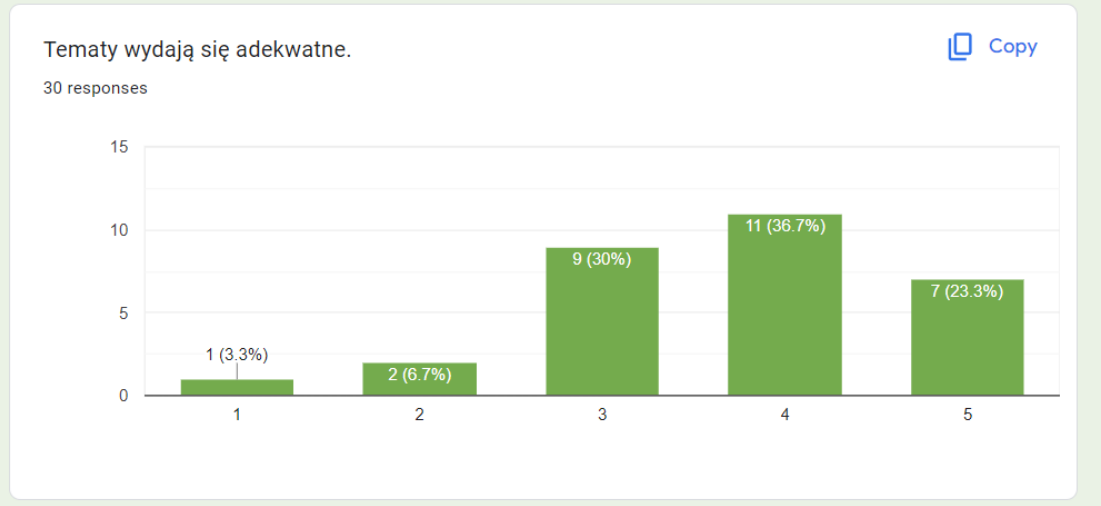
Q5: Please indicate your level of agreement with the statements listed below.
1=Strongly Disagree; 2= Disagree; 3= Neither agree nor disagree; 4=Agree; 5=Strongly Agree

(1)The training objectives meet my expectations

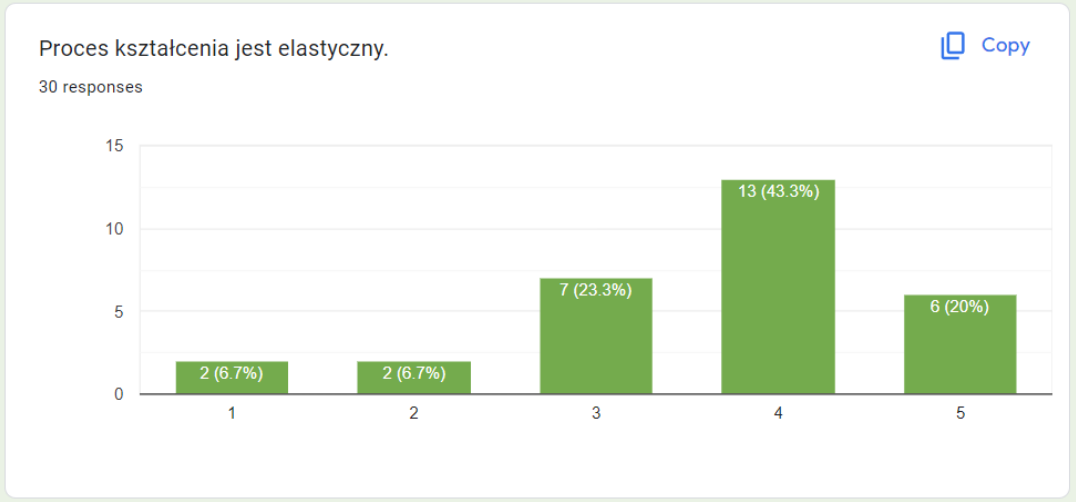


(2) The content seems well organized and easy to follow

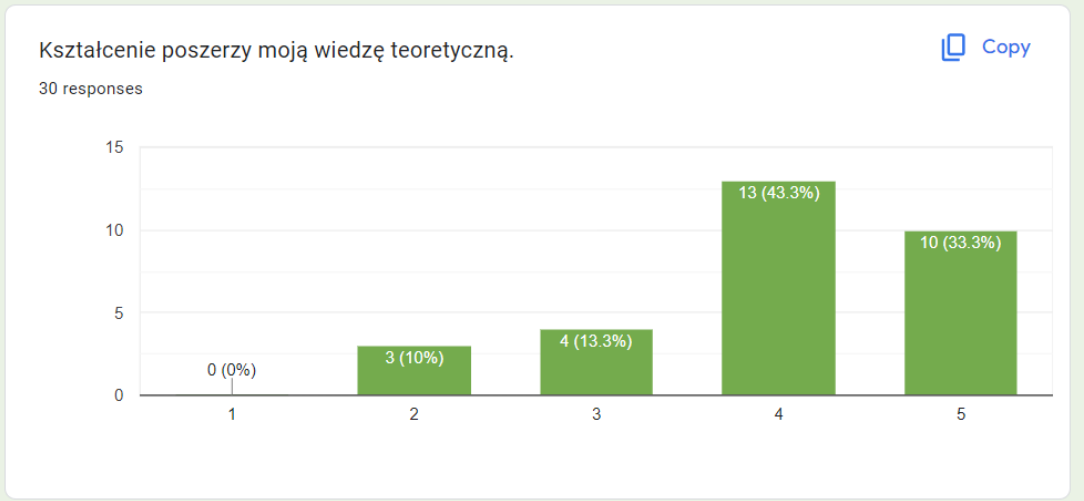
(3) The topics seem relevant to me



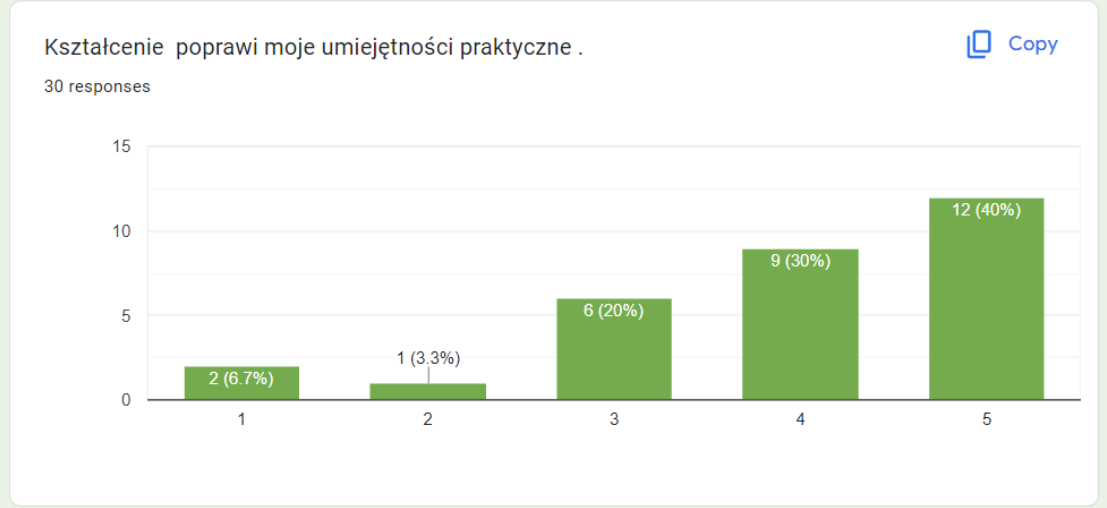
(4) The training process is flexible



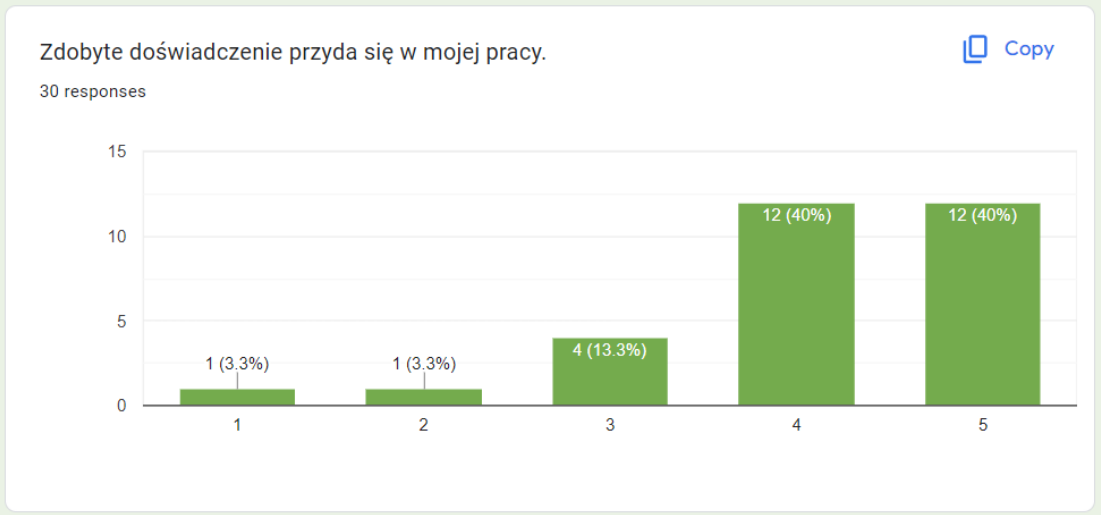
(5) The training will improve my theoretical knowledge



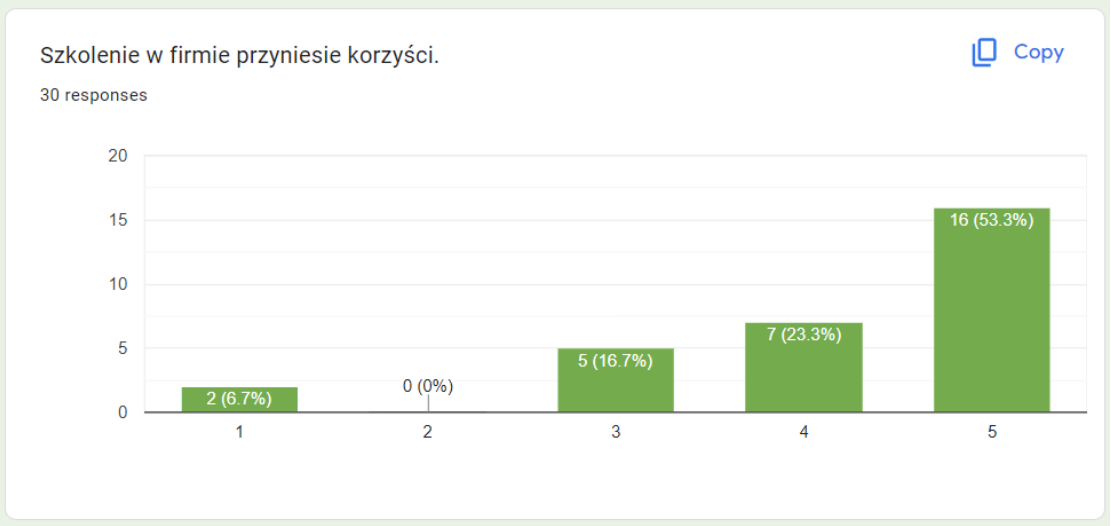
(6) The training will improve my practical skills



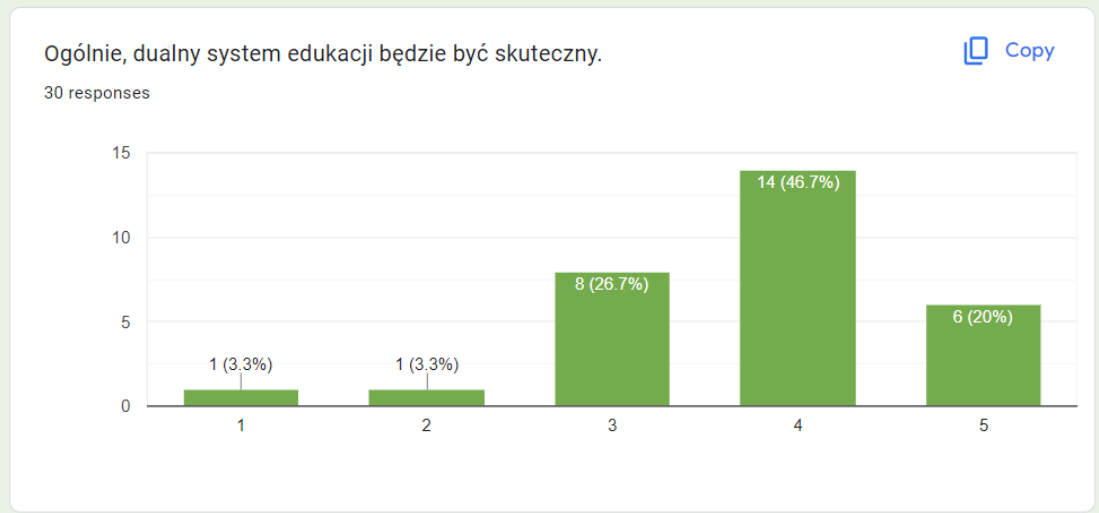
(7) The training experience will be useful in my work



(8) The training in the company will be beneficial



(9) Overall, dual education system will be effective



Findings:

- In the initial evaluation, the majority of students expected that the training would meet their expectations (agree + strongly agree = 60%), however the most frequent individual answer was 'I don't know', accounting for 33.3% of the total. This may show lack of knowledge about the outcomes of the training, which in itself is not surprising as the programme was newly launched in the school.
- Generally, students think that the content is adequate, but students are not that clear about the difficulty level and the organisation of the teaching/ learning content; However, they think that the educational process is flexible;
- Students are convinced that the programme will expand their theoretical knowledge and practical skills;
- Students think that the programme will be useful in their job;
- The respondents clearly indicate that the training in the company will be beneficial (76.6%), however they were not as enthusiastic about the dual system as such. Interestingly enough, as much as 26.7% of the respondents 'do not know' whether the dual system would be effective, which roughly

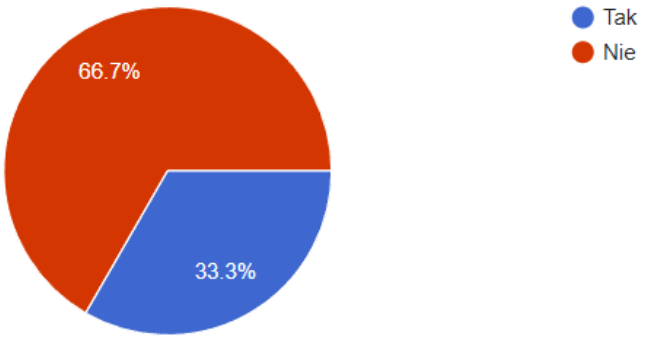
correlates with the percentage of those (33.3%) who do not know whether thre programme would meet their expectations.

Q6: Do you have any comments about your expectations about the dual technician training you enrolled in?

No registered answers.

Demographic/ additional question(s)

(7) Did you know anything about dual vocational or technician trainings before you heard about this training? (BLUE = YES / RED = NO)



Finding:

- Interestingly enough, as many as 33.3% of all respondents had had some knowledge about the dual system before they heard about the dual course offered at PP5.

5.42 Midway survey for participants - results

I Evaluation of motivation to participate in the training

Q1: Please indicate your level of agreement with the statements listed below.

1=Strongly Disagree; 2= Disagree; 3= Neither agree nor disagree; 4=Agree; 5=Strongly Agree

(1) I was motivated to participate in the training

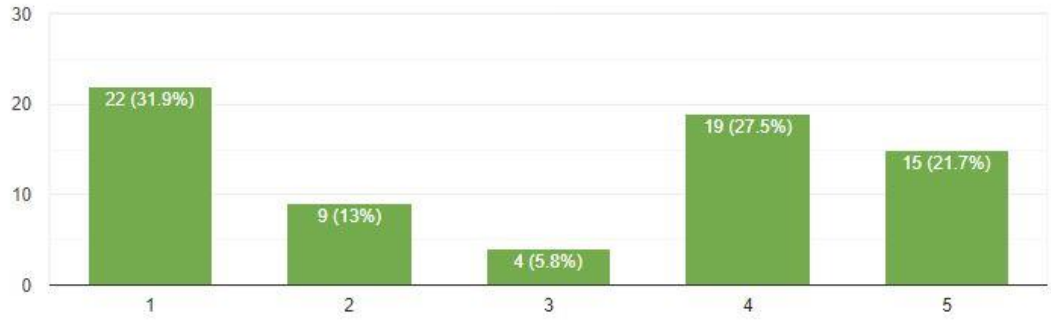
Ocena motywacji do udziału w szkoleniu dla techników dualnych

Pytanie 1. Proszę wskazać, w jakim stopniu zgadzasz się z poniższymi stwierdzeniami. 1=Zdecydowanie się nie zgadzam; 2=Raczej się nie zgadzam; 3=Nie mam zdania, 4=Raczej się zgadzam się, 5=zdecydowanie się zgadzam

Byłem zmotywowany do udziału w kształceniu

Copy

69 responses



(2) Participation and interaction were encouraged

Zachęcano mnie do uczestnictwa i interakcji

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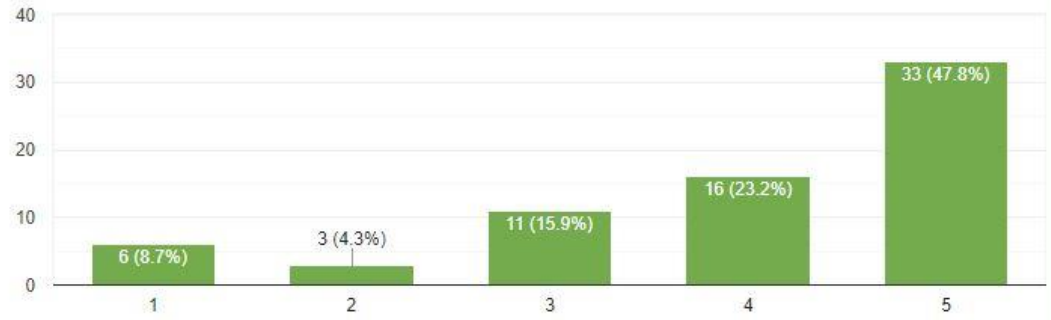
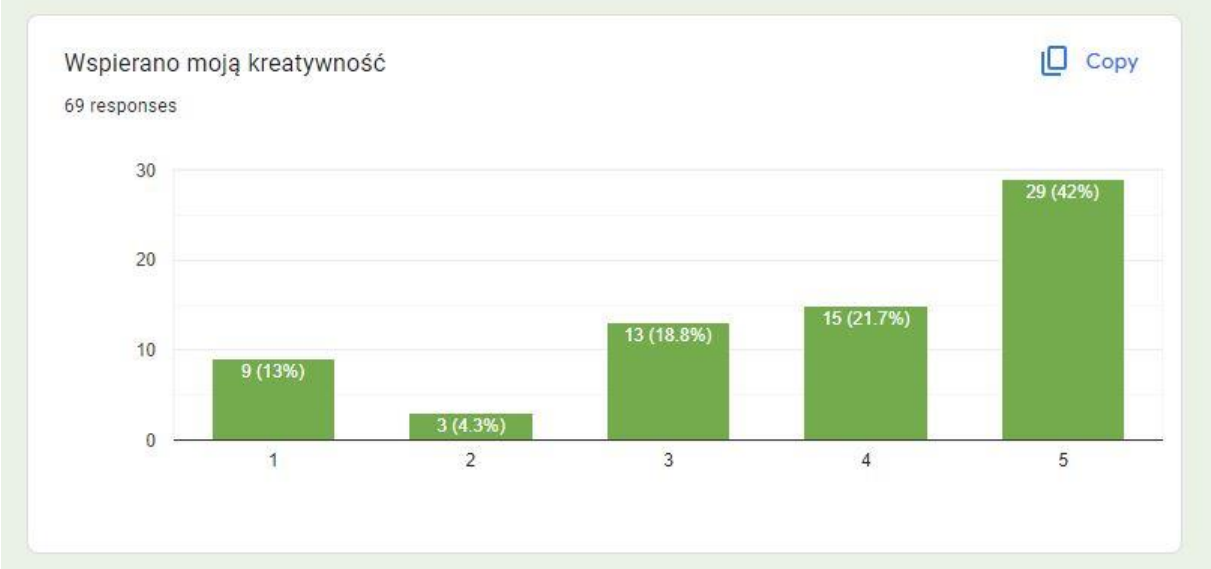


(3) My creativity was encouraged



(4) My initiative was highly evaluated

Findings:

- The evaluation reveals that students were not uniformly motivated to participate in the classes, however the percentage of positive answers being higher than the negative ones by 5 %. This still suggests some issues with the student internal or external motivation (see below);
- As regards the personal factors, such as creativity or initiative, students were generally positive, meaning that student-teacher relation must have been good and very good throughout the course;

Q2: What did you like the most about participating in a dual vocational training programme?

This open-ended question yielded various answers, most of which revolve around the following:

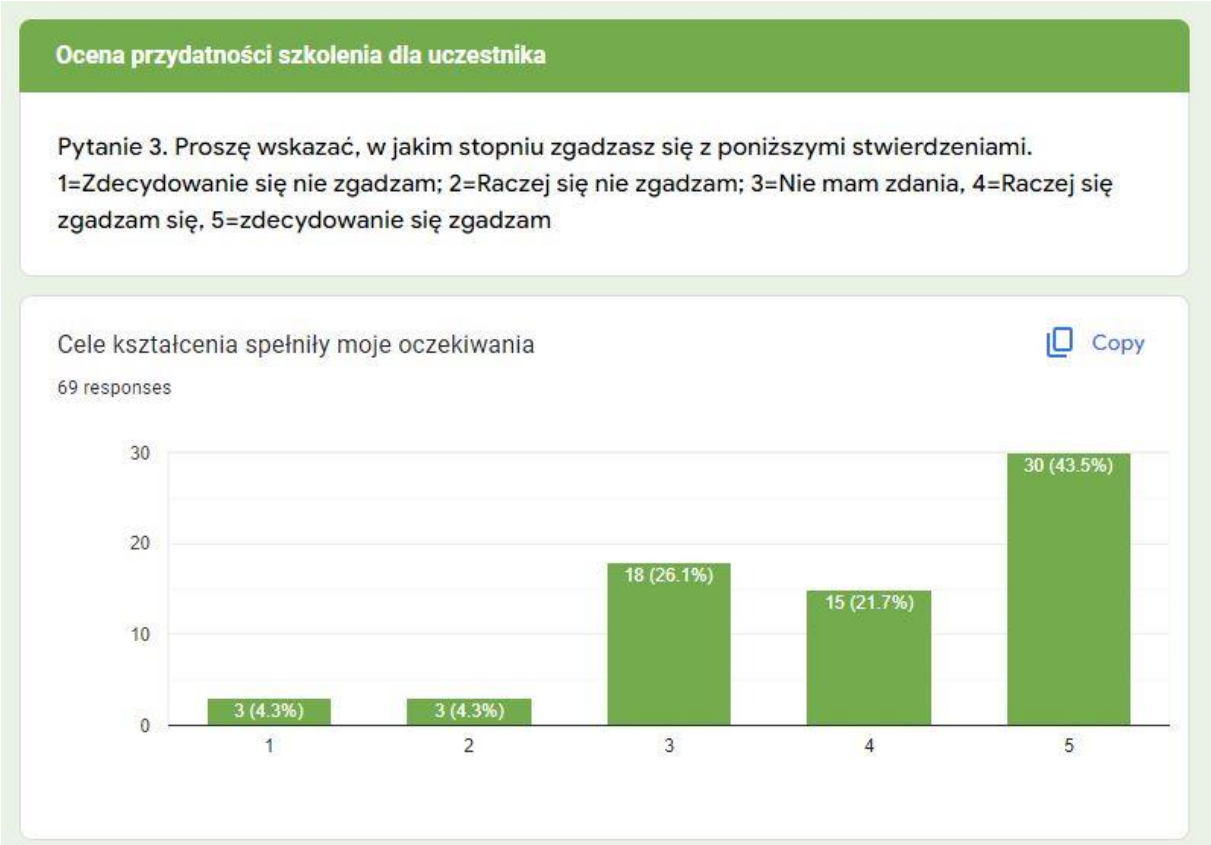
- study programme and lesson presentations,
- showing the students that ecologistics is important,
- new qualifications in the all-important ecologistics,
- the possibility of further professional growth;
- interesting and verified information, presented by highly-qualified teachers;
- very good extra-curricular activities, including study visits to companies.

There was one respondent who claimed to have done everything because they had to.

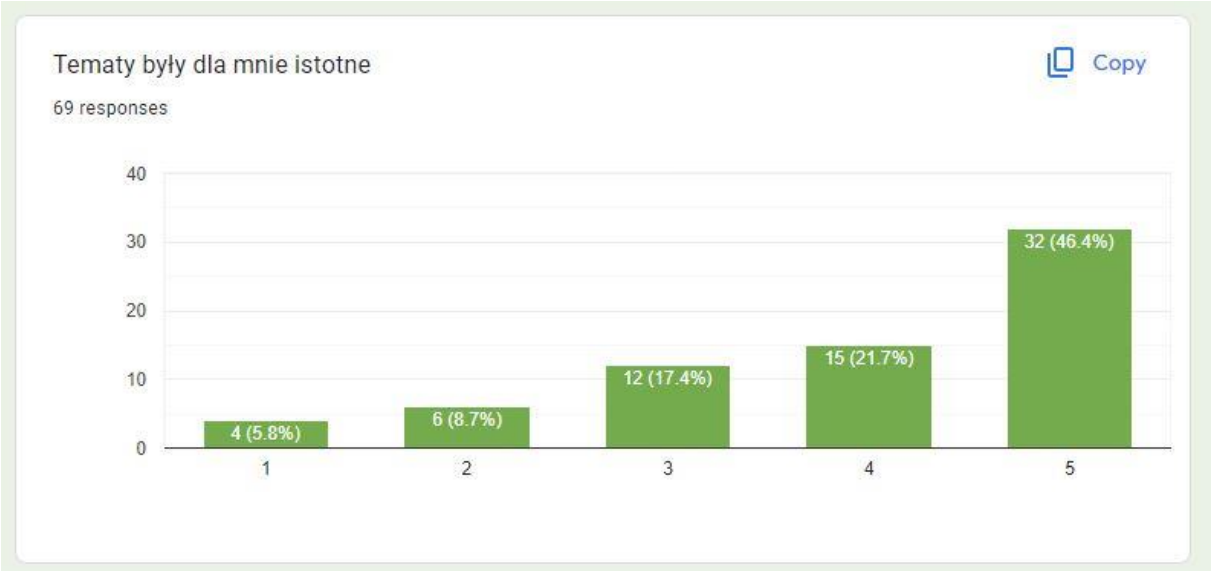
Q3: Please indicate your level of agreement with the statements listed below.

1=Strongly Disagree; 2= Disagree; 3= Neither agree nor disagree; 4=Agree; 5=Strongly Agree

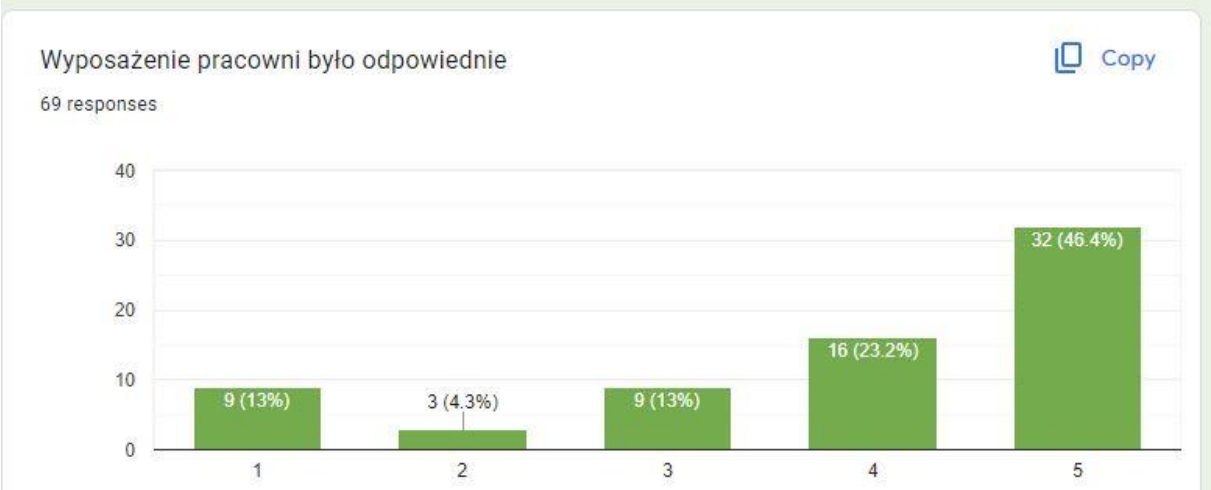
(1) The training objectives have met my expectations



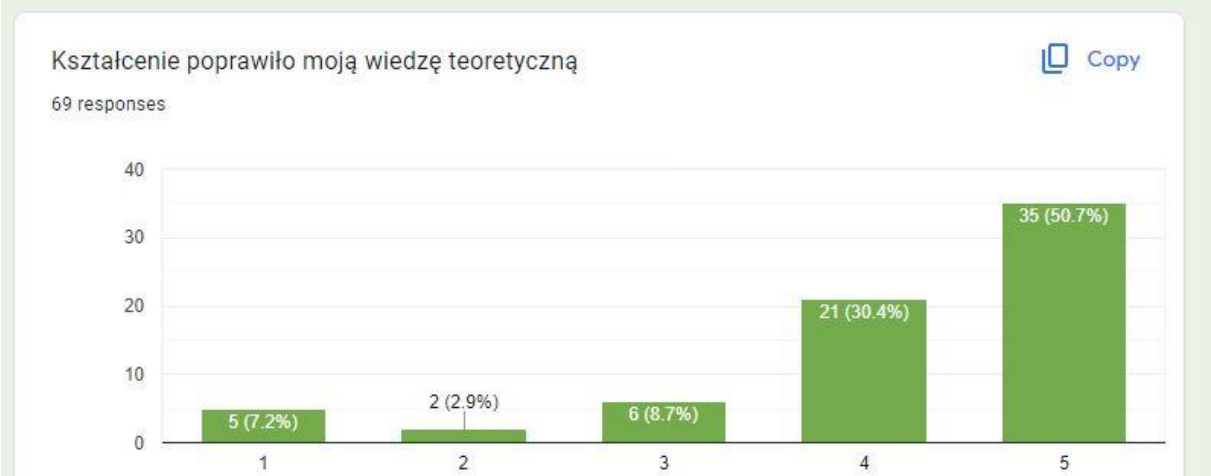
(2) The topics have been relevant to me



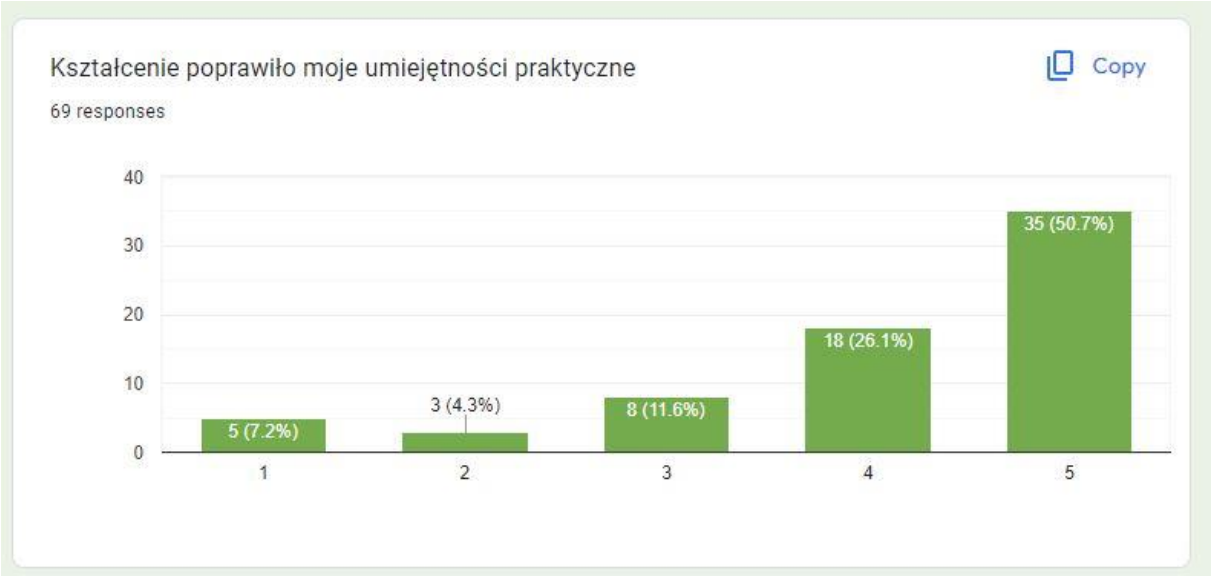
(3) The facilities for the training have been suitable



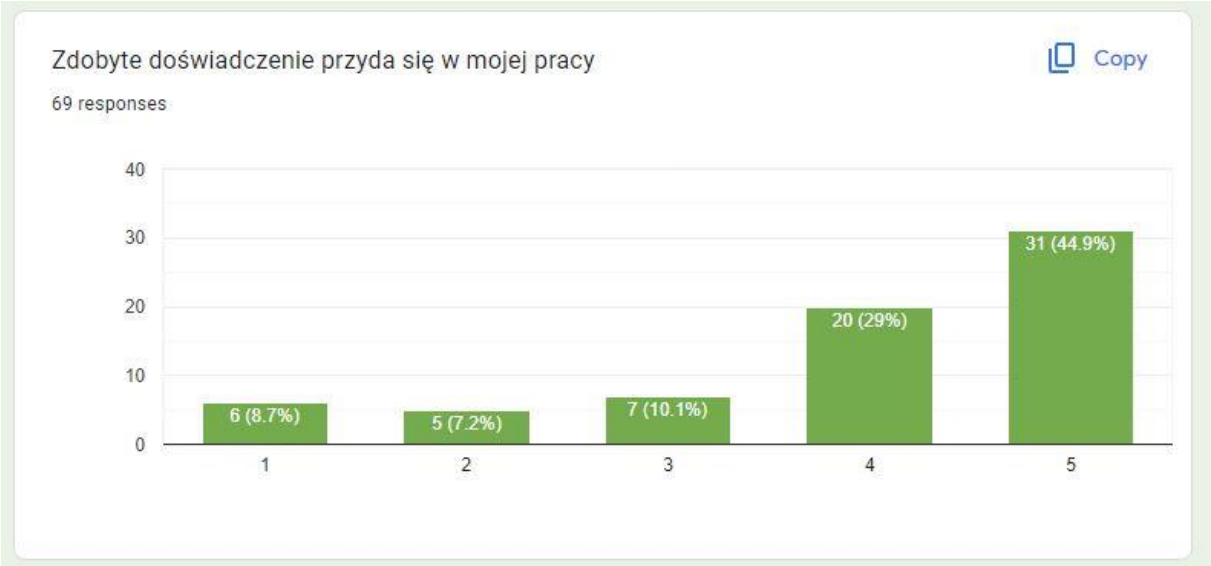
(4) The training has improved my theoretical knowledge



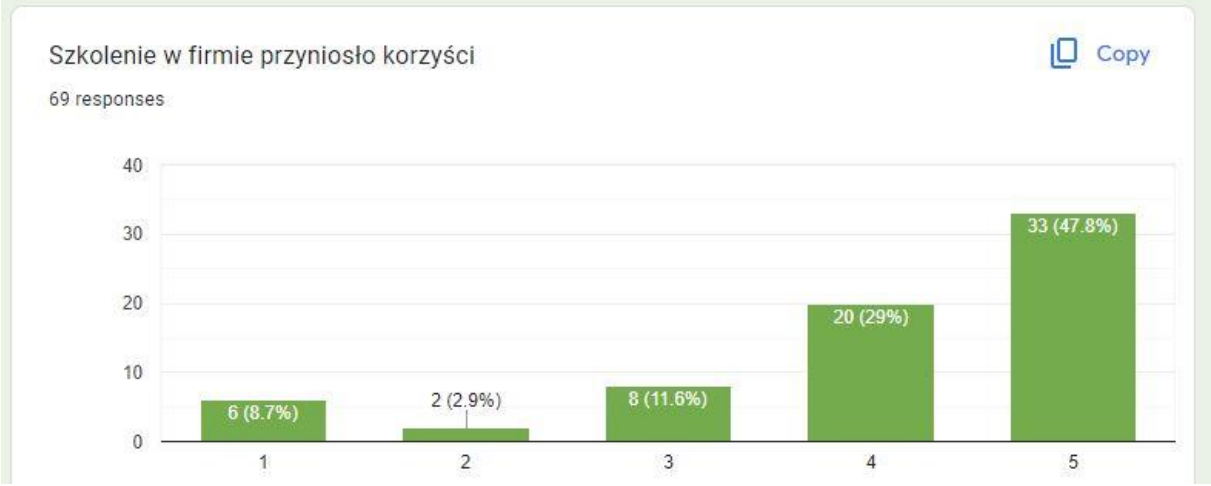
(5) The training has improved my practical skills



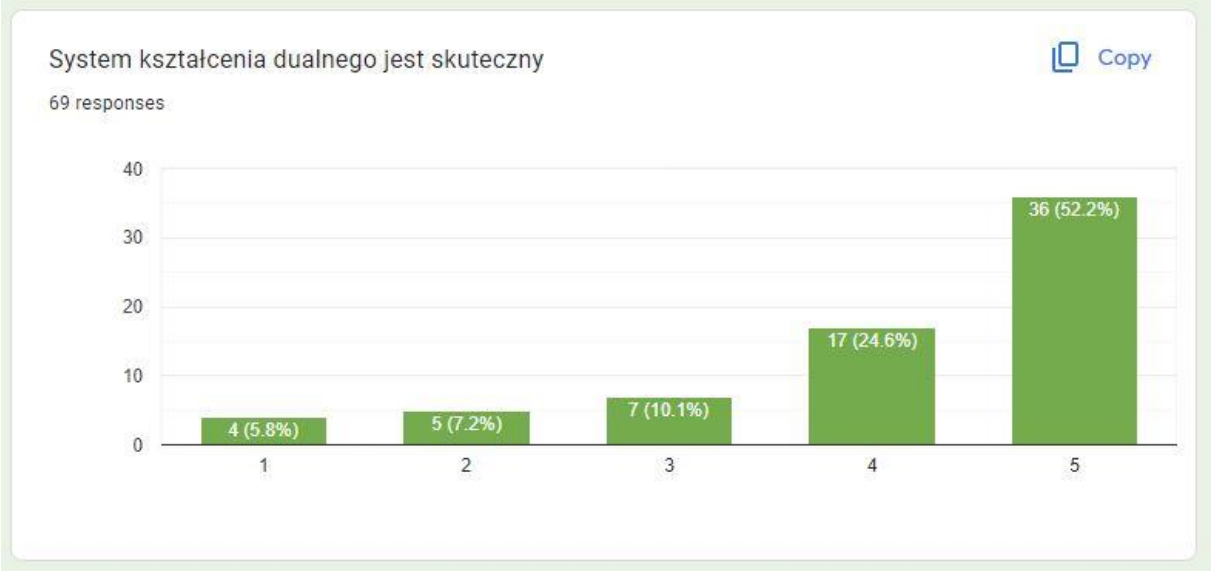
(6) The training experience will be useful in my work



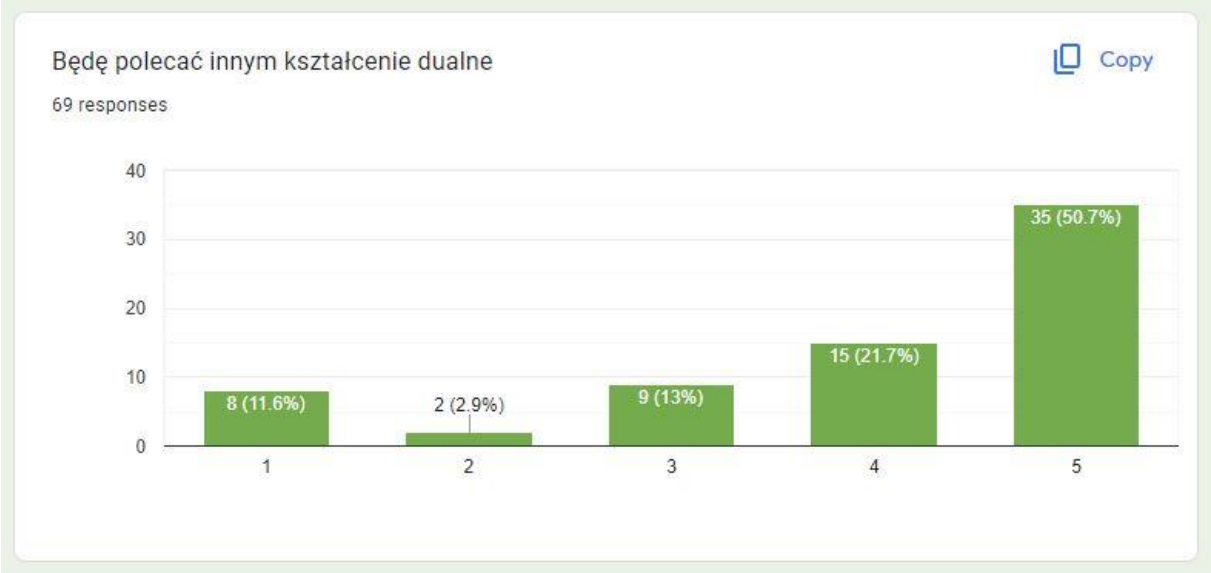
(7) The training in the company has been beneficial



(8) Dual education system has been effective



(9) I will recommend dual technician training to others



Findings:

- According to 65% of the respondents, the programme has met the initial expectations of the students. However, as many as 26% do not have their opinion on the matter, which may indicate that they are not fully aware of the potential benefits of the training;
- Students indicated that throughout the programme, both theoretical knowledge and practical skills have definitely improved (81% and 71%, respectively).
- The respondents generally think that the experience gained will be useful in their work, and the training will be beneficial;

- Almost 77% of respondents find the dual system implemented in the programme effective. This directly corresponds to 73% of the respondents who say that they would recommend the programme to others.

Q4: Do you have any comments regarding the usefulness of dual technician training? Which part was the most useful? Which part should be improved?

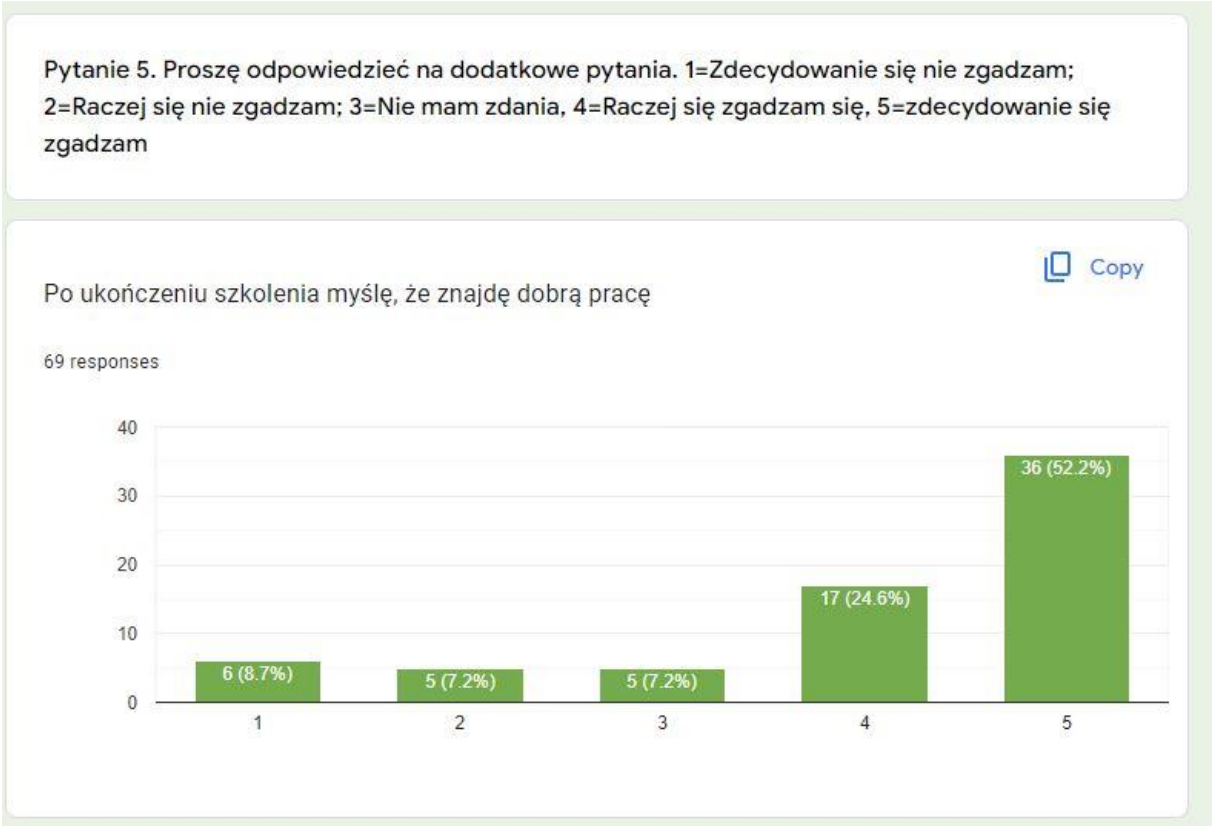
- The dominant answer to this question was that 'everything' was useful, and that there were no part to be improved;
- Students were most happy about the new, additional information gathered;
- One responded pointed to an insufficient number of educational materials/ instruments in one of the classrooms;

Q5: Please, answer these additional questions.

1=Strongly Disagree; 2= Disagree; 3= Neither agree nor disagree; 4=Agree; 5=Strongly Agree

After the completion of the training, I think …

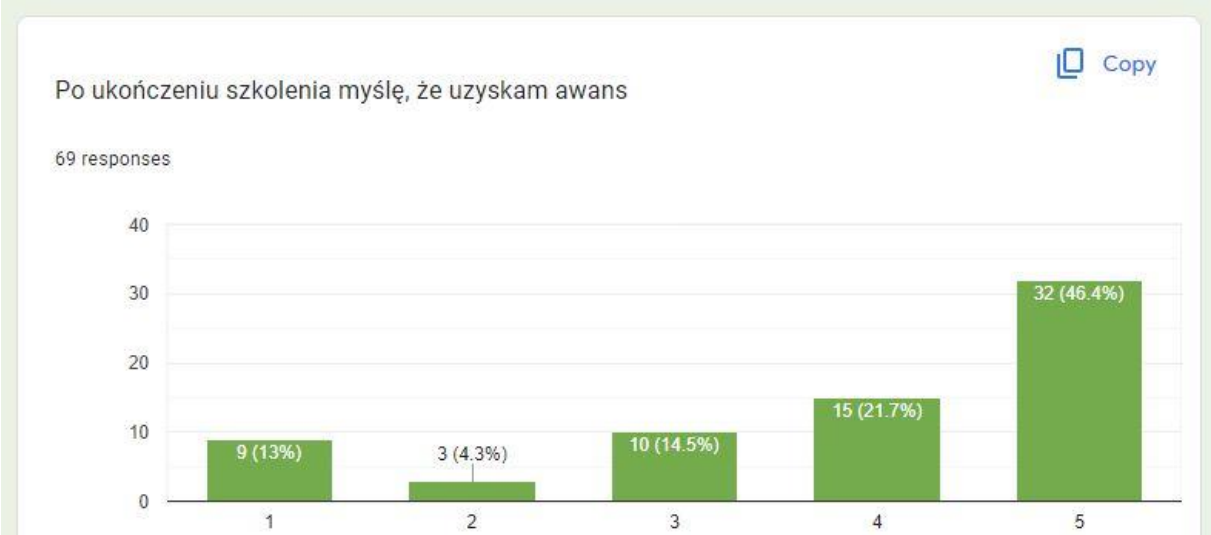
(1) I will get a good job



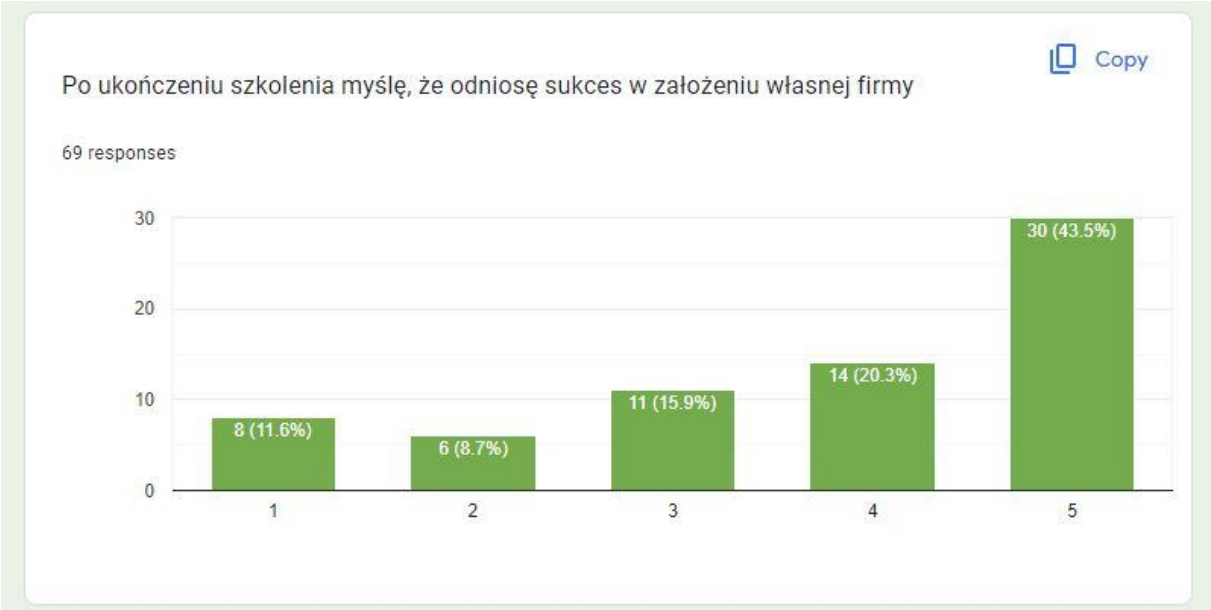
(2) I will earn a lot of money

(3) I will feel more secure in my job

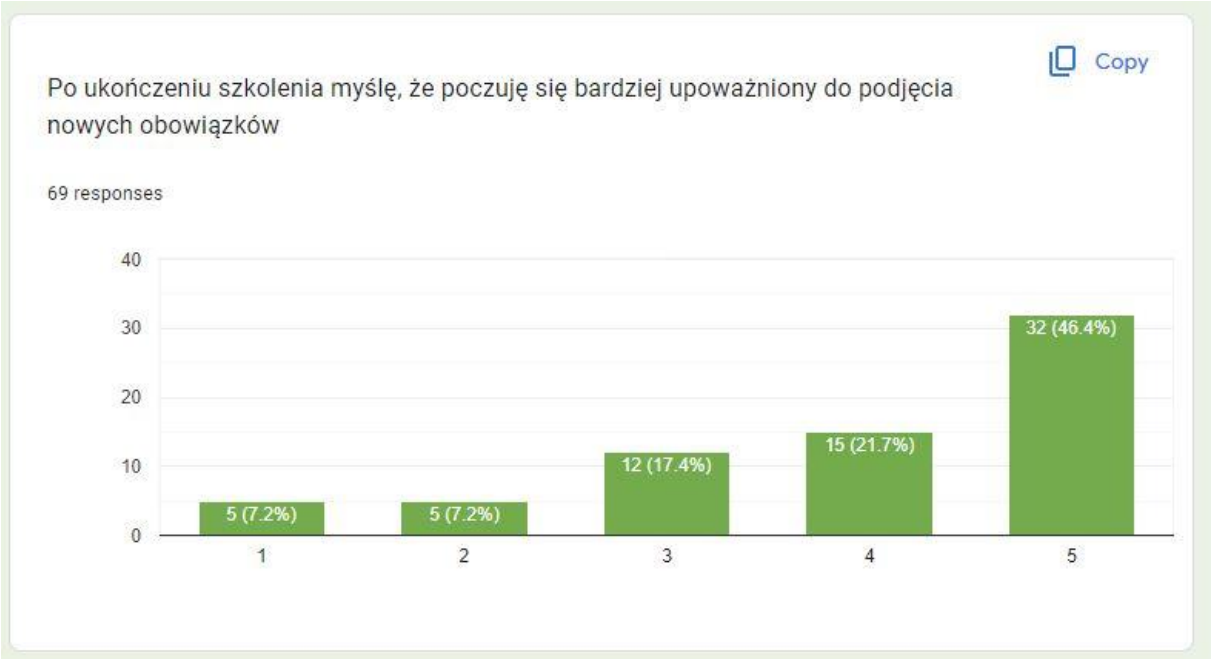
(4) I will get promoted



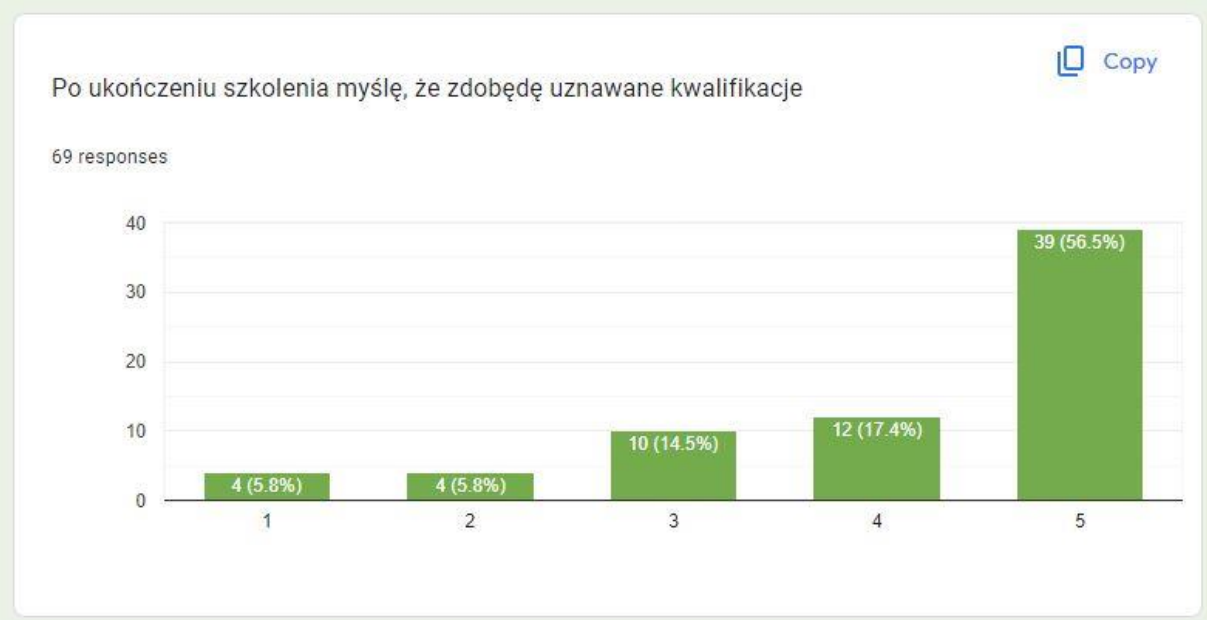
(5) I will be successful with setting my own business



(6) I will feel more empowered to take new responsibilities



(7) I will attain recognised qualifications



(8) I will do my job with greater satisfaction

(9) other…

To this open-ended question students answered in the following manner.
“I think that after the completion of the training, I will:

- find an interesting job in the field of ecologistics;
- be successful in their professional life (will find a good/ well-paid job);
- have expanded their knowledge,
- be much better;
- be successful with establishing their own company.”

Findings:

- Compared to the initial evaluation, students recognise the importance (and the value) of the study programme in developing their stronger position in the job market;
- They recognise that their skills will have improved;
- They are motivated to transfer the skills to their new professional careers, including in their own (future companies).

Q6: How does participating in dual technician training programme prepare you to become a highly-skilled and highly-valued employee?

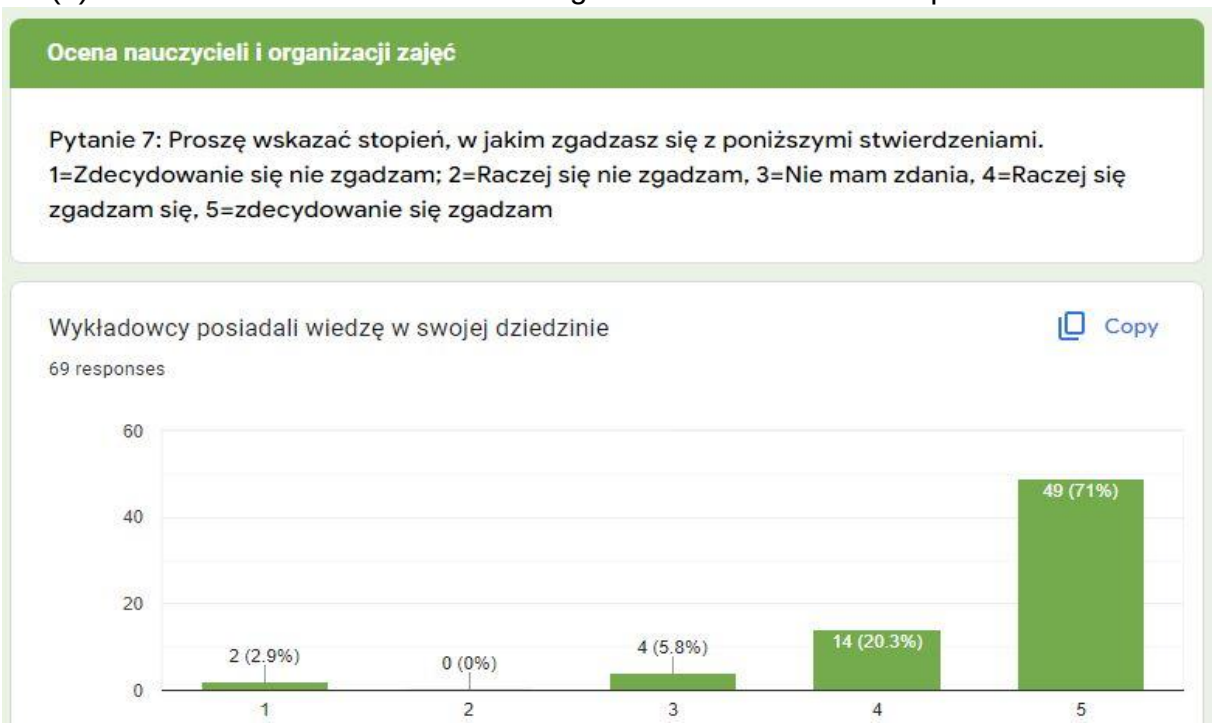
The student respondents mainly focussed on:

- new knowledge and skills that will open new opportunities;
- new ways of thinking that the dual programme has proven to be effective;
- practical skills that are sought for by potential employers;
- experience (that they gain in companies);
- the true/ practical preparation to their professional careers;
- creativity that the programme has evoked in students.

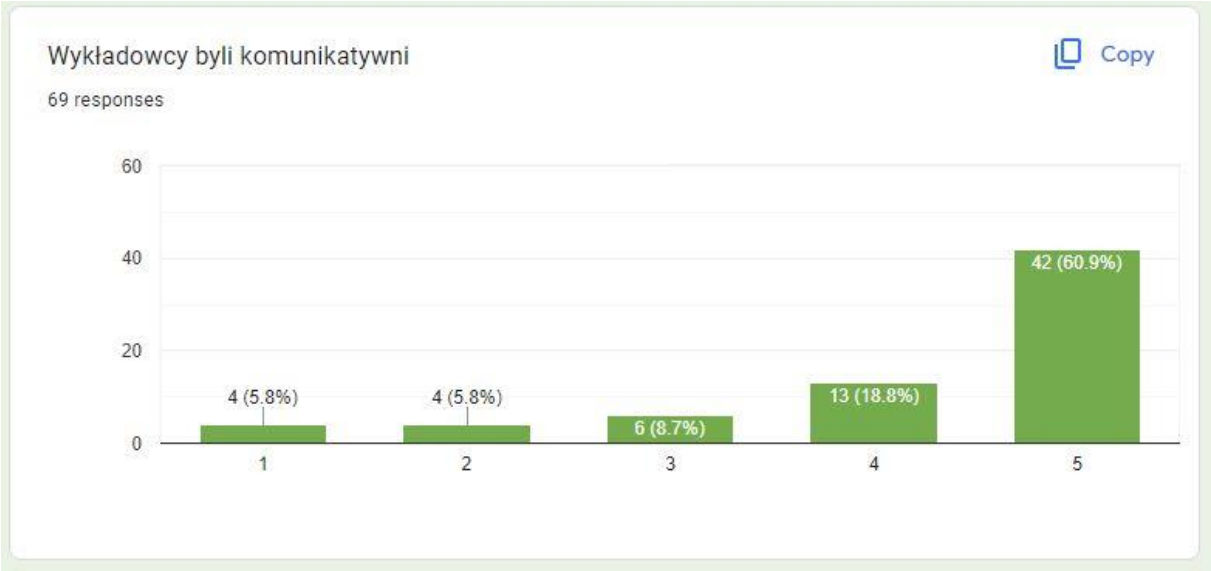
III Evaluation of the trainers and the organization of the training

Q7: Please indicate your level of agreement with the statements listed below..
1=Strongly Disagree; 2= Disagree; 3= Neither agree nor disagree; 4=Agree; 5=Strongly Agree

(1) The lecturers have been knowledgeable in their area of expertise

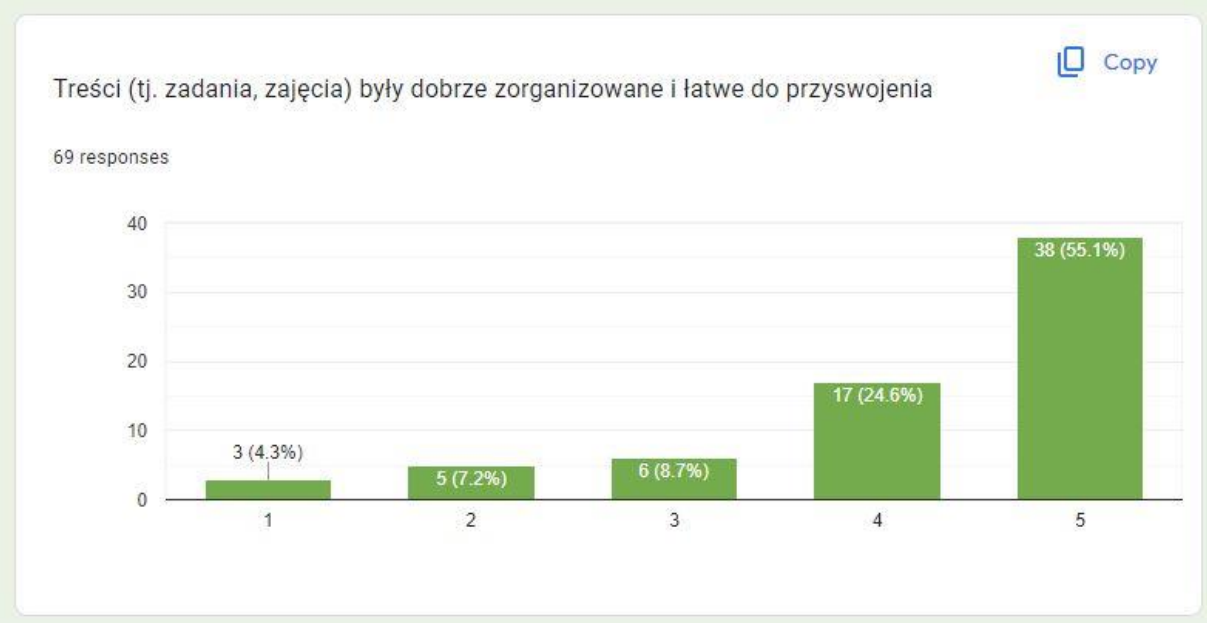


(2) The lecturers have been good communicators

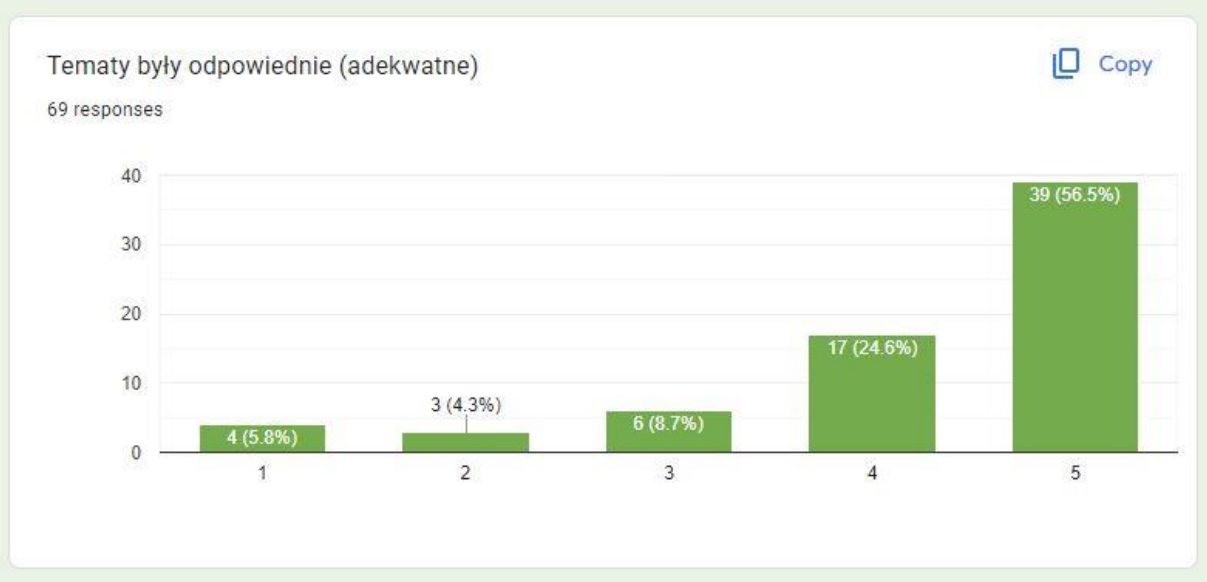


(3) The feedback received from the trainers (teachers) has been useful

(4) The content (i.e. tasks, activities) has been well organized and easy to follow



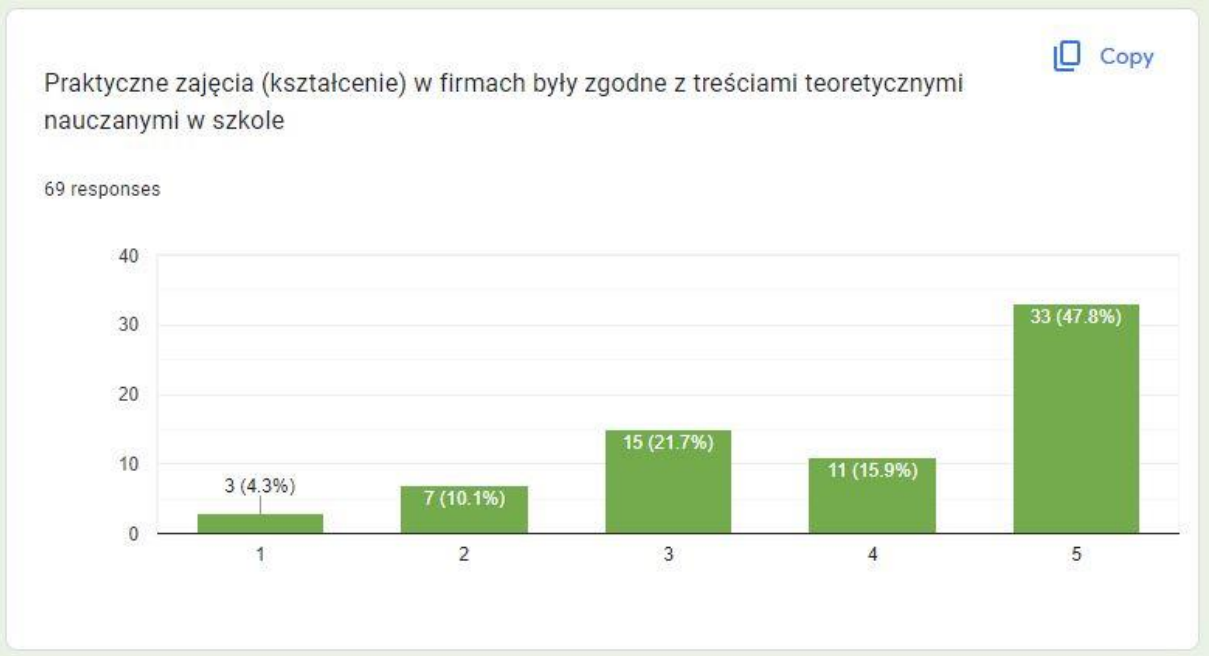
(5) The topics have been relevant to me



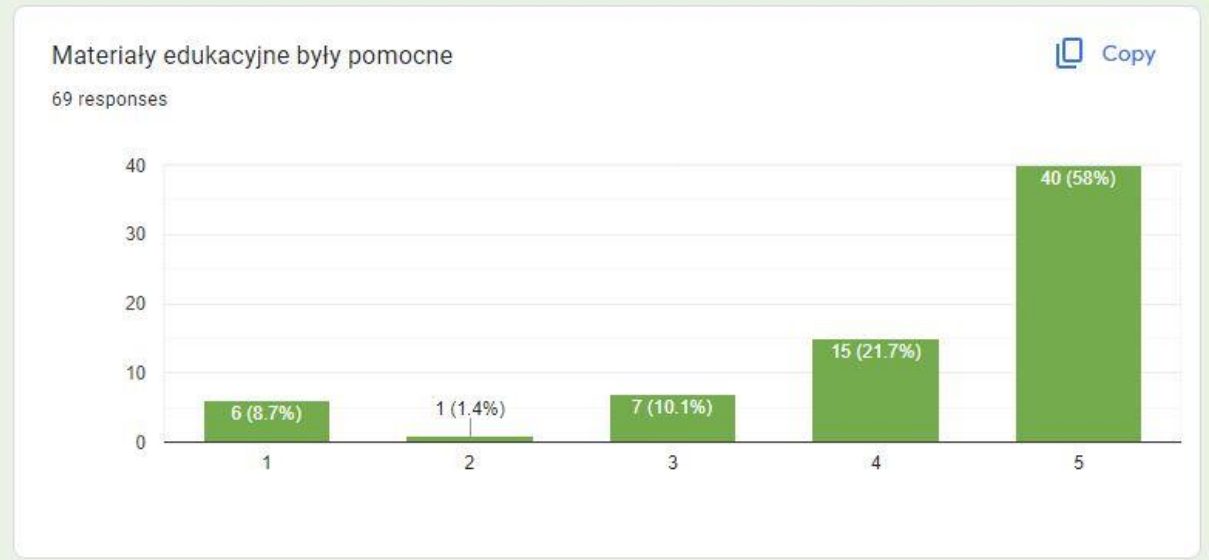
(6) The duration of training activities has been relevant

(7) The teaching materials have been presented in an organized manner

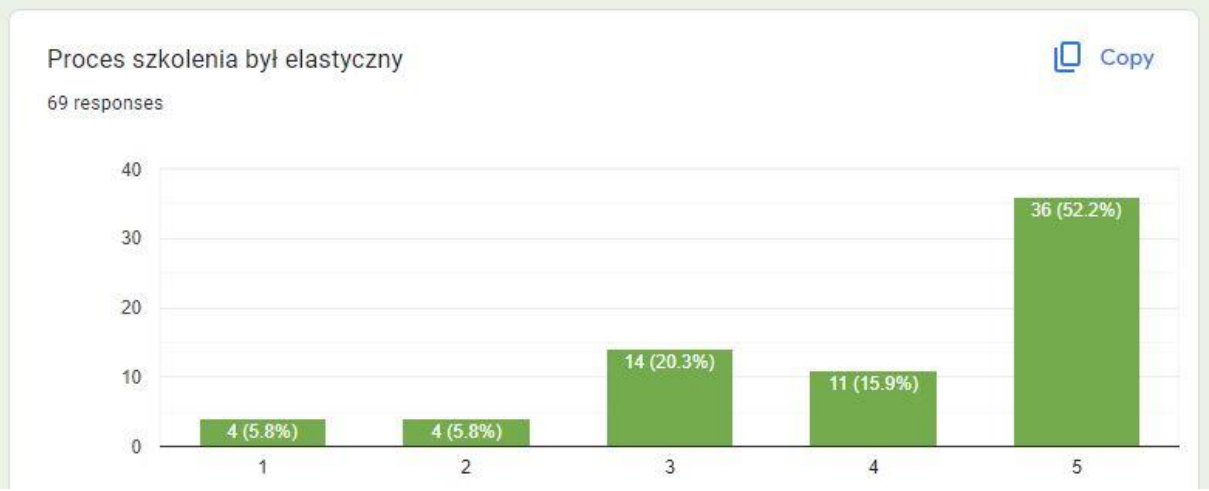
(8) Practical training in companies has been compatible with the theoretical content taught at school



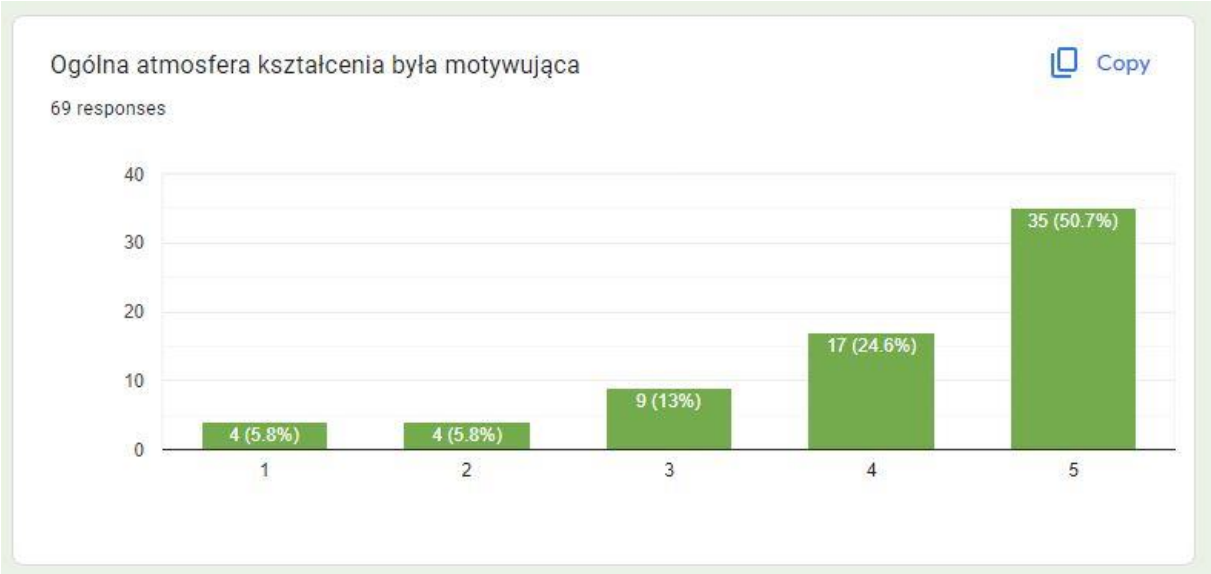
(9) The materials distributed have been helpful



(10) The training process has been flexible



(11) The overall atmosphere of the training has been encouraging



Findings:

- Student respondents think very highly of the trainers in all categories evaluated. It proves that the teaching staff have been chosen in a correct manner; Also, the teaching staff already has a considerable experience in teaching, also in the dual mode.
- To some students, the training in the company may not have fully corresponded to the content taught at school;
- Some of the respondents think that the teaching/ learning process could be more flexible (or they are not sure if the process is flexible enough).

Q8: Which specific difficulties did you encounter while participating in dual technician training programme? Did the trainers try to help you with your difficulties? How?

Findings:

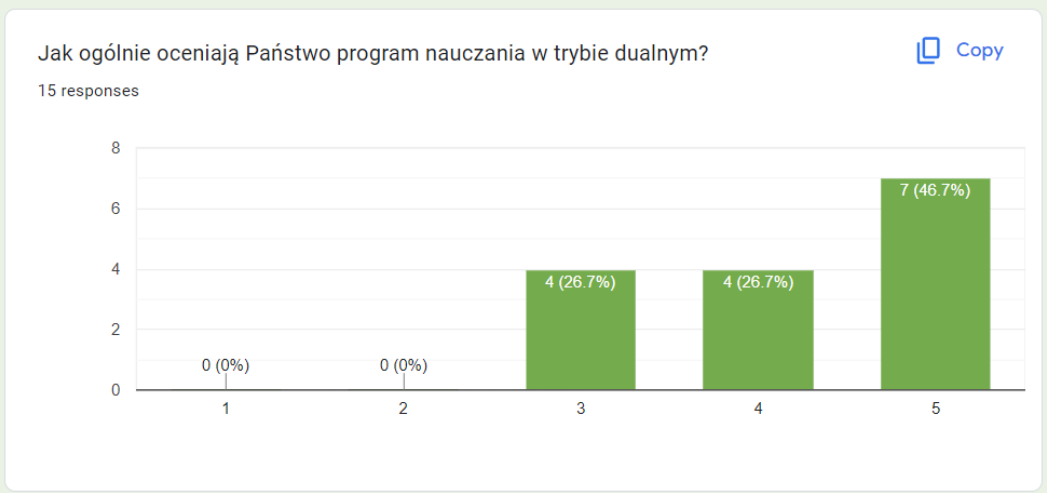
- Generally, students did not report any major difficulties, and often pointed out that teachers were eager to help out in case of some problems;
- Some students pointed to some specific courses that, in their opinion, were more difficult than others (such as: Warehouse management);
- One student reported that there was too much theory taught throughout the course;
- Generally, students praised the manner in which the classes were taught, with only one student (of 69 respondents) not being satisfied.

5.42 Initial survey for teachers - results

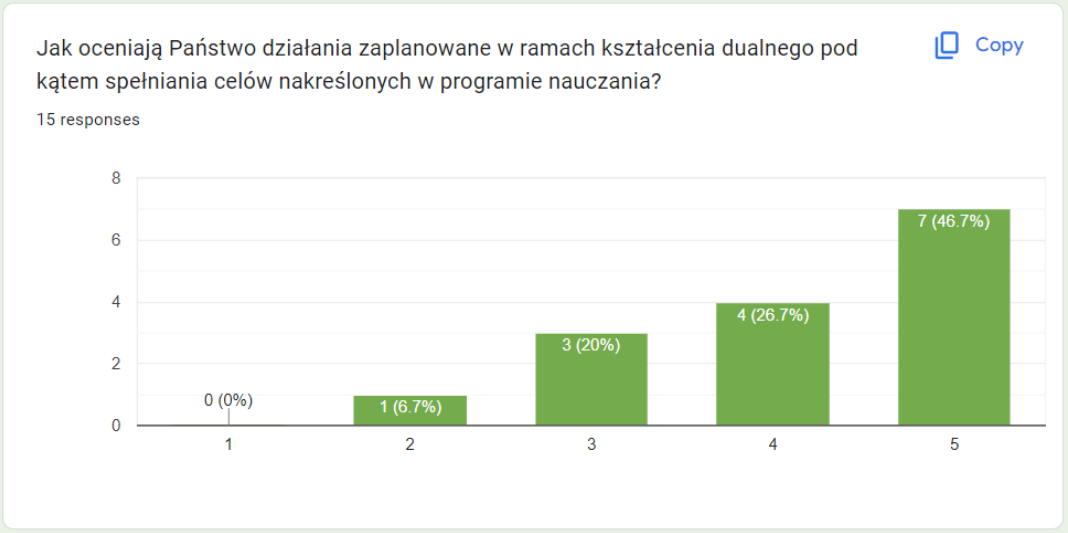
I Evaluation of the content of the training and its organisation

Q1: Please circle the appropriate number to indicate your level of satisfaction
1 = very dissatisfied; 2=somewhat dissatisfied; 3= Neither satisfied nor dissatisfied; 4=somewhat satisfied; 5=very satisfied

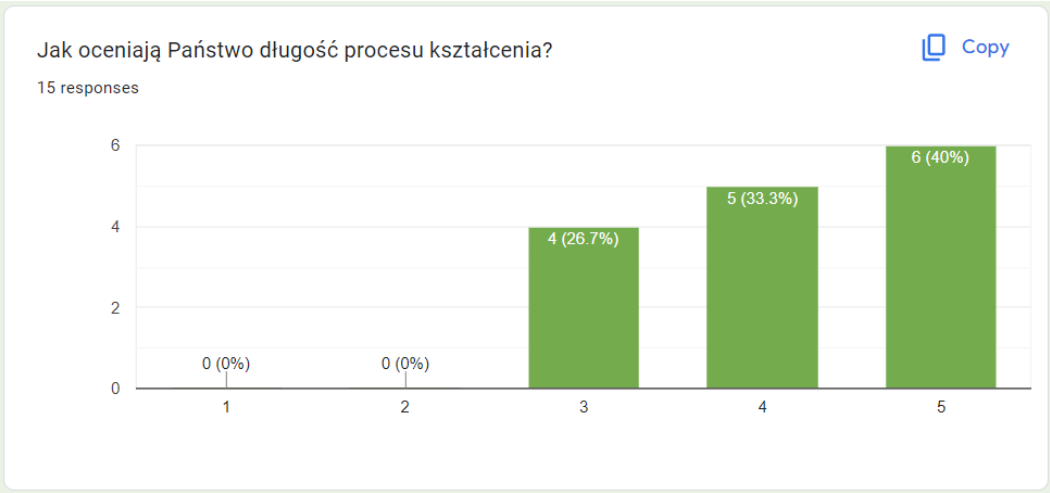
(1) How do you evaluate the program/ curriculum of the training in general?



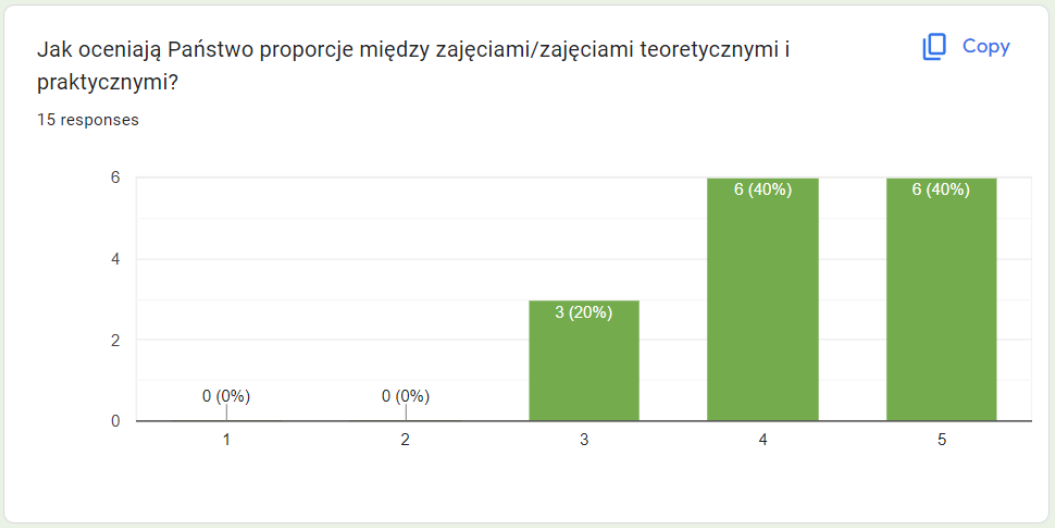
(2) How do you evaluate the activities planned in the training in terms of their fulfilling the objectives outlined in the program/curriculum?



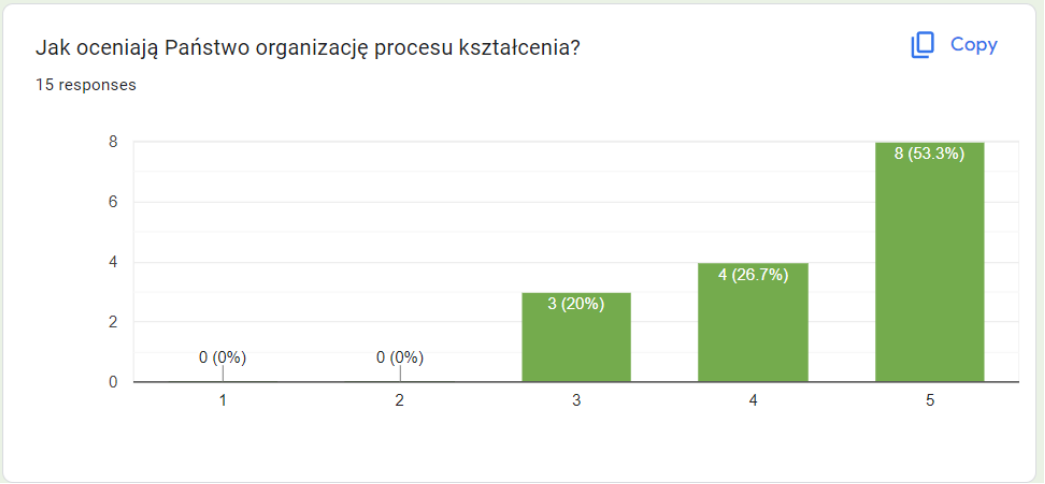
(3) How do you evaluate the length of the training?



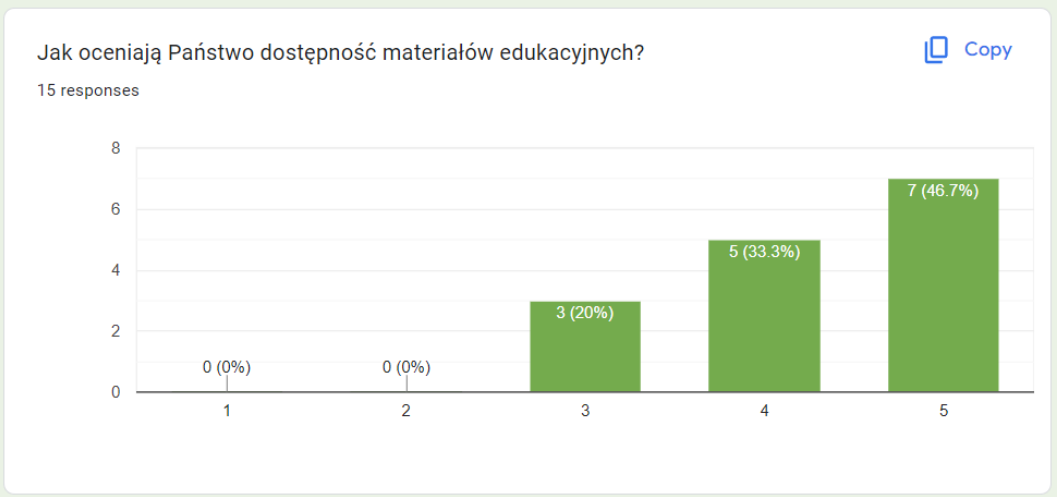
(4) How do you evaluate the balance between theoretical and practical classes/activities?



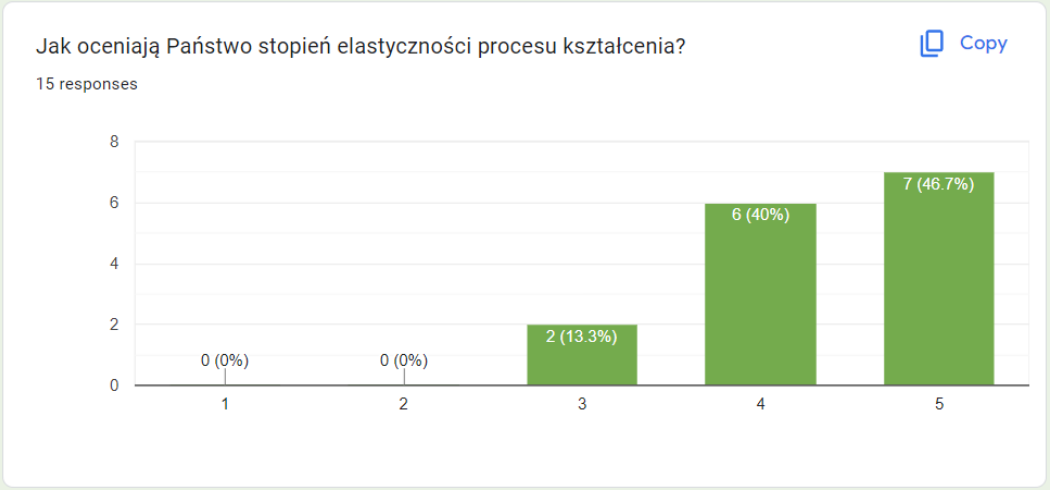
(5) How do you evaluate the organisation of the training?



(6) How do you evaluate the availability of materials for the training?



(7) How do you evaluate the degree of flexibility of the training?



Findings:

- Generally, teachers were positive and very positive about all aspects related to the study content and the organisation of the educational process; the only negative answer was linked to the activities planned in the training in terms of their fulfilling the objectives outlined in the program/curriculum;
- Teachers overall seem to have been very well prepared to take up their duties in the new dual programme: “Ecologic solutions in logistics”.

Q2: What challenges do you envisage as regards the application of the program/ curriculum of the dual technician training? How could these challenges be mitigated?

This open-ended question yielded limited responses, with most answers revolving around ‘I don’t know’ or ‘It is difficult to predict’ answers.

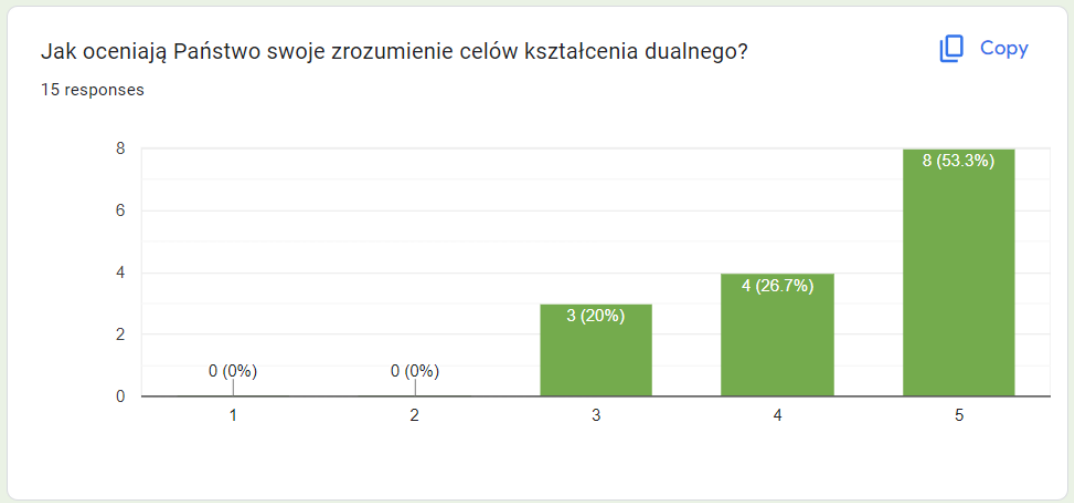
Among the challenges listed were:

- Difficulty in obtaining partners for practical (dual) training;
- The purchase of new didactic tools;
- Lack of materials supporting strengthening the link between theory and practice.

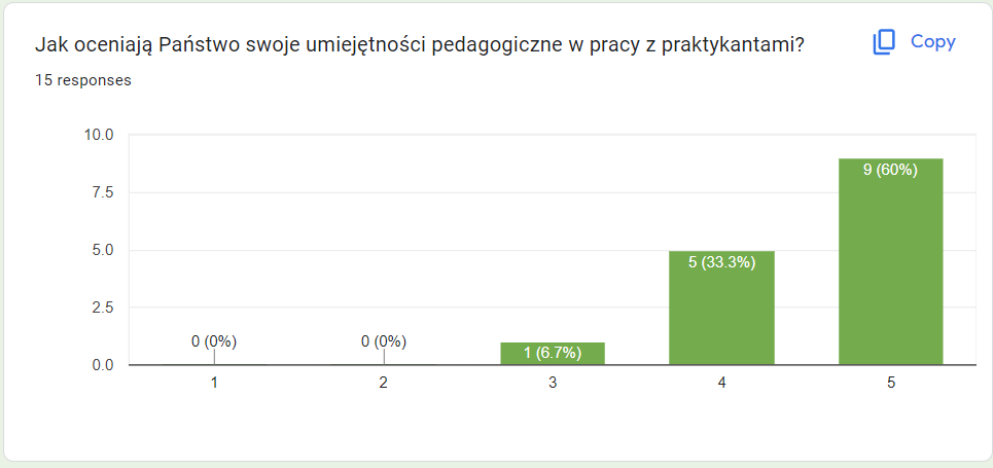
II Evaluation of the trainers' preparedness to run the trainings

Q3: Please indicate your level of agreement with the statements listed below.
1 = very dissatisfied; 2=somewhat dissatisfied; 3= Neither satisfied nor dissatisfied; 4=somewhat satisfied; 5=very satisfied

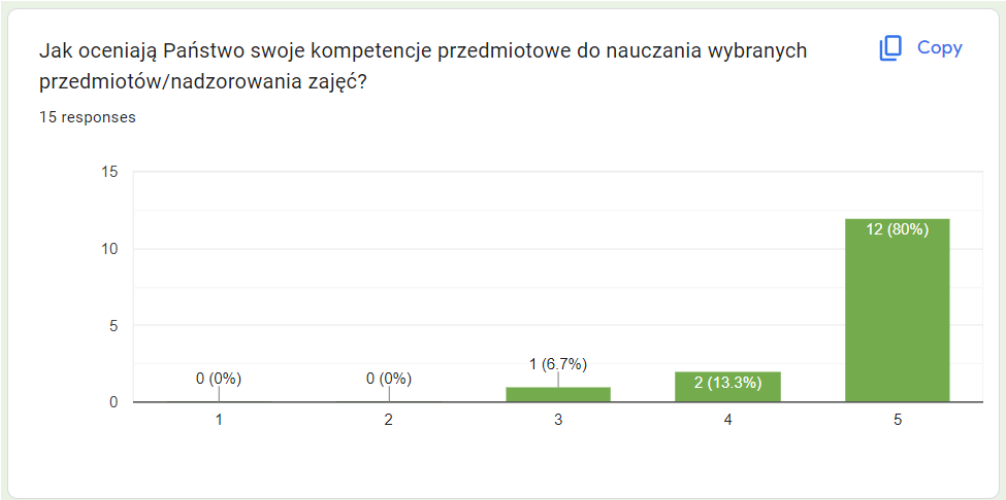
(1) How do you evaluate your understanding of the objectives of the training?



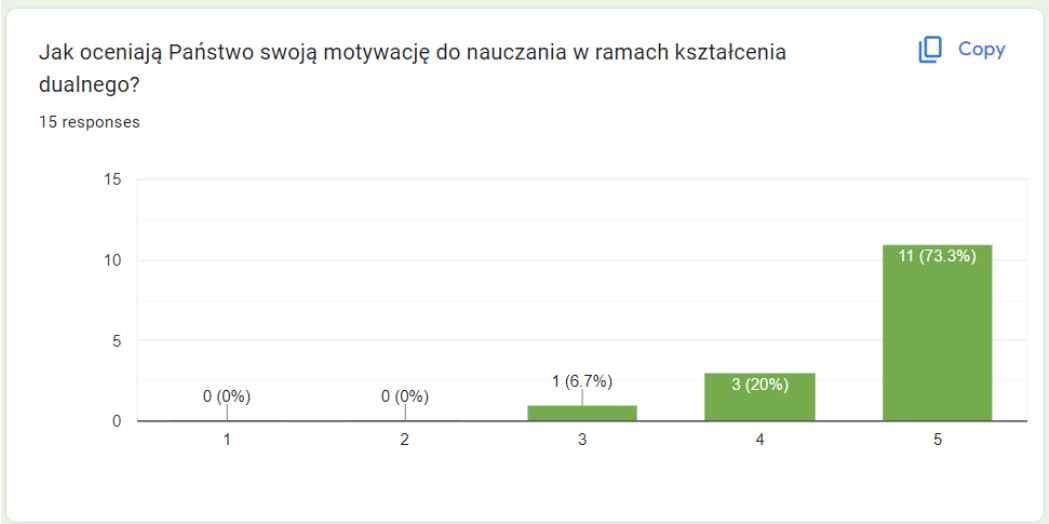
(2) How do you evaluate your pedagogical skills to work with trainees?



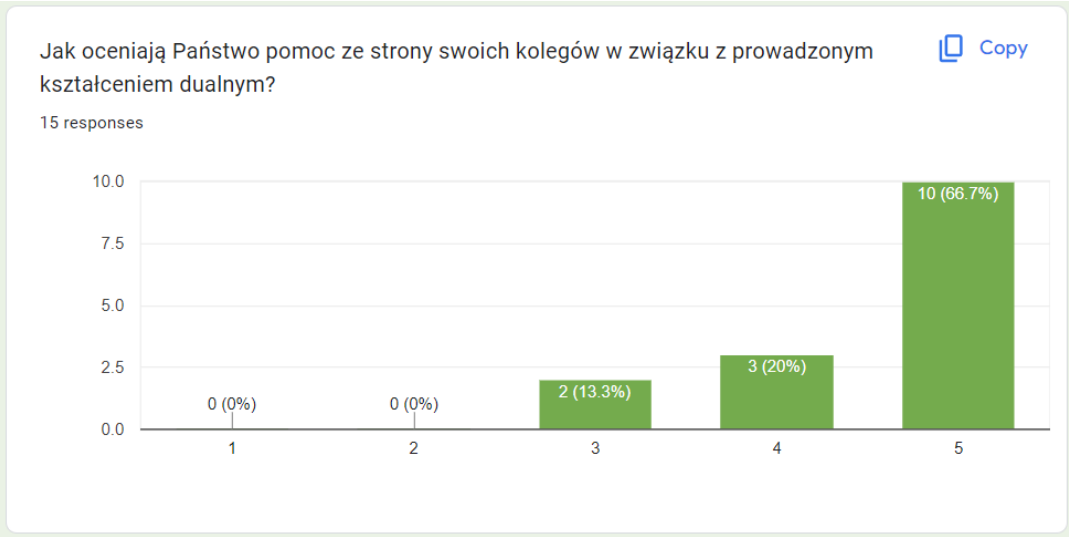
(3) How do you evaluate your subject-related competence to teach selected subjects/ supervise activities?



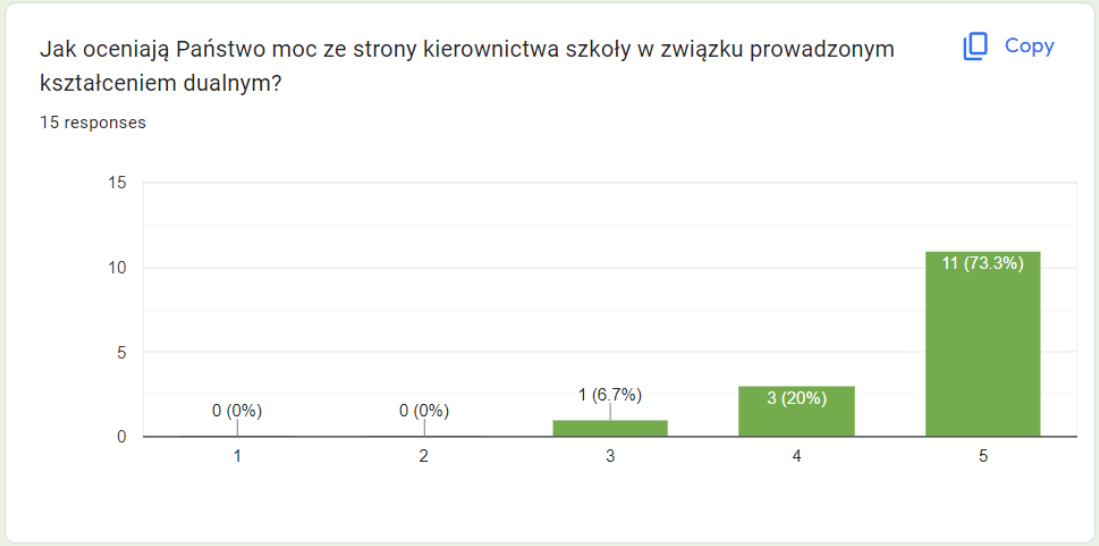
(4) How do you evaluate your motivation to instruct trainees in the dual technician training?



(5) How do you evaluate the assistance on the part of your colleagues in relation to the training?



(6) How do you evaluate the assistance on the part of your school management in relation to the training?



Findings:

- The team of teachers and trainers chosen to run the dual technician programme "Ecologic solutions in logistics' was well composed, with teachers presenting very high level of professionalism and preparedness to teach subjects they were assigned to;
- Teachers were well aware of the dual study system, and generally did not require any additional assistance, also knowing that they could reply on their colleagues, if need be.

Q4: What other issues would you like to raise in relation to your preparedness as a trainer in the training?

There were no substantive answers to this question.

5.43 Mid-way survey for teachers - results

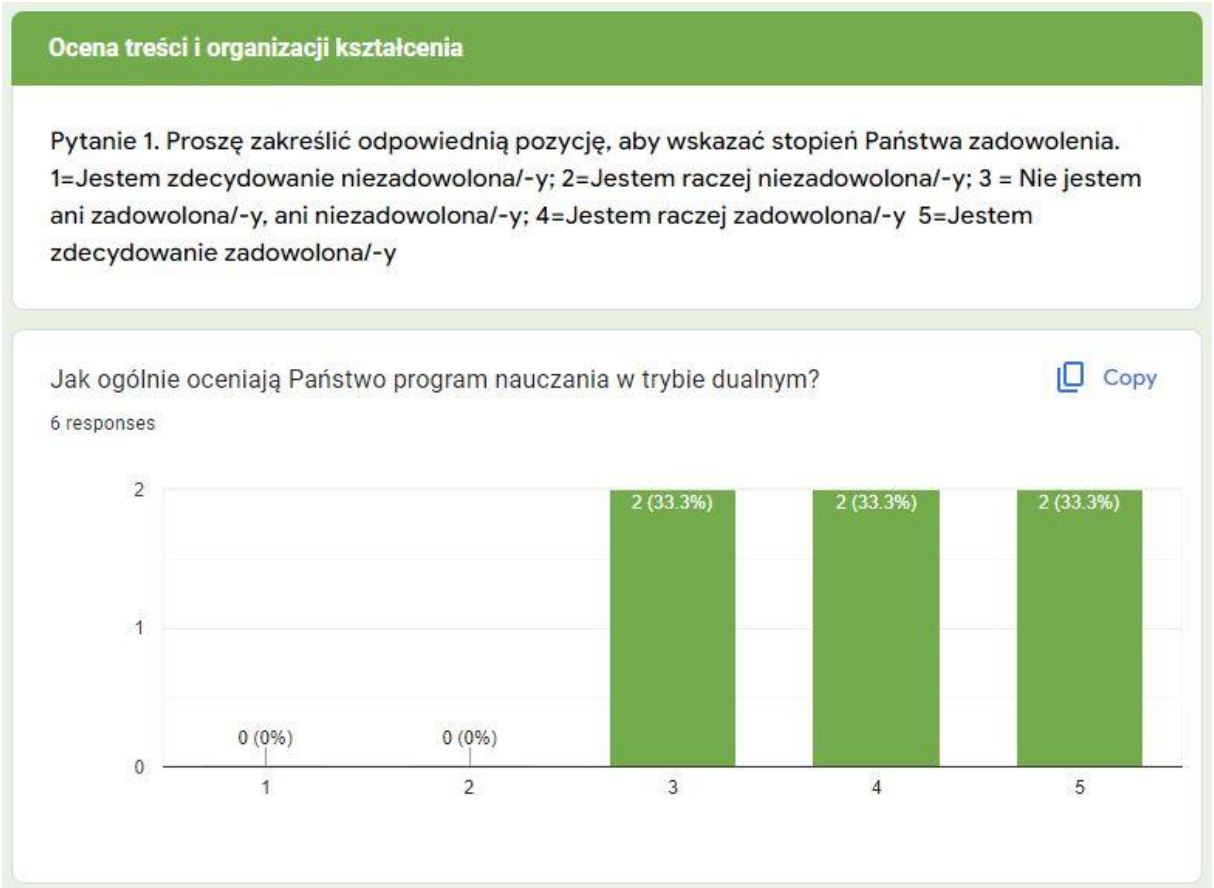
Midway evaluation is aimed at gathering feedback after the full third year of training. The design of the survey was presented in the EVALUATION CONCEPT presented in the initial stages of the 3LoE Project (in 2021).

I Evaluation of the content of the training and its organisation

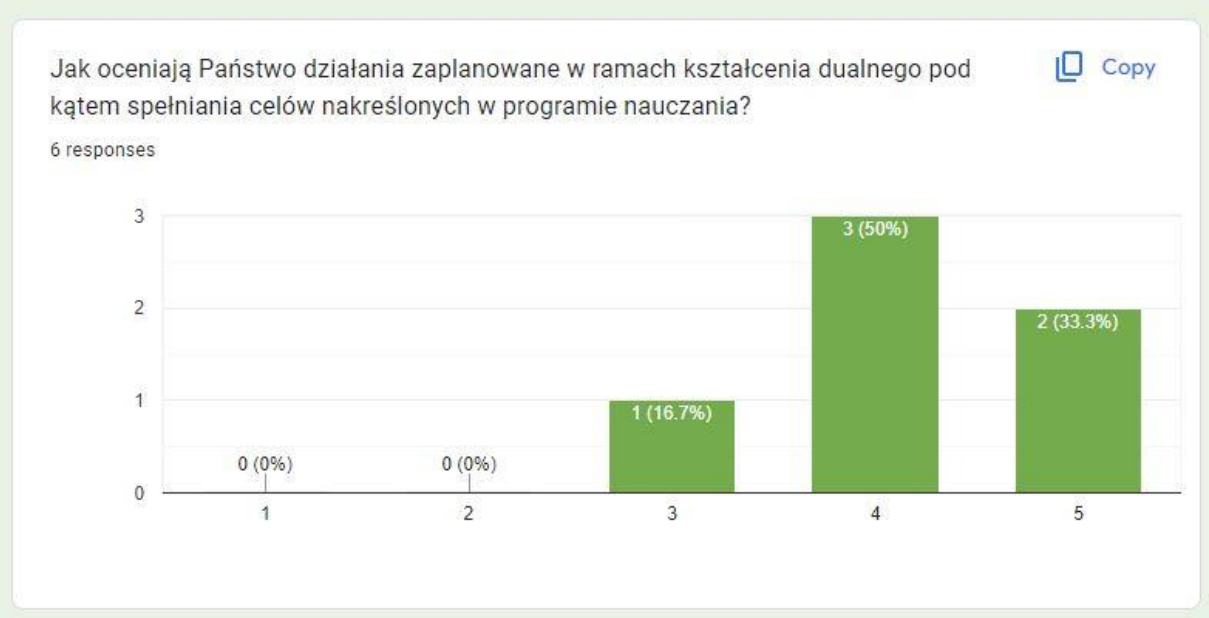
Q1: Please circle the appropriate number to indicate your level of satisfaction

1 = very dissatisfied; 2=somewhat dissatisfied; 3= Neither satisfied nor dissatisfied; 4=somewhat satisfied; 5=very satisfied

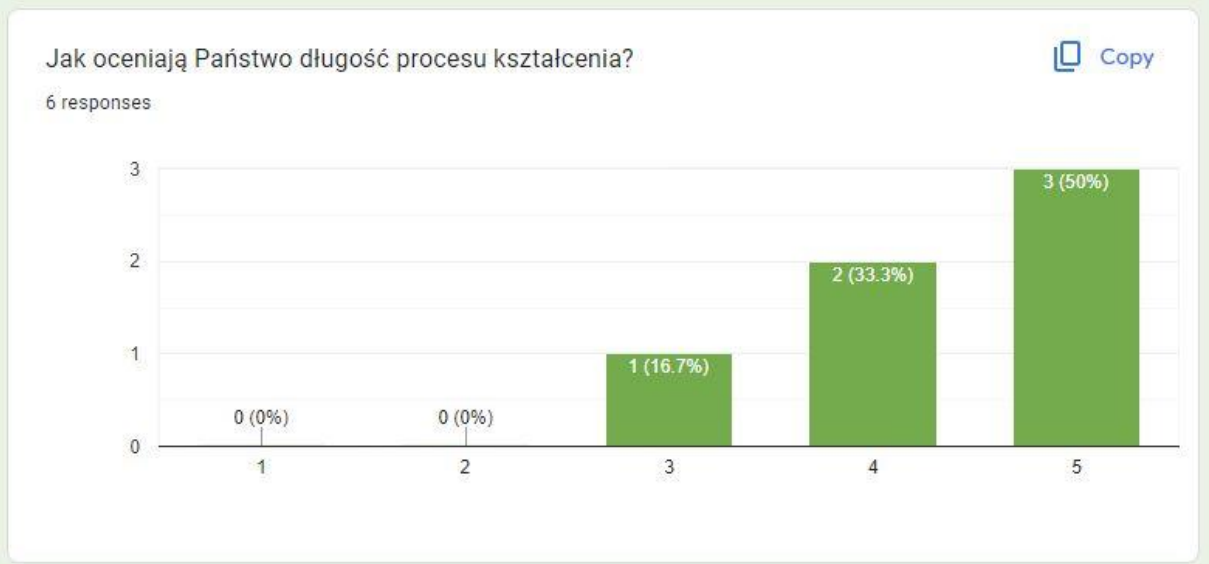
(1) How do you evaluate the program/ curriculum of the training after its completion?



(2) How do you evaluate the activities in the training in terms of their fulfilling the objectives outlined in the program/curriculum?



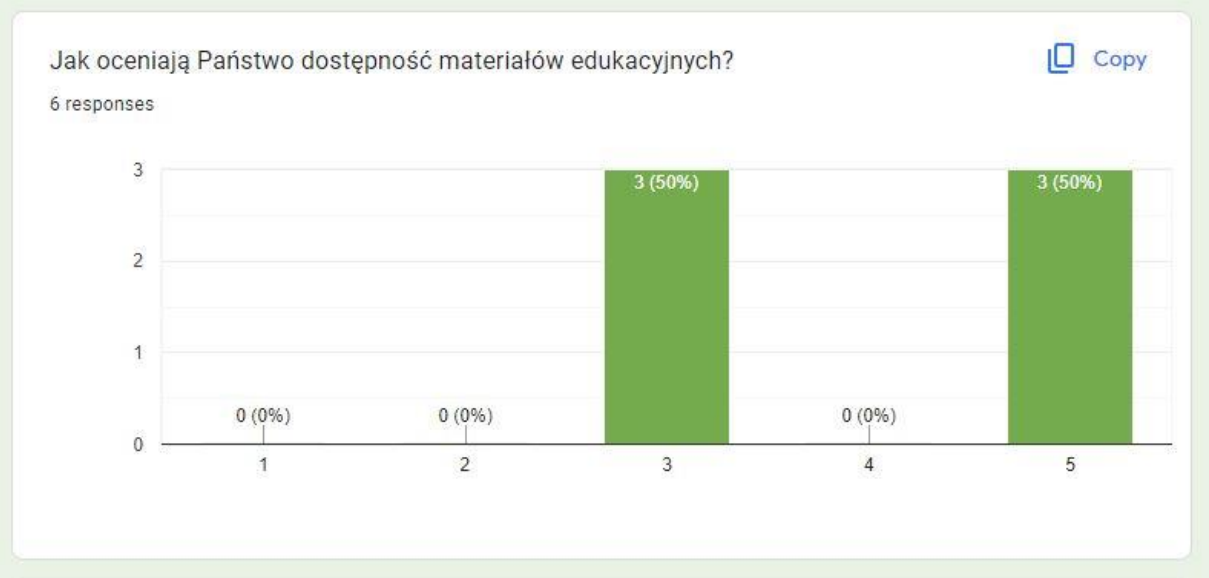
(3) How do you evaluate the length of the training?



(4) How do you evaluate the balance between theoretical and practical classes/activities?

(5) How do you evaluate the organisation of the training?

(6) How do you evaluate the availability of materials for the training?



(7) How do you evaluate the facilities available for the training?

(8) How do you evaluate the degree of flexibility of the training?

Findings:

- Trainers are satisfied with the implemented dual system;
- However, at the same time, some teachers emphasise the pack of necessary didactic materials that needed to complete a training;
- Overall, the courses taught by the teachers at school are well-tailored to the needs of the students, and therefore make a robust programme.

- Positive, yet slightly slipping towards neural is the category of the degree of flexibility; Compared to student evaluations, trainers / teachers are more than aware of the true current/ projected future needs of users.

Q2: What challenges did you encounter while realising the training? How did you mitigate those challenges?

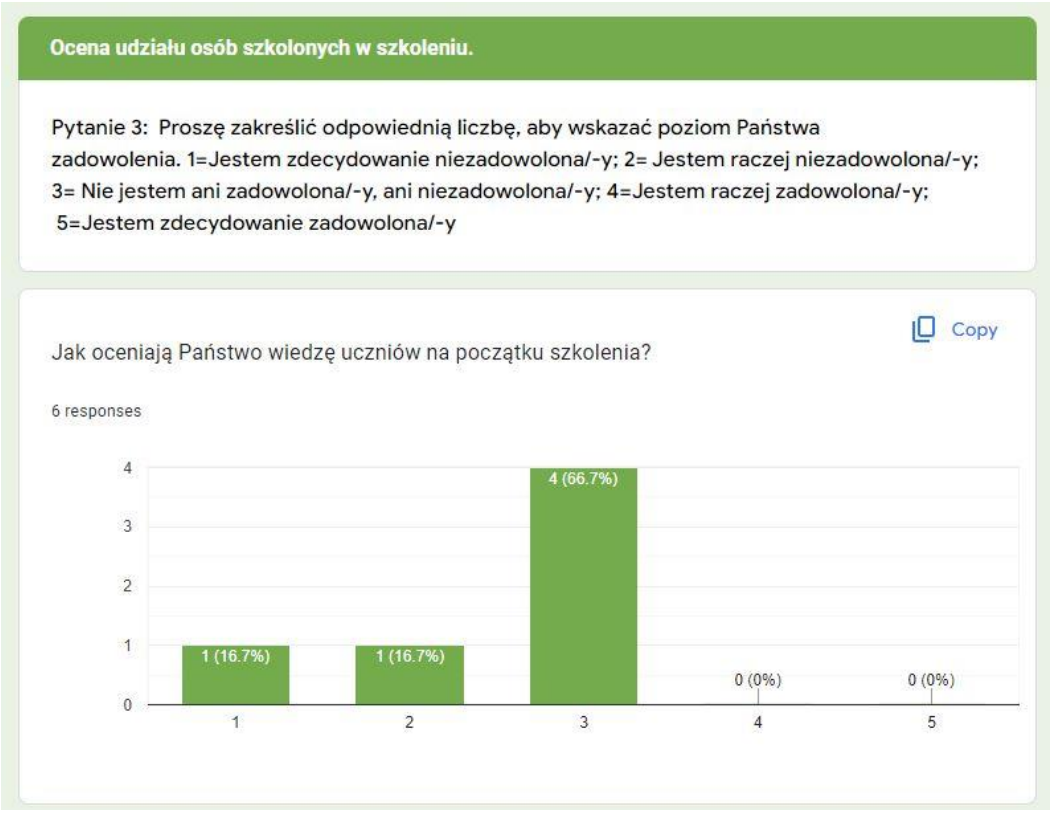
- One of the challenges mentioned was the adaptation of the content taught at school to the rapidly changing job market;
- One teacher emphasised the need to develop uniform, national curricula (mainly in the VET sector);
- One of the challenges was the insufficient collaboration with the companies.
-

II Evaluation of trainees' participation in the training.

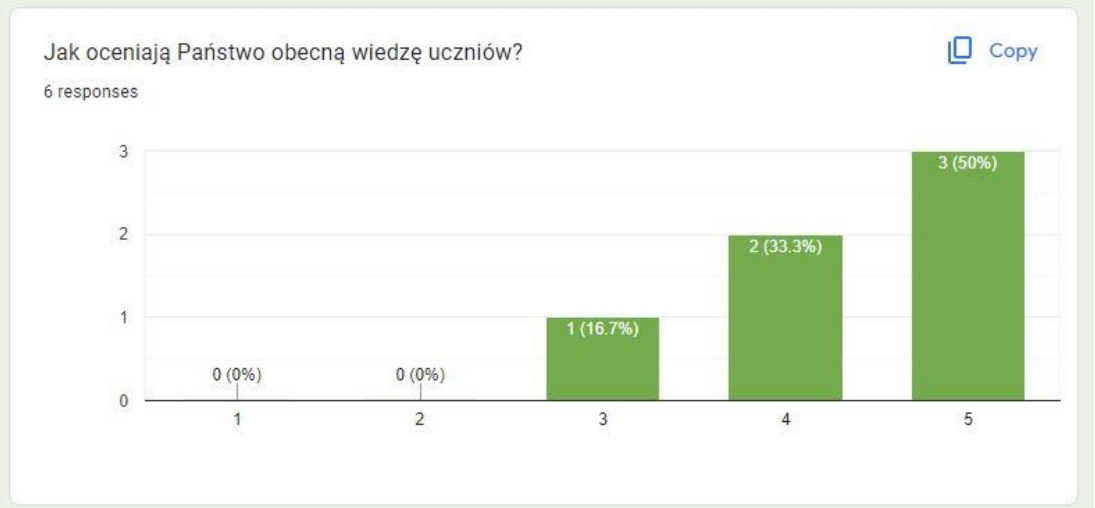
Q3: Please circle the appropriate number to indicate your level of satisfaction

1 = very dissatisfied; 2=somewhat dissatisfied; 3= Neither satisfied nor dissatisfied; 4=somewhat satisfied; 5=very satisfied

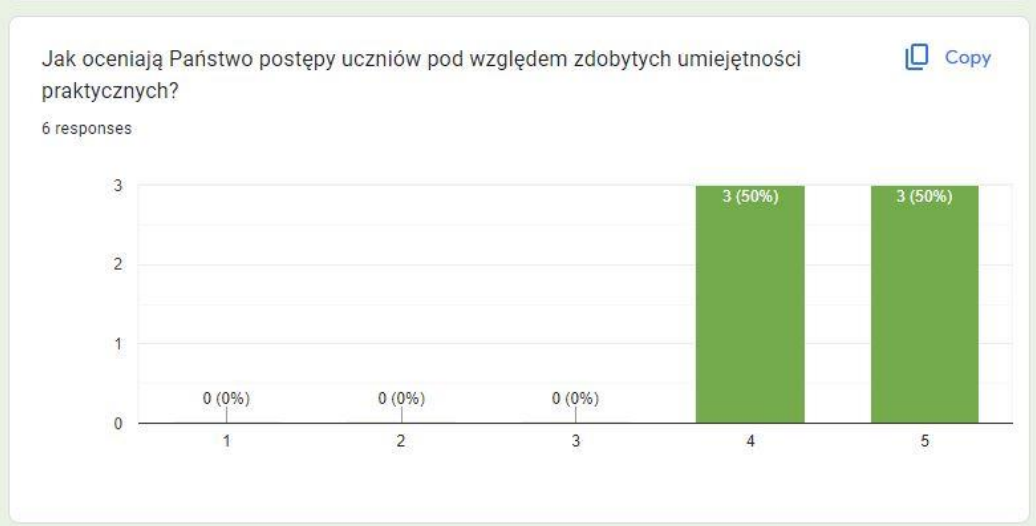
(1) How do you evaluate the trainees' knowledge at the beginning of the training?



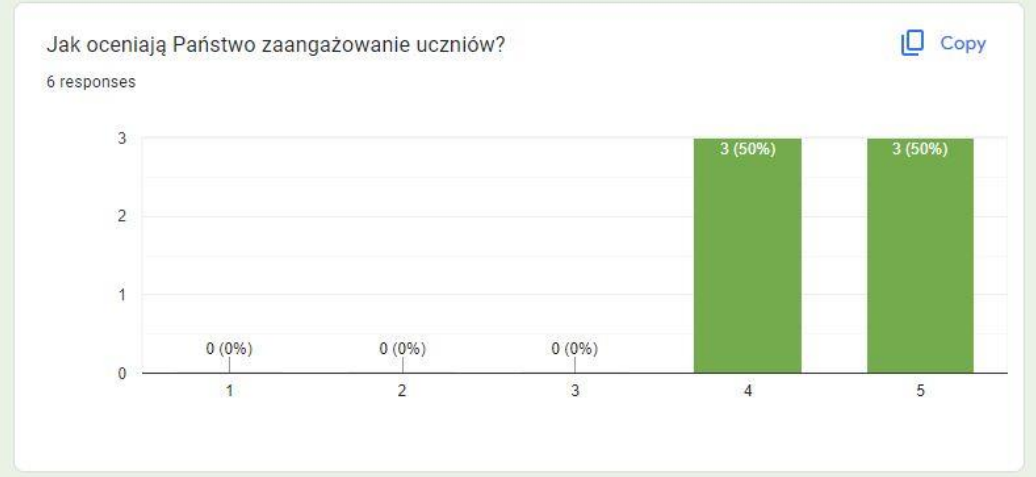
(2) How do you evaluate the trainees' knowledge at the end of the training?



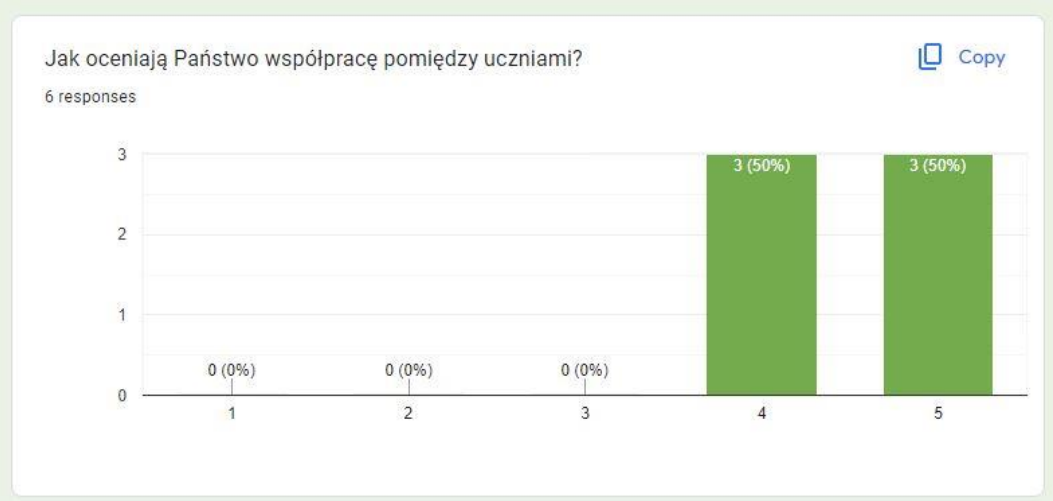
(3) How do you evaluate the progress made by the trainees in terms of the practical skills acquired?



(4) How do you evaluate the trainees' engagement in the training?



(5) How do you evaluate cooperation between trainees?



(6) How do you evaluate trainees' work and learning organization?

(7) How do you evaluate the readiness of trainees to work in the profession?

Findings:

- According to the trainers, the knowledge of the students increased considerably owing to the study programme implemented;
- Trainees have grown a lot, both in terms of cooperation, and in terms of their engagement;
- According to the teachers, the students are ready to work in their profession.

Q4: What methodological and/or organisational changes should be made to improve the training so that it better answers the needs of trainees?

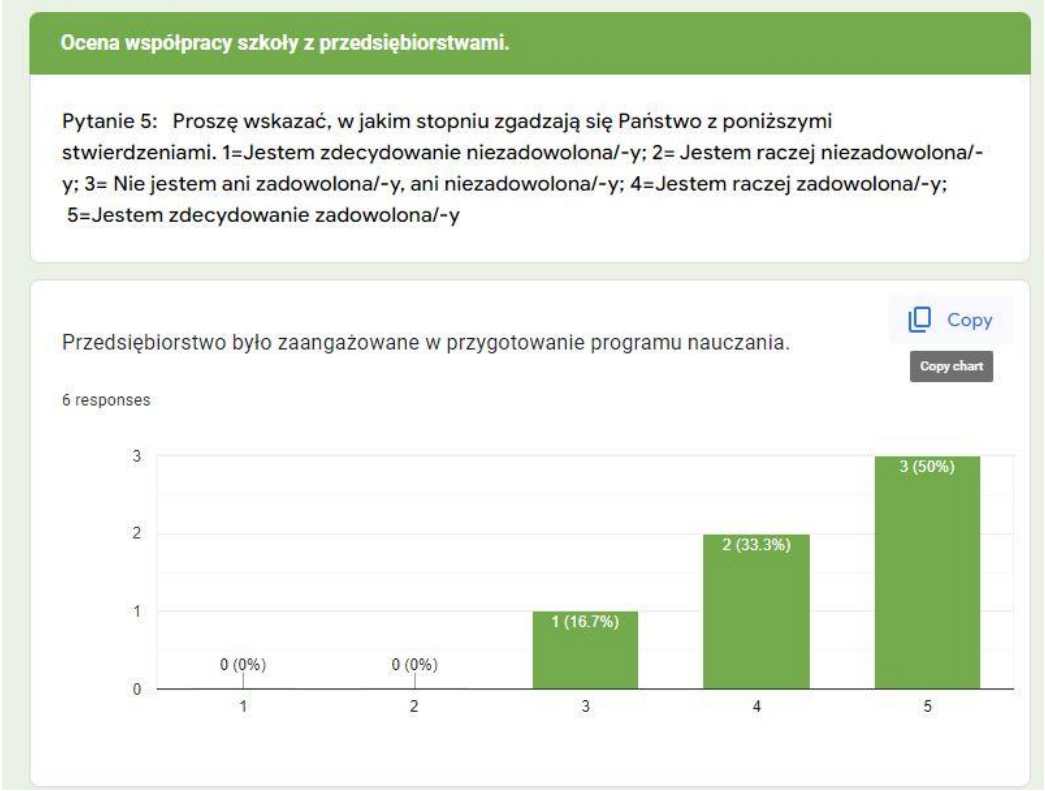
- Teachers definitely need more didactic materials in school;
- They also emphasise the need to make a clearer (and more solid) connection between the theoretical content taught and the practical skills.
- One teacher emphasised that the number of hours spend at school could be reduced.

III Evaluation of the cooperation between the school and companies.

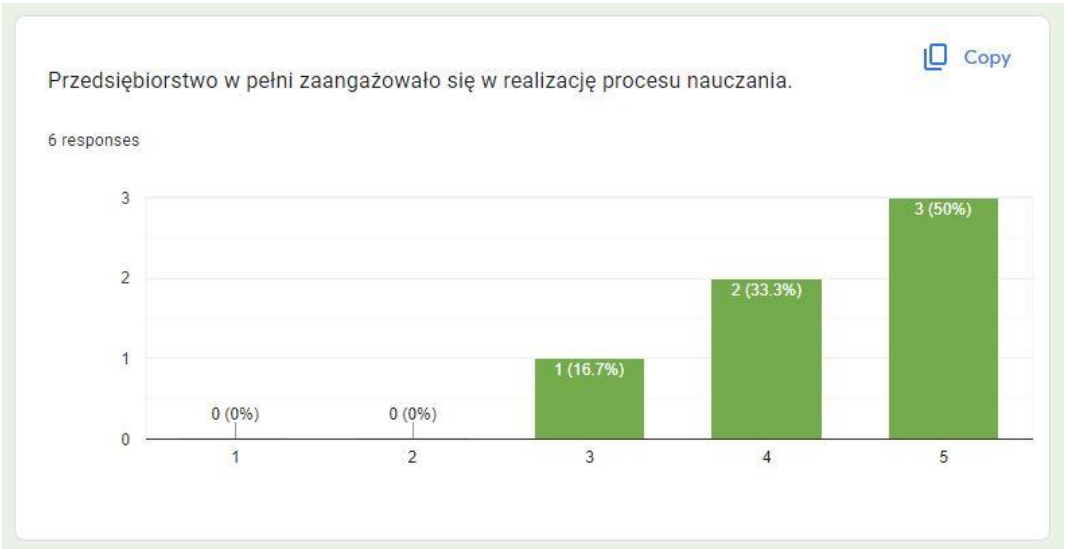
Q5: Please indicate your level of agreement with the statements listed below.

1=Strongly Disagree; 2= Disagree; 3= Neither agree nor disagree; 4=Agree; 5=Strongly Agree

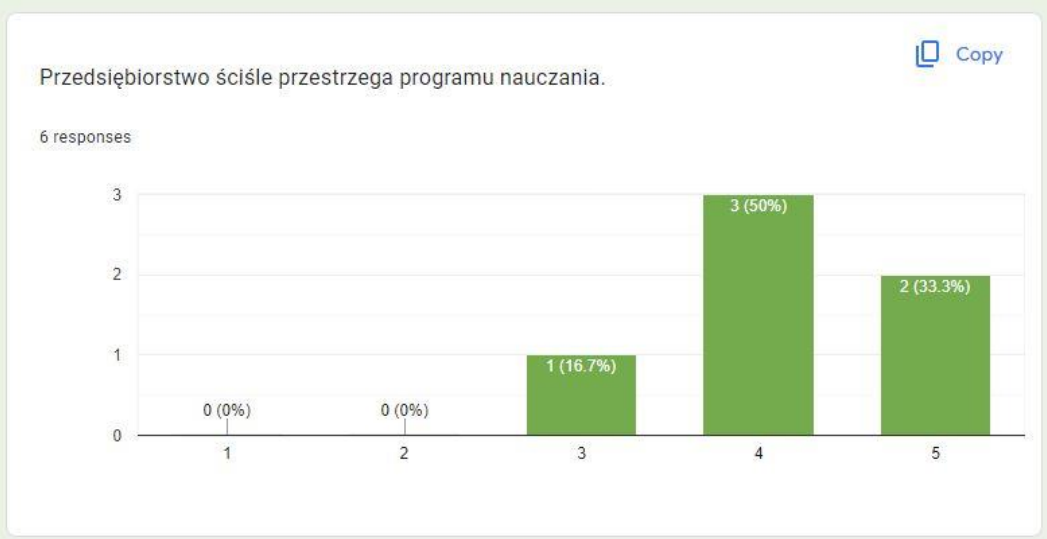
(1) The company has been engaged in the preparation of the program/ curriculum.



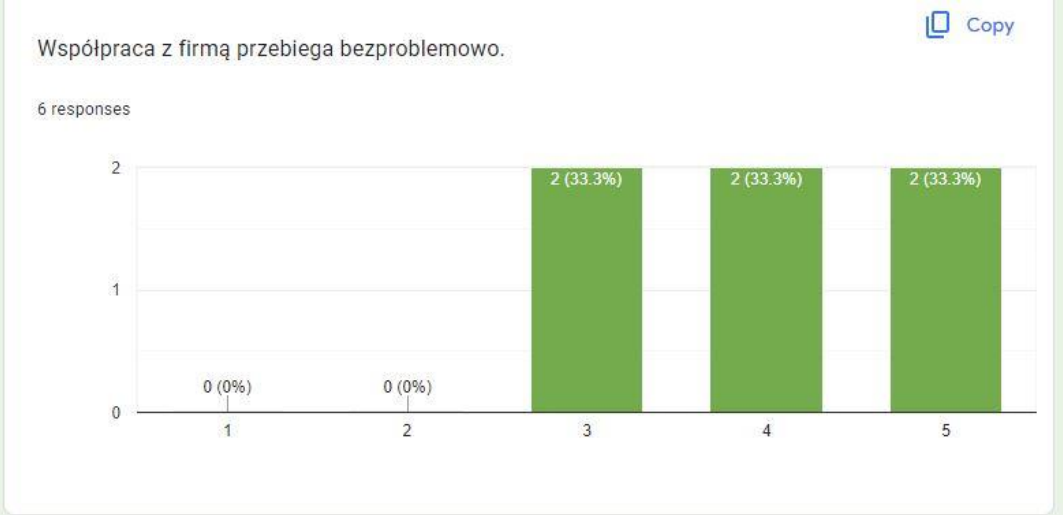
(2) The company has been fully engaged in the realisation of the training.



(3) The company followed the program/ curriculum closely.



(4) Cooperation with the company has been smooth.



Findings:

- Trainers generally assess cooperation with the companies highly, both at the level of curriculum preparation and its execution; The overall level of cooperation was assessed as good (4.0 on a scale from 1.0 to 5.0).
- What could be slightly improved is the more diligent execution of the programme by the companies.

<u>Q6: What improvements could be made in terms of cooperation between the school and the company while realising dual technician training?</u>

- The trainers still see room for more teaching/ training hours realised in the company (see above);

- According to the teachers, the companies could be more involved in the apprenticeship programme;
- The company should more flexible in the realisation of the programme.

5.5 Final Findings

1. **Increased Student Motivation**: Initially, students exhibited moderate motivation due to their lack of experience with secondary school education; 36.6% had no opinion on participating in the course. However, over time, motivation improved, as seen in a more positive engagement and participation in classes.
2. **Preference for Practical Training**: A significant 83% of students expressed a strong preference for the **practical component** of the programme. This preference underscores the importance of hands-on experience in engaging students and enhancing their learning. Students were eager to start training in the company, with over 60% agreeing or strongly agreeing, highlighting the value they place on real-world applications of their studies.
3. **Financial Incentives as Major Motivation**: The prospect of a **well-paid job** was the main motivator for 86.7% of students enrolling in the programme. Additionally, 60% were motivated by the possibility of obtaining a good position in their future careers, and 50% aimed to acquire recognized qualifications. This indicates that the programme effectively appeals to students' desires for improved employment prospects and financial stability.
4. **Programme Met Student Expectations**: By the end of the programme, 65% of students agreed that it met their initial expectations. Although 26% remained neutral, possibly due to lingering uncertainties about the programme's benefits, the majority found it effective. The initial uncertainty (33.3% didn't know if the programme would meet their expectations) decreased over time, demonstrating growing student confidence in the programme.
5. **Significant Improvement in Knowledge and Skills**: The programme substantially enhanced both **theoretical knowledge** and **practical skills** among students. Specifically, 81% reported an improvement in theoretical knowledge, while 71% noted enhanced practical skills. Students believed these gains would be directly applicable to their future jobs, indicating that the curriculum effectively bridges academic learning and practical application.

6. **High Appreciation for Trainers**: Students rated the **trainers highly** across all evaluated categories, suggesting that the teaching staff were well-chosen and contributed positively to the learning experience. The positive student-teacher relationships fostered an environment that encouraged creativity and initiative, essential qualities in the field of logistics and ecologistics.
7. **Positive Impact on Career Prospects**: Students felt confident that the programme would positively impact their careers. They anticipated being able to **find interesting jobs in the field of ecologistics**, succeed professionally, expand their knowledge, and even establish their own businesses. This reflects a strong belief in the programme's ability to equip them with the skills and knowledge necessary for success in the job market.
8. **Effective Dual System Implementation**: Nearly 77% of students found the **dual system effective**, and 73% stated they would recommend the programme to others. This suggests that the integration of theoretical instruction with practical company training was successful, providing a holistic educational experience that students valued.
9. **Teachers Well-Prepared and Professional**: Trainers displayed high levels of **professionalism and preparedness**. They were positive about the study content and the organisation of the educational process. The teaching staff felt well-prepared to deliver the dual programme and were familiar with the dual study system, which contributed to the programme's smooth implementation.
10. **Challenges in Company Collaboration**: Despite the overall success, teachers identified **insufficient collaboration with companies** as a significant challenge. They noted the need for better alignment between the content taught at school and the training provided by companies. Some trainers felt that companies could be more involved in the apprenticeship programme and more flexible in programme execution.
11. **Need for More Didactic Materials**: Both students and teachers pointed out a **lack of didactic materials** and educational tools. Students mentioned insufficient educational instruments in classrooms, and teachers expressed a need for resources to strengthen the link between theory and practice. This shortage indicates a gap in resources that, if addressed, could enhance the learning experience.

12. **Programme Enhanced Student Readiness for Employment**: Trainers observed that students are now **ready to work in their profession**. They noted significant growth in student knowledge, cooperation, and engagement. The programme effectively prepared students for the job market, validating its objectives and implementation.

5.6 Recommendations

1. **Enhance Collaboration with Companies**: Strengthening partnerships with companies is crucial. This can be achieved by:
   - **Aligning School Content with Practical Training**: Ensure that what is taught in classrooms directly corresponds with company training activities. Regular meetings between teachers and company trainers can facilitate this alignment.
   - **Increasing Company Involvement**: Encourage companies to participate more actively in the apprenticeship programme, perhaps by involving them in curriculum development or soliciting their feedback on student performance.
   - **Flexibility in Programme Execution**: Work with companies to make the training schedule and content more flexible to accommodate the needs of students and the demands of the industry.
2. **Improve Availability of Didactic Materials**: Investing in **additional didactic materials and tools** is essential. Steps to address this include:
   - **Allocating Budget for Educational Resources**: Secure funding specifically for purchasing educational instruments, software, and other learning aids that support both theoretical and practical instruction.
   - **Developing Supplementary Materials**: Create or source materials that strengthen the connection between theory and practice, such as case studies, simulations, and interactive modules.
   - **Upgrading Facilities**: Enhance classrooms and training environments to better accommodate practical exercises and demonstrations.
3. **Update Curriculum to Reflect Market Needs**: To keep the programme relevant:
   - **Continuous Curriculum Review**: Establish a process for regularly reviewing and updating the curriculum to reflect the latest trends and requirements in ecologistics and the broader logistics industry.

- **Incorporate Industry Input**: Involve industry professionals in curriculum development to ensure that the skills taught align with current and future job market demands.
- **Develop Uniform National Curricula**: Advocate for standardised curricula in the vocational education and training (VET) sector to ensure consistency and quality across programmes.

4. **Increase Flexibility in Teaching Methods**: Adapting teaching approaches can enhance learning:
   - **Student-Centered Learning**: Implement teaching methods that cater to different learning styles and encourage active participation, such as project-based learning, group work, and problem-solving activities.
   - **Adjusting Difficulty Levels**: Monitor student feedback to adjust the complexity of the material, ensuring it is challenging yet manageable.
5. **Strengthen the Link Between Theory and Practice**: Enhancing this connection can be achieved by:
   - **Integrated Projects**: Design projects that require students to apply theoretical knowledge to practical tasks, ideally in collaboration with partner companies.
   - **Guest Lectures and Workshops**: Invite industry professionals to deliver lectures or workshops, providing real-world insights that complement classroom learning.
   - **Real-Life Case Studies**: Use current industry case studies to illustrate theoretical concepts, helping students see the practical relevance of what they are learning.
6. **Expand Promotion of Programme Benefits**: To increase awareness and motivation. Use various channels (e.g., school events, social media, informational sessions) to highlight the programme's successes and potential benefits.
   - **Success Stories**: Share testimonials from current students and alumni who have benefited from the programme to inspire prospective and current students.
   - **Career Guidance Support**: Provide additional career counselling to help students understand the opportunities available to them upon completion of the programme.
7. **Increase Company Involvement in Curriculum Development**: To ensure the programme meets industry needs:
   - **Establish Advisory Boards**: Create formal or informal advisory boards comprising industry representatives to provide ongoing input into curriculum development and programme structure.

- **Joint Training Initiatives**: Develop training modules in partnership with companies, ensuring that the skills taught are those most in demand.
- **Feedback Mechanisms**: Implement systems for companies to provide feedback on student preparedness and curriculum relevance.

8. **Adjust Programme Structure if Necessary**: Based on feedback:

- **Optimize Theory-Practice Balance**: Reevaluate the proportion of time allocated to classroom instruction versus company training to ensure an optimal balance that maximizes learning.
- **Streamline Course Content**: Identify and reduce redundant or less relevant content to focus on areas that provide the most value to students and meet industry needs.