



**EXPLORING
THE DIGITAL LANDSCAPE:
INTERDISCIPLINARY PERSPECTIVES**



EXPLORING THE DIGITAL LANDSCAPE: INTERDISCIPLINARY PERSPECTIVES

Monograph

*Edited by Olha Blaha
and Iryna Ostopolets*

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5.16. Use of unmanned aircraft by fire and rescue departments of Ukraine

Застосування безпілотних літальних апаратів пожежно-рятувальними підрозділами України

Постановка проблеми. Під час широкомасштабного вторгнення російської федерації на територію України для сектору сил безпеки та оборони виникли нові виклики та задачі для рішення яких сьогодні потребує нові технічні рішення та нову тактику застосування технічних приладів (Закон України «Про Національну безпеку України», 2018). У наслідок пожеж протягом 2023 року в Україні загинуло 1472 людини, з яких 40 дітей (Інститут державного управління..., 2024). Для сил безпеки, до яких відносяться сили цивільного захисту, забезпечення безпеки суспільства наразі складна проблема, яка вимагає вирішення комплексу різнорідних завдань і залучення технічних засобів з тактикою застосування яких ще належить визначитися (Кодекс України «Кодекс цивільного захисту України», 2013). До сучасних та новітніх технічних засобів, які Державна служба України з надзвичайних ситуацій (далі ДСНС) застосовує для ліквідації надзвичайних ситуацій можна віднести: роботизовані комплекси, машини механізованого розмінування та безпілотні літальні апарати (далі БпЛА) (Веб-сайт ДСНС, 2023).

Марк Догерті англійський письменник, журналіст та оглядач у своїй книзі пише «Кілька років тому мало хто чув про безпілотні літальні апарати, але навіть у тих хто про них знав, такі машини асоціювали скоріше з науковою фантастикою і техно-трилерами як у плані того, що таке безпілотник взагалі так і того, які його реальні можливості, причому скільки-небудь реальні відомості про БпЛА відсутні. Однак за кілька років безпілотники вийшли з тіні невідомості і опинилися у фокусі уваги засобів масової інформації. Сьогодні засоби масової інформації повідомляють нам про все більш широке застосування безпілотних літальних апаратів. БпЛА використовують як у військових цілях так і в цивільних» (Dougherty, M. J., 2015).

На сьогоднішній день в ДСНС розуміють важливість застосування БПЛА для попередження та ліквідації надзвичайних ситуацій і сфера застосування БПЛА весь час буде розширюватись в залежності від тактико-технічних характеристик БПЛА та навісного обладнання, яке використовується. На даний час в ДСНС розпочали навчання по програмі підготовки зовнішніх пілотів (операторів) безпілотних літальних апаратів. Таким чином проведення даних досліджень є актуальними. На даний час пожежно-рятувальними підрозділами використовується різні види БПЛА, в більшості це цивільні БПЛА різних закордонних комерційних фірм, які отримали в порядку гуманітарної допомоги від держав партнерів. В подальшому стоять питання, які БПЛА використовувати при виконанні оперативної роботи, як показали себе при ліквідації пожежі або ліквідації наслідків надзвичайної ситуації вже наявні БПЛА, тактика застосування БПЛА, правові основи використання повітряного простору операторами БПЛА оперативно-рятувальних служб.

Отже, як завдання даної роботи розглядається: проаналізувати нормативну базу використання БПЛА в Україні, зробити аналіз БПЛА за моделями які є на оснащенні ДСНС, навести приклади роботи операторів БПЛА, проаналізувати тактико-технічні характеристики та тактику застосування БПЛА найбільш поширених моделей, зробити висновки.

Метою роботи є початок розробки концепції застосування та розвитку безпілотних авіаційних систем оперативно-рятувальними силами ДСНС України.

Аналіз останніх досліджень та публікацій. У роботі (Тютюнник, В., & Захарченко, Ю., 2023) розроблено методику формування траси польоту поодиноких БПЛА та групи БПЛА при проведенні хімічної розвідки та уточнення параметрів зони зараження НХР. При формуванні траси польоту БПЛА враховується як прогнозні дані щодо зон забрудненої території НХР, так і можливості БПЛА, зокрема тривалість польоту та його швидкість. Але в роботі відсутня прив'язка до якоїсь конкретної моделі БПЛА і не визначені характеристики БПЛА, які можуть застосовуватися.

У роботі (Mosov S., Prisiazhnyy V., Saliy, 2023) показує світовий досвід, де безпілотники мають широкі перспективи щодо їхнього застосування при виконанні завдань з радіаційної, хімічної та біологічної розвідки, а також у ході ліквідації НС, у результаті яких відбувається радіаційне, хімічне та біологічне зараження. Цей напрям вважається в світі трендовим навіть для провідних країн світу і потребує проведення низки різноманітних досліджень і випробувань. В роботі наведені БпЛА тільки для проведення розвідки.

У роботі (Слободська, І., & Юхимович, М., 2022) досліджено правове регулювання використання безпілотних літальних апаратів у цивільній авіації Європейського Союзу та України, вказано на наявні прогалини у діючому законодавстві України, надано авторські рекомендації щодо подолання таких недоліків шляхом реформування чинного національного законодавства. Дискусія у даному дослідженні присвячена особливостям правового регулювання використання безпілотних літальних апаратів у цивільній авіації Європейського Союзу та України, а також виявленню плюсів та мінусів нового законопроекту, присвяченому регулюванню вказаного питання. В роботі не розглянуті питання, щодо специфічного застосування БпЛА оперативно-рятувальними службами.

У роботі (Бондар, Д., та ін., 2022) висвітлено сучасний досвід і тенденції застосування країнами світу безпіотної авіаційної техніки у сфері цивільного захисту; наведено стан ризиків виникнення надзвичайних ситуацій техногенного і природного характеру в Україні; обґрунтовано вимоги до безпілотних авіаційних систем в інтересах виконання завдань цивільного захисту; досліджені питання тактики застосування безпілотних літальних апаратів в умовах надзвичайних ситуацій; запропоновано рекомендації щодо розміщення безпілотних авіаційних систем по регіонах України, а також визначено вимоги до підготовки персоналу безпілотних авіаційних систем сфери цивільного захисту. Але залишилось відкритим питанням аналізу по моделям БпЛА.

Основна частина. БпЛА є одним із перспективніших видів авіаційної техніки, і розширення сфери їх використання вимагає правового забезпечення як на державному, так і на міжнародному рівнях безпеки діяльності, пов'язаної з використанням цих технічних пристроїв. Головна мета авіаційної нормативної бази полягає в забезпеченні та підтримці найвищого однакового рівня безпеки польотів. Першим кроком у цьому напрямку стало внесення низки поправок у Додаток 2 до Чиказької конвенції 1944 року, до якої Україна приєдналась 10 серпня 1992 року, якими визначалися основні поняття та принципи експлуатації БпЛА. Надалі нові стандарти для цієї категорії літальних суден були внесені у Додатки 1, 6, 7, 13, було розроблено спеціальний циркуляр щодо безпілотних авіаційних систем. Одночасно почалася розробка правових стандартів у цій сфері у рамках міжнародних регіональних організацій і на рівні законодавчих ініціатив держав-членів міжнародної організації цивільної авіації (далі ІКАО). Найбільш збалансованою і системною є у цьому питанні позиція Європейського Союзу (далі ЄС), реалізована у низці Регламентів та інших актів, які урегулювали основні аспекти використання БпЛА на регіональному рівні (Григоров О. М., 2021). У рамках права ЄС одним із перших актів, присвячених проблематиці БпЛА є, Регламент № 216/2008 про загальні правила у сфері цивільної авіації та про створення Європейського агентства з авіаційної безпеки (далі ЄААБ). Згідно з цим регламентом Агентство є компетентним органом регулювання використання БпЛА вагою понад 150 кг. Використання інших категорій БпЛА підпадає під регулювання держав-членів, а саме їх органів у сфері цивільної авіації. Законодавства іноземних країн свідчить про загальні тенденції щодо максимального забезпечення безпеки експлуатації БпЛА, у зв'язку з чим важливими питаннями є підготовка пілотів, їх сертифікація та отримання ними ліцензії для виконання польотів. Зовнішній пілот БАС і пілот на борту повітряного судна несуть аналогічну кінцеву відповідальність за безпечний політ їх повітряних суден і тому повинні володіти однаковими знаннями в галузі повітряного права, здійснення та планування польотів, польотних навантажень, аспектів людського фактора, метеорології, навігації,

процедур експлуатації, принципів польоту і радіотелефонного зв'язку. Обидва пілоти повинні пройти льотну підготовку, продемонструвати свої навички, отримати певний досвід і відповідні свідоцтва.

В Україні таким органом є Державна авіаційна служба, яка є центральним органом виконавчої влади України і була утворена 9 грудня 2010 року шляхом реорганізації Міністерства транспорту та зв'язку України.

До нормативно-правових актів, регулюючих експлуатацію безпілотної авіації в Україні, відносяться: Повітряний кодекс України; Постанова КМУ «Про затвердження Положення про використання повітряного простору України» від 06. 12. 2017 р. № 954; наказ МО України від 07. 02. 2012 № 63 «Правила реєстрації державних повітряних суден України та Правил сертифікації екземпляра державного повітряного судна України»; наказ МО України від 05. 01. 2015 № 2 «Про затвердження Правил виконання польотів державної авіації України»; наказ МО України від 09. 12. 2015 № 700 «Про затвердження Правил польотів державної авіації в повітряному просторі України»; наказ МО України від 08. 01. 2020 № 2 «Про затвердження Змін до деяких наказів Міністерства оборони України в галузі державної авіації України»; наказ МО України від 08. 12. 2016 № 661 «Про затвердження Правил виконання польотів безпілотними авіаційними комплексами державної авіації України»; 10. 08. 2018 № 401 «Про затвердження Правил технічної експлуатації безпілотних авіаційних комплексів I класу державної авіації України»; наказ начальника Управління регулювання діяльності державної авіації України (УРДДА) від 31. 01. 2020 № 5 «Про затвердження Методичних рекомендацій державної авіації щодо організації процедур реєстрації, перереєстрації й виключення безпілотних апаратів I класу та нанесення на їх поверхню розпізнавальних знаків (МРДА-11/20)».

Щодо порядку використання повітряного простору безпілотними повітряними суднами в Україні. Відповідно до вимог пункту 4 розділу II Правил використання повітряного простору, польоти безпілотних повітряних суден масою до 20 кг включно виконуються без подання заявок на

використання повітряного простору, без отримання дозволів на використання повітряного простору, без інформування органів управління Повітряних Сил Збройних Сил України та органів об'єднаної цивільно-військової системи організації повітряного руху України (ОЦВС), органів Державної прикордонної служби України, органів обслуговування повітряного руху (ОПР) та відомчих органів управління повітряним рухом (УПР), за умови дотримання таких вимог:

1) польоти виконуються без перетинання державного кордону України;

2) польоти виконуються поза межами встановлених заборон та обмежень використання повітряного простору, крім випадків, установлених Положенням про використання повітряного простору;

3) польоти виконуються не ближче 5 км від зовнішніх меж злітно-посадкових смуг аеродромів або не ближче 3 км від зовнішніх меж злітно-посадкової смуги ЗПМ / вертодромів, крім випадків узгодження з експлуатантом аеродрому / ЗПМ / вертодрому;

4) польоти виконуються не ближче 500 м від пілотованих повітряних суден;

5) польоти не виконуються над:

- скупченням людей на відкритому просторі та над місцями щільної забудови;

- об'єктами (зонами), які визначені Міністерством оборони України, Міністерством інфраструктури України, Міністерством внутрішніх справ України, Державною прикордонною службою України, Службою безпеки України, Національною поліцією України, Національною гвардією України, Державною фіскальною службою України, Службою зовнішньої розвідки України, Управлінням державної охорони України, іншими військовими формуваннями та правоохоронними структурами, утвореними відповідно до законів України, та відносно яких здійснюється охорона / державна охорона (за умови позначення території навколо цих об'єктів інформаційними знаками про заборону польотів безпілотних повітряних суден та / або шляхом оприлюднення

меж такої заборони), крім випадків виконання польотів за дозволом зазначених вище повноважних органів;

б) польоти виконуються в межах прямої видимості (VLOS);

7) максимальна висота польоту не вище:

- 120 м над рівнем земної (водної) поверхні поза межами CTR, AFIZ, ATCA, ATCZ, спеціально встановлених зон, іншого спеціально зарезервованого повітряного простору;

- 50 м над рівнем земної (водної) поверхні в межах CTR, AFIZ, ATCA, ATCZ, спеціально встановлених зон, іншого спеціально зарезервованого повітряного простору, якщо інформація про фактичний статус елементів структури повітряного простору на час виконання польоту відсутня;

- 50 м над статичними перешкодами на горизонтальній відстані не більше 100 м від таких перешкод, як відхилення від зазначених вище обмежень по висоті, на запит власника такого об'єкту;

8) швидкість польоту безпілотного повітряного судна складає не більше 160 км/год.;

В інших випадках польоти безпілотного повітряного судна масою до 20 кг включно та усі без винятку польоти безпілотного повітряного судна масою більше 20 кг виконуються у межах спеціально встановлених зон та маршрутів з дотриманням вимог щодо подання заявок на використання повітряного простору, отримання дозволів та умов використання повітряного простору, інформування органів управління Повітряних Сил Збройних Сил України, органів Державної прикордонної служби України, органів ОЦВС, органів ОПР / УПР.

Відповідальність за порушення порядку використання повітряного простору включає таке. Перелік порушень порядку використання повітряного простору України, наведений у пункті 46 Положення про використання повітряного простору України.

Відповідальність юридичних осіб – суб'єктів авіаційної діяльності за порушення правил та порядку використання повітряного простору України встановлена статтею 127 Повітряного кодексу України

Відповідальність фізичних осіб – суб'єктів авіаційної діяльності за виконання польотів з порушенням нормативно-правових актів, які регулюють діяльність авіації, встановлена статтею 111 Кодексу України про адміністративні порушення.

Відповідальність за порушення правил польотів та використання повітряного простору встановлена статтями 281, 282 Кримінального кодексу України (Мосов С. П., 2022).

Документом для офіційного застосування БПЛА у ДСНС став наказ «Про допуск до експлуатації безпілотних літальних апаратів» від 20. 11. 2018 р. № 675, згідно якого, з метою упорядкування застосування БПЛА в територіальних підрозділах ДСНС та організації їх державної реєстрації встановленим порядком, допущені до експлуатації БПЛА таких типів:

- DJI Phantom 2, DJI Phantom 2 Vision;
- DJI Phantom 3 Professional, DJI Phantom 3 SE;
- DJI Phantom 4, DJI Phantom 4 Pro V2.0, DJI Phantom 4 GL300E, DJI Phantom 4 Advanced;
- Hubsan H502S FPV.

У наказі визначено, що льотну та технічну експлуатацію БПЛА здійснювати відповідно до вимог експлуатаційної документації та Правил виконання польотів безпілотними авіаційними комплексами державної авіації України, затверджених наказом Міністерства оборони України від 08. 12. 2016 № 661 (Наказ Державної служби України...).

З метою упорядкування застосування БПЛА в територіальних органах ДСНС, підприємствах, установах, організаціях сфери управління ДСНС був виданий наказ ДСНС «Про внесення змін до наказу ДСНС від 20. 11. 2018 № 675» від 08. 02. 2019 № 92, яким додано декілька типів БПЛА: DJI Matrice 100, DJI Matrice 200, DJI Matrice 210; DJI Mavic Air, DJI Mavic 2 Zoom;

Yuneec Turphoon H., а також додано ще один наказ Міністерства оборони України від 10. 08. 2018 № 401, яким затверджено «Правила технічної експлуатації безпілотних авіаційних комплексів I класу державної авіації України».

З метою упорядкування застосування безпілотних літальних апаратів у територіальних органах ДСНС, підрозділах центрального підпорядкування, закладах освіти, науково-дослідних установах, підприємствах, установах та організаціях системи ДСНС був виданий наказ ДСНС «Про внесення змін до наказу ДСНС від 20. 11. 2018 № 675» від 27. 07. 2022 № 422, яким додано декілька типів БПЛА: DJI Matrice 300, DJI Mini 2, DJI Mavic Mini 2; DJI Mini Se, DJI Air 2s, Brinc Drones Lemur, DJI Mavic 3, DJI Mavic 2 Pro, DJI Mavic 2 Enterprise, Acs-3 verwatch, SPARK.

ДСНС зобов'язало територіальні органи ДСНС, підрозділи центрального підпорядкування, заклади освіти, науково-дослідні установи, підприємства, установи та організації системи ДСНС після отримання БПЛА та документів, які підтверджують право власності на них, протягом п'яти робочих днів організувати заходи щодо їх внесення до Реєстру державних повітряних суден України.

На основі отриманої інформації від підрозділів ДСНС України було зібрано та відображено у Табл. 1 детальну інформацію про наявність безпілотних літальних апаратів коптерного типу за моделями, які перебувають на озброєнні у підрозділах ДСНС України.

На основі даних, які наведено у Табл. 1 за допомоги програмного забезпечення Microsoft Excel було проведено аналіз за моделями БПЛА Табл. 2.

Можна дійти висновку, що найбільшу у підрозділах ДСНС України використовується БПЛА китайської приватної компанії DJI. Дронами даної компанії різних серій користуються у ДСНС в кількості 67 шт, а саме DJI Mavic різних конфігурацій – 37 шт. DJI Phantom – 15 шт. DJI Matrice – 8 шт. та ін. Дрони американської компанії Autel різних серій у кількості 9 шт. А також

безпілотні літальні апарати коптерного типу ACS-3 Skyeton 2, створений компанією АВК «Скаетон» у кількості 6 шт.

Таблиця 1. Зареєстровані БпЛА та закріплені за підрозділами

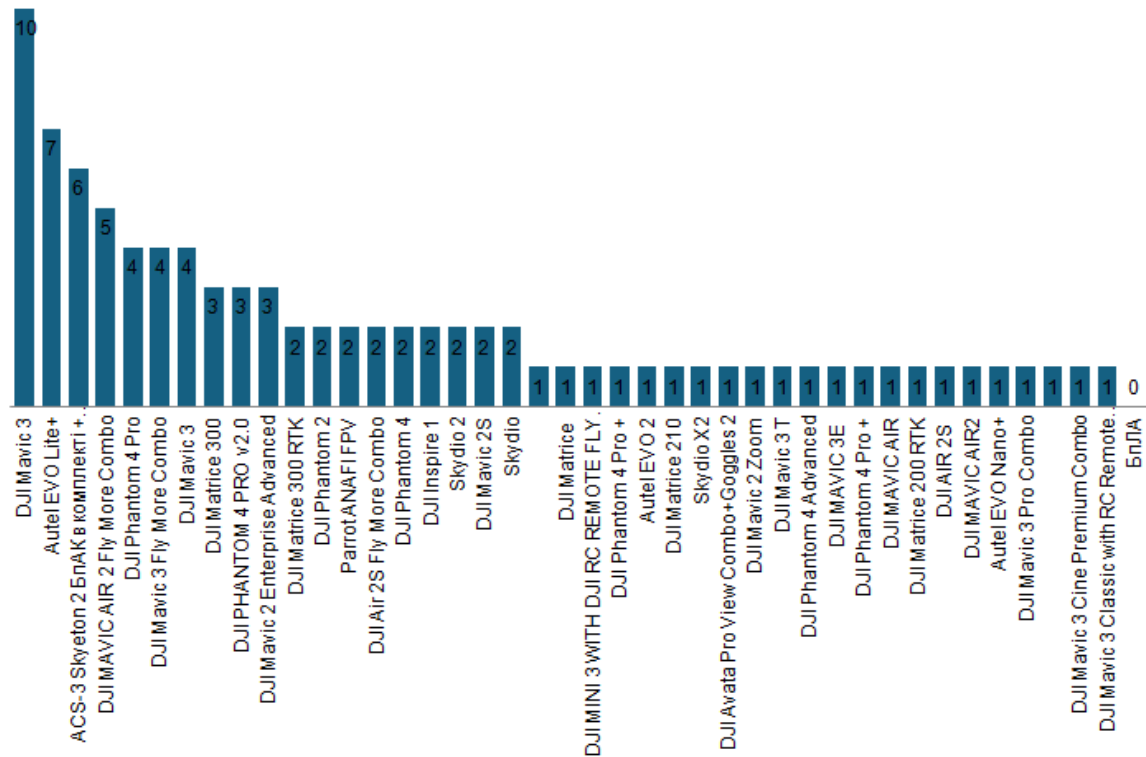
№	Управління / Область	Модель БпЛА	Кількість, (шт.)
1	ГУ ДСНС у Вінницькій обл.	DJI Mavic 3	2
2	ГУ ДСНС у Волинській обл.	Autel EVO Nano+	1
		Autel EVO Lite+	1
		Autel EVO Lite+	3
		DJI Matrice 300 RTK	1
		DJI Air 2S Fly More Combo	2
3	ГУ ДСНС у Дніпропетровській обл.	DJI Matrice 300 RTK	1
4	ГУ ДСНС у Донецькій обл.	DJI Mavic 3 Fly More Combo	1
5	ГУ ДСНС у Житомирській обл.	DJI Phantom 4 Pro	2
6	ГУ ДСНС у Закарпатській обл.	DJI Mavic Air 2 Fly More Combo	1
7	ГУ ДСНС у Запорізькій обл.	DJI Mavic 3	2
8	ГУ ДСНС в Івано-Франківській обл.	DJI MINI 3 WITH DJI RC REMOTE FLY MORE COMBO	1
		DJI PHANTOM 4 PRO v2.0	1
9	ГУ ДСНС у м. Києві	DJI Phantom 4 Pro	1
10	ГУ ДСНС у Київській обл.	DJI Mavic 3	2
		DJI PHANTOM 4 PRO v2.0	2
11	ГУ ДСНС у Кіровоградській обл.	DJI Phantom 4 Advanced	1
12	ГУ ДСНС у Луганській обл.	DJI Matrice 300	1
		Skydio 2	2
		DJI Mavic 2 Enterprise	1
		DJI Mavic 3	2
		Autel EVO 2	1
		Parrot ANAFI FPV	1
13	ГУ ДСНС у Львівській обл.	DJI Mavic Air Fly More Combo	1
14	ГУ ДСНС у Миколаївській обл.	DJI Phantom 4 Pro +	1
15	ГУ ДСНС в Одеській обл.	DJI Mavic Air 2 Fly More Combo	1
16	ГУ ДСНС у Полтавській обл.	DJI Phantom 2	2
17	ГУ ДСНС у Рівненській обл.	DJI MAVIC AIR2	1
		DJI Mavic 2 Zoom	1
18	ГУ ДСНС у Сумській обл.	DJI Phantom 4 Pro +	1
19	ГУ ДСНС у Тернопільській обл.	DJI Phantom 4 Pro + з обладнанням для відеопошуку (спостереження) в режимі реального часу	1
20	ГУ ДСНС у Харківській обл.	DJI Mavic 3	2
		DJI Matrice	1
		DJI MAVIC AIR	1
		Skydio	2
21	ГУ ДСНС у Херсонській обл.	DJI Phantom 4 Pro	1
		DJI Mavic 3 Fly More Combo	1

22	ГУ ДСНС у Хмельницькій обл.	DJI Mavic 3 T	1
		DJI Mavic 3	1
		DJI Mavic 3	1
23	ГУ ДСНС у Черкаській обл.	DJI Mavic 2 Enterprise Advanced	1
24	ГУ ДСНС у Чернівецькій обл.	DJI Matrice 200 RTK	1
25	ГУ ДСНС у Чернігівській обл.	DJI Mavic 3 Pro Combo	1
ВСЬОГО:			56
1	УОЗ (м. Київ)	DJI Phantom 4	1
2	МРЦ ШР (м. Київ)	DJI MAVIC AIR 2 Fly More Combo	1
3	ЦЗУ (м. Переяслав)	DJI Matrice 210	1
4	САЗ ОРС ЦЗ (м. Ніжин)	ACS-3 Skyeton 2 БПАК в комплекті + авто (6 БПЛА)	6
5	МЦШР (м. Ромни)	AUTEL EVO Lite Plus Premium Bundle Orenge	1
6	2 СЦШР (м. Дрогобич)	Autel EVO Lite+	1
7	3 СЦШР (с. Жеребкове)	DJI MAVIC AIR 2 Fly More Combo	1
8	МЦГР ШР (м. Мерефа)	DJI Mavic 2S	2
		Autel EVO Lite+	1
		DJI Matrice 300	2
		Skydio X2	1
		Parrot Anafi FPV	1
		DJI Inspire 1	2
		DJI Mavic 2 Enterprise Advansed	1
		DJI Mavic 3 Fly More Combo	1
9	ДГВРЗ (м. Кривий Ріг)	DJI Phantom 4	1
10	ДВГ(АР)З (м. Дніпро)	DJI Mavic 3 Fly More Combo	1
ВСЬОГО:			25
1	НУЦЗ (м. Харків)	DJI Mavic 3 Classic with RC Remote (CP.MA.00000554.01)	1
		DJI AIR 2S (CP.MA.00000359.01)	1
2	ЛДУБЖД (м. Львів)	DJI Mavic 3 Cine Premium Combo	1
3	ЧПБ ім. Героїв Чорнобиля (м. Черкаси)	DJI Mavic 3	2
4	ІДУ НДЦЗ (м. Київ)	DJI MAVIC 3E (CP.EN.00000411.01)	1
		DJI Matrice 30T у комплекті з 6 акумуляторами DJI Matrice 30 Series TB 30	1
		DJI Avata Pro View Combo+Goggles 2	1
ВСЬОГО:			8

**Наведені данні у таблиці, зібрано за 2022-2023 рр. та можуть змінюватись.*

З аналізу модельного ряду за кількістю БПЛА бачимо що модель DJI Mavic 3 має лідерство серед моделей. В Табл. 3 наведені тактико-технічні характеристики моделі, на Рис. 1, 2 наведені приклади роботи даної моделі.

Таблиця 2. Модельний ряд за кількістю БпЛА, які закріплені за підрозділами



За рахунок якійсної камери, тактика застосування в основному є моніторинг, так як додаткове обладнання до виконання інших робіт на даний час відсутнє.

Таблиця 3. Технічні характеристики DJI Mavic 3

Вага порожнього, г	895
Час польоту, хв	46
Максимальний час зависання повітря, хв	40
Максимальна висота, м	6000
Довжина, мм	380,1
Максимальна швидкість польоту (на рівні моря без вітру), м/с	5 (режим C)
	15 (режим N)
	21 (режим S)
Максимальна дальність польоту, км	30
Внутрішнє сховище, Гб	8
Робоча температура, °C	-10 - +40
Максимальна відстань для зображення, км	15 км або 8 км з контролером CE
Автономний час роботи, год	без заряджання мобільного пристрою 6 год
Камера Hasselblad L2d-20	фото 20 МП



Рис. 1. Моніторинг оперативної ситуації при ліквідації наслідків обстрілу селище Лютіж, Київської області.



Рис. 2. Моніторинг лісової пожежі в Чорнобильській зоні відчуження.

Результати проведених досліджень дозволяють зробити такі висновки: найбільш успішним напрямом для розв'язання проблем моніторингу НС є застосування безпілотної авіації. При ліквідації масштабних надзвичайних ситуацій керівнику з ліквідації наслідків НС може бути недостатньо інформації про НС, так як звичайні способи спостереження можуть не дати всю

інформацію про обстановку при ліквідації НС, тим паче, якщо відбудеться різка динамічна зміна обстановки то керівник ліквідації НС може прийняти невірне рішення або взагалі його не прийняти, тому крім засобів зв'язку для ефективного управління силами і засобами ОРС ЦЗ вкрай необхідно проводити моніторинг оперативної обстановки за допомоги БпЛА.

В ДСНС розуміють все більш зростаючу роль БпЛА за різними напрямками застосування, тому розпочали підготовку пілотів (операторів) БпЛА. На теперішній час у багатьох країнах йде розробка концепцій реального застосування БпЛА у військовій сфері, сфері цивільного захисту та комерційній сфері.

На даний час ДСНС на озброєні має цивільні комерційні БпЛА, які застосовуються, в більшості випадків, тільки для моніторингу. Технічні характеристики цих БпЛА та їх навісного обладнання мають свою ефективність для вирішення завдань, які можуть стояти при ліквідації НС. Проведений аналіз показав, що використовуються переважно БпЛА китайського виробника – фірми DJI, що в подальшому може поставити нас в залежність від цього виробника. Тому бажано розробити концепцію використання безпілотної авіації в ДСНС та ставити завдання перед вітчизняними виробниками почати виробляти свої БпЛА з тактико-технічними характеристиками, які будуть задані концепцією використання безпілотної авіації в ДСНС. Ця концепція повинна враховувати:

- визначити функції та завдання безпілотної авіації в ДСНС;
- правові аспекти застосування використання безпілотної авіації в Україні та операторами ДСНС;
- врахувати світові тенденції розвитку БпЛА та тактики застосування у сфері цивільного захисту;
- визначитися з потрібними класами БпЛА та їх тактико-технічними характеристиками;
- надати методики підготовки операторів БпЛА ДСНС в залежності від класів БпЛА;

- розробити алгоритм аналізу роботи операторів БпЛА.

Таким чином, використання БпЛА істотно змінить діяльність підрозділів ОРС ЦЗ щодо забезпечення комплексу заходів, які реалізуються на території України в мирний час та в особливий період і спрямовані на захист населення, територій, навколишнього природного середовища, майна, матеріальних і культурних цінностей від надзвичайних ситуацій та інших небезпечних подій, запобігання виникненню таких ситуацій та подій, ліквідацію їх наслідків, надання допомоги постраждалим, здійснення державного нагляду (контролю) у сфері пожежної та техногенної безпеки.

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Annotation

Part 1. Interdisciplinary insights into modern digitalization and management

1.1. *Natalia Bobro*. Digitalization and management of the modern educational process.

The article analyzes the management of the modern educational process in the context of digitalization. The features of the digital transformation of education are considered and its main advantages and disadvantages are outlined. The use of immersive educational technologies, in particular, the use of virtual and augmented reality, as well as other means of interaction to create an interactive learning environment, is analyzed. The possibilities of using virtual and augmented reality technology in the learning environment are highlighted. It is noted that digital technologies can significantly improve the quality of education, provide greater flexibility and adaptability of the educational process, expand access to education for different groups of the population, improve monitoring and assessment of knowledge, and increase students' motivation and interest in learning.

1.2. *Nataiia Bozhko, Olha Tsubova*. Lviv Medical University's architectural complex: a historical perspective on its establishment and development.

The purpose of the study is the history of the development of the main stages of the design and construction of educational buildings, which have become the central premises for the study and training of medics at Lviv University. The methodological basis of the study became historiographical analysis and synthesis methods and historical-systemic method used under the principles of historical objectivism.

The main results of the study. The study examines the process of founding Lviv University as one of the oldest in Ukrainian lands. Attention is drawn to the progress of secularization in the Austrian Empire, which provided an opportunity to use the fortunes of liquidated monastic orders for the needs of the state, in particular, the restoration of educational institutions in Lviv. The scientific investigation examines the process of the formation and development of the medical faculty into a medical university proper, as well as the possibility of using the old hospital premises of Lviv monasteries. Information is highlighted concerning the construction of new educational buildings for the medical faculty of Lviv University and educational premises where future medical professionals were trained at city medical institutions at the end of the 19th and 20th centuries.

Conclusions. The presented information shows that the history of the design and construction of premises where medics studied is inextricably linked with the formation of the historical landscape of the city of Lviv during the 19th and 20th centuries. This period also provides an opportunity to analyze the changes that took place in the development of the city's infrastructure, especially in its eastern suburb – the Lychakiv district. The author of the study draws attention to the creative activity of famous European architects and constructors who participated in the design and construction of the city's medical institutions and educational buildings of the medical university. Their creative output makes it possible to trace the evolution of the use of architectural styles in Lviv from baroque to twentieth-century constructivism.

1.3. Vasyl Kot, Valentyna Yuskovych-Zhukovska. Control software by electronic load of the household. The latest information technologies today affect the pace of development and changes of the element base and software in the electric power industry. The use of computer information technologies ensures uninterrupted supply of electricity to household consumers. Control of parameters, monitoring and forecasting of indicators takes place with the help of controllers, routers, networks, and software. In the context of the formation of the information society and the need to ensure the reliability and efficiency of autonomous energy supply systems, the authors propose a computerized approach to energy consumption management.

1.4. Igor Shaforenko, Svitlana Zaika. Optimization of the stages of accepting administrative decisions to minimize the impact of uncertainty. In the conditions of fierce competition and limited resources, enterprises need to make effective management decisions that will enable them to achieve their goals and minimize risks. Existing theories and methods of management decision-making do not always account for the specifics of decision-making in uncertain conditions, necessitating their scientific study.

The study examines issues related to improving the management decision-making process under conditions of uncertainty. The authors investigate the main stages of management decision-making, as well as factors influencing their effectiveness in uncertain conditions.

The results of the study can be valuable for enhancing the effectiveness of management decisions in uncertain conditions, reducing risks associated with decision-making, and enhancing the competitiveness of enterprises.

1.5. Sviatoslav Shaforenko, Svitlana Zaika. Remote work: analysis of the essence and strategic significance. The study examined the impact of remote work on Ukrainian society in the context of martial law, revealing its significance and necessity as a strategic tool for supporting the country's economy, ensuring labor productivity, and promoting the social well-being of citizens. Remote work has proven to be an effective response to numerous problems related to the forced migration of Ukrainians and the imperative to ensure the safety of workers, enabling them to sustain their professional activities amidst uncertainty and change.

The proliferation of remote work not only contributes to job preservation and the maintenance of economic stability but also opens up new opportunities for the implementation of flexible forms of employment that can be adapted to various life circumstances. The importance of this transition to new work formats lies not only in addressing current issues but also in laying the foundations for the future development of enterprise personnel and the economy.

It has been established that remote work holds significant potential as a tool for enhancing the country's economic and social stability during crisis conditions. It provides the necessary adaptability and flexibility, aiding in overcoming challenges associated with the economic and social consequences of war while facilitating the integration of Ukrainians into the international labor market.

It is crucial to continue developing and supporting policies and initiatives that facilitate the expansion of telework opportunities while ensuring adequate working conditions and social protection for all categories of workers.

1.6. Iryna Shumilova, Nataliia Hrechanyk, Serhii Kubitskyi. Pedagogical prognostication of formation of innovative and entrepreneurial competence in future managers of education. The article is aimed at pedagogical forecasting of the formation of innovative and entrepreneurial competence of future education managers. The article defines and characterizes the direction of the strategy of entrepreneurial activity of the university of sustainable development; the role of the «entrepreneur-scientist» – a new type of manager who has economic thinking, mobility and can effectively carry out innovation and entrepreneurial activities based on a sufficient level of innovation and entrepreneurial competence. The features of the intensified influence of the formation of innovation and entrepreneurial competence of future education managers are characterized.

1.7. Svitlana Zaika, Andriy Avriata. Information technologies as a driver of tourism business development. In the modern world, information technologies play an increasingly important role in the development of all sectors of the economy, including tourism. They contribute to the improvement of management efficiency, the promotion of the tourist product, and the enhancement of the quality of the provision of tourist services.

The purpose of the study was to generalize the theoretical and practical aspects of the influence of information technologies on the development of the tourism business.

As a result of the study, it was established that information technologies have a positive impact on the development of the tourism business, in particular:

- contribute to increasing the efficiency of management of tourist enterprises by automating routine operations, such as booking, financial, and personnel management.

- improve the quality of service for tourists by providing them with access to information about tourist destinations and services at any time and in any place. This also allows them to compare the offers of different tourist companies and choose the best option.

- create new types of tourist products and services.

Therefore, the introduction of information technologies in tourism is an inevitable process that has a significant impact on the development of this industry. Tourism businesses need to understand these impacts and develop strategies that will allow them to get the most out of their application.

1.8. Iryna Hrabovets, Liudmyla Kalashnikova, Liudmyla Chernous. Information privacy: threats and challenges in the conditions of hybrid war in Ukraine. The article analyzes modern threats to Ukraine's information security under martial law conditions. Particular attention is paid to the fact that today, in connection with the full-scale war in Ukraine; information security issues are becoming extremely acute and urgent. The level of security of information resources becomes one of the critical factors that determine the course of military operations and affect the privacy of life and the national security of the state as a whole. An important component of this analysis is an understanding of what threats specifically exist in the modern information environment and how they can affect private security in wartime conditions.

1.9. Serhii Kachurynets. The essence of the concept «choreographic projects» in the media industry: social-humanitarian dimensions. The article deals with the topical aspects related to the essence of the concept of «choreographic projects» in the context of the media industry and their social-humanitarian dimensions. The importance and the role of choreographic projects in the modern media space as a key element of the cultural paradigm has been revealed. The influence of choreographic projects on the formation of social values and the perception of art by the audience has been analyzed. The possibility of using choreographic projects as a means of communication and solving social problems in society has been studied. The role of the media industry in the formation and dissemination of choreographic projects and their influence on the cultural development of modern society has been considered. Examples of choreographic projects have been offered for a better understanding of the deep socio-cultural and media-discursive processes that take place in the modern media space.

1.10. Tetiana Koliada-Berezovska, Stanislav Berezovsky. Cross-cultural communication: Ukrainian-Polish informational-educational connections. Authors, basing themselves on the definition of information and communication technologies as the driving force of progress, as declared in a globally recognized document of the international organization for education, science, and culture, provide a retrospective analytical overview of the development of Ukrainian and Polish printing as components of the general civilizational cross-cultural process. Defining the polyvalent nature of the latter, the role of historically significant figures that ensured mutual influence in the field of publishing, design, and dissemination of Ukrainian and Polish printed books is emphasized – as determinants of culture, spirituality, and national spirit. As a result, an expanded understanding of cultural connections in the late Middle Ages among all Slavic peoples and their neighbors is proposed in the context of ethnocultural identification as a counteraction to dehumanizing tendencies of modernity.

1.11. Hanna Stepanova. Electronic evidence in the criminal process of Ukraine. The parties to criminal proceedings are increasingly using the practice of submitting electronic evidence, which is due to the specifics of certain types of criminal offenses, the method of commission of which directly involves the use of devices and instruments which operate with information in electronic (digital) form.

The article notes that electronic evidence has certain specific features which will be reflected in the procedural legislation and proves that compliance with the requirements for the form of an electronic document forms its evidentiary value, the possibility to put it in the basis of a procedural decision and refer to it when considering criminal proceedings in court.

1.12. Liutsiia Tsyhaniuk. The music of the Ukrainian composer V. Bibik in the global information space of the 21st century. The article describes the personality of Valentyn Bibik, an outstanding Ukrainian composer of the second half of the twentieth century, describes his life and creative work, analyses the reasons that led to the silencing of his music in Ukraine in Soviet times, because of which the composer's music is sometimes better known in the world information space than in Ukraine. The article analyses the polyphonic cycle «34 Preludes and Fugues»

for piano by V. Bibik, its constructive, artistic and interpretive features, and highlights an extraordinary event for the world and Ukrainian artistic community – the premiere of the entire cycle in the United States on 7, 8 and 9 March 2018 by American pianist Timothy Goft with the assistance of Ukrainian-American composer, pianist and conductor Virko Balei, who has become a kind of «a bridge» between Ukrainian and world music culture, persistently promoting Ukrainian art in the global information space of the 21st century.

Part 2. Advancing education in the digital age: insights and strategies

2.1. Alina Chaikina. A competent approach to the information security digital skills formation in the educational environment. The article examined the concept of lifelong learning, which involves constantly acquiring new knowledge, abilities, and skills for successful functioning in society. European approaches to defining competencies that should be formed in future specialists were analysed. It was determined that formal and informal education in Ukraine should provide higher education students with opportunities for their development, as well as forming key competencies such as digital literacy, critical thinking, adaptability, stress resistance, information security, and others.

2.2. Vasyl Levkulych, Oksana Petriv, Mykola Yehupov. European strategy «Open Science» as a driver of innovation in the information society. The last decades have seen the growth of integration processes in the world, the development of trends towards joint solutions of social, research and economic problems by countries. Another difference is related to the scientific and technological revolution and the emergence of the «information society». The reality is that globalisation is an objective and absolutely inevitable phenomenon of our time, which can be slowed down by means of economic policy (which is happening in some cases), but cannot be stopped or «cancelled», as it is an imperative requirement of modern society and scientific and technological progress. The scientific system and its various components, in particular, the Open Science strategy, the so-called «databases», are a global research, analytical, comparative and ranking, bibliographic and abstract system of scientific research data, a tool for tracking the citation of scientific publications and other results of scientific and research activities. As this need was felt in different countries with a relatively small time difference, various research technologies were invented and developed in the context of the common strategy of Open Science.

2.3. Liudmyla Zagoruiko, Yevhen Plotnikov, Iryna Didenko. Quality assessment of blended language learning courses: a practical case. The paper is aimed at identifying the features of quality evaluation of blended courses for foreign language teaching based on a practical example of their implementation. The pre-service English learners from several Ukrainian universities were asked to take a questionnaire to determine their general readiness to work with e-courses, identify factors that may influence the effectiveness of blended learning, and find out their attitudes towards working with e-courses. Those e-courses were placed on Moodle platform.

The results of the proposed questionnaire made it possible to identify the quality of studied e-courses, namely via assessment of teaching methods, examining assessment techniques, inquiry into student engagement and evaluating technology support. That feedback supported identifying strengths, weaknesses, and areas for improvement of blended courses.

2.4. Viktor Zinchenko, Tetiana Bilan, Nataliia Vynnyk. Transformation of the education system in preparation for the «Digital Era». A strategic and long-term approach to the digital transformation of education and science is essential to prepare people for life and work in a changing world. In recent decades, many initiatives and investments have been made in educational technology and digital skills development. As digital change accelerates, it is essential that science, education and training systems adapt accordingly. While the responsibility for the content of teaching and the organisation of educational systems lies primarily with Member States, there has been a growing momentum in recent years to share best practices in digital science, education, and training; and to develop common tools and frameworks at EU level. Joining forces and working together on digital education has never been more important. The EU can play a more active role in identifying, sharing and scaling up good practice and supporting Member States and the education and learning communities at large through tools, frameworks, guidance, technical expertise and research.

2.5. Natalia Afanasieva, Natalya Byelyayeva, Viktoria Shkoda. Psychological features of the adaptation of Ukrainian adolescents to learning conditions in a foreign school. The article presents the results of a study of the peculiarities of the socio-psychological adaptation of teenagers – Ukrainian migrants – in German schools. Modern events forced a large number of Ukrainian citizens to go abroad. Germany has taken in about one million Ukrainians seeking asylum, most of them school-age children. The results of the study showed that female respondents suffer from depression. In the group of girls, depression has much greater and closer connections with adaptation and its criteria. It has been scientifically proven that early diagnosis and treatment of depression helps prevent or minimize its negative consequences. According to the results of the study, a close relationship between the depression index and the self-assessment of the feeling of loneliness was found in the boys, although depression as such was not found in them. Therefore, it will be appropriate to pay attention to the feeling of loneliness in boys, which can improve their general emotional state.

2.6. Zhanna Bogdan. Theoretical justification of soft skills development of youth students. The article presents a theoretical analysis of the problem of flexible skills and shows that the ideas about their structure, list and characteristics are scattered in modern studies of psychological, pedagogical and managerial directions. The presented study shows a new author's model of soft skills of a modern specialist, which represents the inter- and intrapsychic reality of the individual and contains soft skills described in traditional studies, as well as those proposed for consideration for the first time.

2.7. Oksana Davydova. Optimization of the process of adaptation of visually impaired persons to life in war conditions: empirical dimension. The work presents a comprehensive study of the problem of psychological aspects of adaptation of visually impaired persons in wartime conditions. The results of theoretical and empirical research on the relevant issues are analyzed. The sample of respondents is characterized, the quantitative and qualitative analysis of the results of the formative stage of the experiment is presented. The study was conducted in the context of Russian aggression, which is currently ongoing during a large-scale war in Ukraine. In the theoretical discourse, the aspects of the phenomenon of adaptation as a functional possibility of the individual are clarified, it is about the problems of integration and social-psychological adaptation of people with visual impairments. It was determined that traumatic events in a person's life are related to the phenomenon of stress resistance, coping strategies, the activation of human resources to overcome negative emotional experiences and depends on the effectiveness of continuous social and psychological support, relying on the positive potential of a person with visual impairments.

2.8. Marina Zaushnikova, Liubov Dolynska, Yulia Tonkopei. Psychologist communicative competence as a condition for his efficiency in the realities of the information society. The article highlights the study of a psychologist's communicative competence as a condition for his successful professional activity in the realities of using information and communication technologies. It is noted that professional activity in the «person-person» system has its own specificity, which determines the necessary professionally significant qualities and its set of competences, among which the leading place is occupied by communicative competence, which subsequently acquires changes in the conditions of the information society: on the one hand, it expands and improves the psychologist's field of activity, and on the other hand, it leads to a decrease in the development of communicative competence and complicates the consultation process. Accordingly, the problem of forming a psychologist's communicative competence in accordance with society's requirements in a combination of modern and traditional teaching methods arises.

2.9. Olexiy Os'machko, Roman Maiboroda, Eduard Shcholokov. Use of software environments of simulation for the information society development. In the article a scientific problem of designing the technological object has been analyzed. The information technology of the technological object computer-aided design and its information support have been developed. Demonstration the decomposition a general task of synthesis system of technological object on separate task. Demonstration the information technology of synthesis system of technological object. The information support of process of designing technological object is developed.

2.10. Oleh Samborskyi. Multidisciplinary approach to pharmaceutical management and marketing teaching. The article reveals the importance of an interdisciplinary approach to pharmaceutical management and marketing teaching in the professional training of future specialists in the field of pharmacy. The study discipline «Pharmaceutical Management and Marketing» in pharmacy taught at the Higher Education Institution has been characterized and evaluated. Emphasis is placed on the expediency of implementing an interdisciplinary approach as an effective didactic tool for increasing the efficiency of professional training of future pharmacists.

2.11. Svitlana Sechka, Maryna Kushnarova. Application of innovative methods in English language lessons as an educational component of the information society development. The article considers the use of innovative methods in English lessons on the example of personality-oriented method. The tasks of modernization of education cannot be solved without the optimal introduction of modern educational technologies in all its spheres. The use of innovative methods gives impetus to the development of new forms and content of traditional activities of students, which leads to their implementation at a higher level. Work with the use of such methods should be organized in such a way that from the very beginning it becomes a powerful psychological and pedagogical means of forming a motivational plan for students, a means of supporting and further developing their interest in the subject. It is emphasized that properly organized work of students with the use of innovations can promote in particular the growth of their cognitive and communicative interest, which in turn will enhance and expand opportunities for independent work of students to master a foreign language, both in class and after school. It is emphasized that the use of innovative forms of learning in contrast to traditional methods gives the student a major role in the acquisition of knowledge, in which the teacher is an active assistant, organizes, directs and stimulates learning activities. In his work, the teacher must not only solve educational problems, but also create conditions for students to independently creatively search, encourage them to research, develop skills of orientation in a huge information space and independent decision-making. And as a necessary condition in solving the tasks is the introduction of innovative technologies in the educational process. The constantly evolving system of information support in combination with technical support ensures the quality of the educational process.

Innovative methods have become an integral part of the process of teaching and learning English. They help students to acquire the necessary skills for free use of English in a short time, namely: listening, reading, writing and communication skills. Given the importance of innovative methods, it should be noted that the central place in the teaching process is the personality of the teacher, who selects, evaluates and implements new methods. Thus, innovative methods help the teacher to solve a large number of organizational issues, to make the lesson more interesting, but innovation cannot completely replace the teacher. An analysis of other innovative trends in the teaching of English may be a prospect for further research.

2.12. Yehor Sypchuk. Physics simulations as a tool for forming the research competence of students in the process of learning physics. The paper reveals the possibilities of physical simulations for the development of research competence of students in physics. The advantages and disadvantages of using simulations

in the educational process are analyzed. Examples of online platforms, mobile applications, which include similar tools are given and described, and an own structure of physical simulations is proposed. It is noted that this technology is one of the effective digital tools for the development of research skills in students during the study of physics, which vividly and accurately models various physical phenomena and processes, and also greatly facilitates the process of perception and assimilation of the material.

2.13. Iryna Ushakova, Bohdan Liashenko, Anastasia Mahonina. Psychological factors of procrastination in students. The article is devoted to consideration of the current issue of procrastination and the psychological factors that determine it. Procrastination is defined as a tendency to put off important and difficult, unpleasant things and make decisions «for later». Its differences from laziness and rest are shown. The main causes (factors) of procrastination have been identified: internal and external, permanent, and situational, motivational, emotional, behavioral, psychophysiological and temporary. The results of an empirical study of the relationship between procrastination and perfectionism, anxiety and coping strategies are presented. It was established that they can act as positive and negative factors of delaying actions. Initial recommendations regarding the prevention and correction of procrastination among students have been provided.

2.14. Iryna Shymkova, Svitlana Tsvilyk, Vitalii Hlukhaniuk. Formation of environmental competence of labor education future teacher in the higher teaching school. The study deals with the peculiarities of the formation of environmental competence of the future teacher of labor education. The directions of this process are as follows: formation of ecological awareness, environmentalization of the content of professional disciplines, organization of ecological and technological activities of students. It was established that the formation of environmental competence of the future teacher of labor education is effective under certain organizational and pedagogical conditions: familiarization with the purpose, tasks, and content of environmental education; formation of a value-motivational attitude towards nature; environmentalization of learning content; organization of ecological-technological and artistic-creative practical activities.

2.15. Olha Yuzyk, Sergiy Veyna, Halyna Bilanych. Tests as a modern knowledge assessment technology. The article substantiates the role and place of competence formation in the modern New Ukrainian School and institutions of higher or professional higher education. The role and types of assessment of students are studied.

The essence of the concept of «testing» as a method of measurement and one of the technologies of modern assessment in such levels of education (primary, secondary, higher education) is revealed. It is taken into account that testing is a process of measuring quantitative indicators using a test. Examples of test tasks for the 6th grade textbook «Informatics» that can be used in written testing and computer testing are given. We offer test tasks with one best answer and test tasks with several best answers. We offer examples of educational resources on the methodology of test item design that are available on YouTube.

The author argues that test technologies can be key to the quality training of students.

Part 3. Navigating the digital frontier: innovations in management and economy

3.1. *Olena Chukurna, Olena Stanislavyk, Olena Radius. Digital assets as a tool for financial assets management in the digital economy.* The article discusses digital assets and ways of managing them in the digital economy. Identified types of digital assets, their economic and legal nature. Four components of digital assets were substantiated: economic component, legal component, information component, value component. It had defined the concept of tokenomics. Research aspects of tokenized legal relations and virtual assets. It was systematized and characterized structural components of virtual assets according to their technological, economic-legal and informational-application nature. The most common digital ecosystems of digital asset management were considered.

3.2. *Artem Koldovskiy, Kateryna Shafranova. Reshaping management infrastructure in the digital financial frontier.* This paper explores the transformative impact of digital technologies, particularly blockchain, on the management infrastructure within the financial sector. Examining a collection of key literature, including studies on blockchain architecture, consensus mechanisms, hybrid blockchains, and diverse applications in banking, trade finance, and digital currencies, the research aims to elucidate the evolving landscape of management practices. Insights from this literature review shed light on how the integration of blockchain technology is reshaping traditional financial management structures. The discussion encompasses challenges, advantages, and the potential for establishing global norms to safeguard the integrity of financial data. By providing a comprehensive overview, the paper contributes to understanding the nuanced dynamics at play in the digital financial frontier and sets the stage for further exploration into the managerial implications of these technological advancements.

3.3. *Volodymyr Koloskov. Digital technologies application for environmental safety management of waste treatment process during emergency situations.* The purpose of the study is to develop the simulation complex of the environmental safety management system of the city during an emergency at the waste storage site on the basis of digital technologies application for the regional economy.

A simulation model of the environmental safety management system of the city during an emergency at the waste landfill was developed. On its basis, a soft ware and computing complex was created to support decision-making in the environmental safety management system of the city.

Developed simulation complex may be applied to fulfill the task of ensuring the required level of safety, but also to increase the effectiveness of protective measures implemented to solve it in the system of regional and state economy.

3.4. *Olha Komelina, Inna Miniailenko. Smart – concept of regional policy of spatial development in conditions of digitalization.* The main task of the post-war reconstruction of Ukraine is determined – the application of smart – concept of regional policy of spatial development in conditions of digitalization. The fundamental principles of sustainable spatial development have been formed. An algorithm for forming a smart concept of regional spatial development policy in conditions of digitalization has been developed. The peculiarities of the priorities of smart specialization in Ukraine are noted. Practically-oriented methodical approaches

to the development of a regional smart strategy are analyzed. It has been proven that strategic planning of spatial development on the basis of smart-specialization is the only means of forecasting and planning the development of territories for the future regarding the acceleration of innovative development. The principles of formation and implementation of spatial development strategies of regions on the basis of reasonable specializations are highlighted. A digital platform for strategic planning of the spatial development of regions based on the criteria of smart specializations has been created.

3.5. *Olha Komelina, Mariana Vasylychenko. Exploring the startup ecosystem's vibrant growth: lessons learned from the advanced economies.* The main purpose of the given paper is to put everyone in the picture about the economic essence of the startup ecosystem as a driving force for innovation and economic prosperity, to analyze the role of the leading players in the startup ecosystem's development, to compare the American and European models of the startup ecosystems' growth and to determine the lessons learned from the advanced economies that can be implemented in Ukraine to support its national economic development in the conditions of the full-scale war. It is emphasized by authors that the contemporary startup ecosystem is able to bring together all the stakeholders that gravitate towards ventures that leverage disruptive technologies. The findings of the analysis indicate that they should work together to promote startups, disruptive business models and leadership in various areas of technology.

3.6. *Tetiana Lysiuk. Historical museums in innovative tourism activities in Ukraine.* The article examines Ukrainian historical museums, which are currently developing in difficult conditions due to economic difficulties caused by limited funding for museum activities.

The conditions for the use of innovative digital technologies in the work of museum institutions are analysed. The process of digitalisation of museums and its role in the work of modern museology in terms of attracting tourists, which is inseparable from the socio-cultural function of the museum space, are described.

It is determined that under the influence of the latest trends in museology, which have shifted the focus from museum objects to the socio-cultural needs of visitors, society's requirements for the communication capabilities of museums have increased. In the context of information and technological development, in addition to traditional forms, modern ways of interaction between museums and society are emerging in the form of three-dimensional technologies, including creative video screenings, panoramic projection, virtual reality and animation technologies.

3.7. *Inna Vlasenko. Assessment of the influence of factors on the formation and improvement of quality and competitiveness of products of industrial enterprises.* The article identifies the factors influencing the formation and improvement of the quality and competitiveness of products (QCP) of industrial enterprises. To this purpose, at four industrial enterprises it was conducted a relevant study, on the results of which it was identified and substantiated 6 criteria that characterize the level of quality and competitiveness of products at industrial enterprises. The method of rank correlation and the method of expert evaluations were used to process the research results. According to the results of their use, it is proved the scientific assumption about the dependence of the level of QCP on the efficiency of use of materials, raw materials and resources in the enterprise activity.

3.8. Wladyslaw Wornalkiewicz. Breaking social anxiety – green light for nuclear power plants. In the past period, the world community was surprised by several nuclear power plant accidents. The Chernobyl power plant in Ukraine and the Fukushima power plant in Japan were particularly remembered. This caused many countries to periodically withdraw from the operation of already existing nuclear reactors, also called nuclear reactors, of a similar class as at Chernobyl, and to make efforts to secure them against harmful radiation to the environment. However, not all countries did so. France and the United States continued to improve the structures and control systems of nuclear power plants. Years passed, and offers of improved solutions in the field of nuclear energy appeared on the market. The times of the current climate warming, the increase in the prices of fossil fuels, especially gas and oil, have resulted in a return to the so-called clean sources of renewable energy. We are talking about wind energy, photovoltaics, energy of the Earth and electricity and heat derived from the splitting of uranium nuclei. The next COP28 conference devoted to counteracting climate warming, by gradually reducing the consumption of carbon dioxide-emitting fuels, gave a clear incentive to intensify the efforts of countries, including Poland, towards nuclear energy.

3.9. Wladyslaw Wornalkiewicz. Carbon-nuclear transformation. Nuclear power plants, also called nuclear energy, after the period of stagnation of the 1990s, underwent quite turbulent development in terms of size, construction, control, security, IT technology and fissile fuel supply. The trend of building rather medium and small power plants powered by uranium, thorium or hydrogen emerged. Particularly small SMR nuclear power plants, built modularly, found many supporters in the business world. The elements of nuclear reactors can be transported to the construction site. There is an era of fabrication of these elements and serial production of reactors. This is an impulse towards the coal-nuclear transformation of many already obsolete installations generating electricity and heat and operating on fossil fuels. Meeting this trend involves gradual replacement of boilers in coal-fired power plants with technically modern, designed generation IV nuclear reactors. In this generation, special emphasis was placed on environmental protection, increased safety for the environment and reliability of nuclear reactors. It should be noted that the United States are well advanced in the direction of efficient control of nuclear fission reactions, not only uranium.

3.10. Liudmyla Halan, Evgeniya Borysevych. Features of using Amazon Web Services as digital tools of modern business. Cloud web services of Amazon, AWS (Amazon Web Services) represent a wide set of infrastructure services, such as the provision of computing power, various data storage options, network solutions and databases, which are offered as services, if necessary, with availability within seconds, with payment according to the fact of consumption. At the customer's disposal are more than 200 varieties of AWS: from data storage to deployment tools and catalogs for content delivery. New services can be set up for the client quickly and without initial capital expenditure. This enables corporations, start-ups, small and medium-sized businesses and customers from other sectors to gain access to the components they need to quickly respond to changing business requirements and, most importantly, to increase their competitiveness and customer focus.

3.11. Oleksandr Hladkyi, Tetiana Dupliak, Mikael Hashimov. Innovative technologies of digital management of the tourist enterprise. The essence of innovative technologies as well as the main directions of their application in digital management of tourist enterprises are defined. The classification of innovative technologies in tourism is proposed. The main directions of innovative technologies usage in tour operators' business are analyzed. The main problems and advantages of innovative technologies usage in digital management of tourist enterprises are highlighted. The most promising directions for innovative technologies usage in tourism are: e-commerce, online stores and online travel agencies, as well as extensive development of tours based on virtual (augmented) reality technologies. The application of innovative technologies extremely need for high-tech computer equipment of tourist enterprise as well as for availability of highly qualified personnel.

3.12. Liudmyla Zveruk, Anna Monzolevska. Banking business management in the conditions of digital transformation of the economy. The digital transformation of the economy means the integration of digital technologies into all areas of economic activity, which leads to a change in the way of thinking, strategy and management of the banking business. Updating the management system includes innovative approaches and the introduction of new business models. Digitalisation in management is a comprehensive and systematic process of optimising and automating management decision-making, increasing communication methods and creating a new corporate culture. In the context of digital transformation, the effectiveness of the banking business development management mechanism, which is a set of functional elements: methods, tools, and levers, is important. The innovation management method and the technology management method are relevant. Successful implementation of the banking business development management strategy is ensured by: effective areas of innovation, marketing management, risk management and cybersecurity, improvement of management structures and information and communication technologies. Modern digital tools in business management include cloud technologies, AI analysis of branches, distributed ledger technology (DLT), electronic document management, ERP systems (Enterprise Resource Planning), Agile, and BI systems (Business Intelligence). Modern digital banks include online banks or direct banks, challenger banks, digital natives. The main directions of transformation of the modern banking system under the influence of digitalisation of management are: digital transformation of bank transfers, rethinking the banking business model using blockchain technology and smart contracts, application of cloud technologies, and development of Big Tech.

3.13. Olha Komelina, Sveta Shcherbinina. Digital technologies in the green economy. The article examines the concept of «green economy» and directions for its implementation, defines the features of the formation of the «green economy» model. The principles of building an «inclusive green economy» are revealed. The main aspects of the use of digital technologies in the green economy, their advantages and challenges, as well as examples of the successful implementation of these technologies in various sectors of the economy are studied, and the key role of the «green economy» in the post-war reconstruction of Ukraine is emphasized.

3.14. Svitlana Kulakova, Oksana Zhytnyk. Formation features of Ukraine's digital economy in modern conditions. The purpose of this article is to provide a multidimensional overview of the essence of the digital economy, the process of digital transformation, and a general analysis of the IT sector of the national economy. In addition to the theoretical foundations, the authors paid special attention to determining Ukraine's place in terms of digital development in the international market. It is found that the martial law in force on the territory of Ukraine, imposed in connection with Russia's armed aggression, has slowed down the innovative development of the information and communication technologies sector. However, this sector of the economy is still considered promising. Therefore, the issues of increasing the efficiency of investments in the IT sector, increasing the volume of investments, and accelerating digital transformation by learning from the experience of the leading EU and world countries are of relevance today.

3.15. Maryna Mashchenko, Olha Haponenko, Iryna Lisna. Forming a strategy of investment and innovation development of enterprise in the information society. The article is dedicated to the pertinent issue of forming a strategy for investment and innovation development of enterprises in the information society. The dynamics of capital investments by types of economic activity in Ukraine and their share in the total volume are analyzed. The directions for improving investment and innovation policy are systematized: increasing accessibility of financing; increasing the number of investment projects; state regulation; availability of highly qualified personnel with innovative thinking and knowledge; development and implementation of new technologies; support for small and medium-sized enterprises; attracting foreign experience and investments. A methodical approach to forming an innovative strategy is proposed, which includes: analysis of needs and opportunities for innovation implementation; after market analysis, it is necessary to develop an innovation idea that meets the needs of customers and can compete with other products in the market; development of a detailed plan for implementing the innovation strategy; product testing; market implementation of the innovation; evaluation of the results of implementing the innovation strategy.

3.16. Andrii Romin, Nina Rashkevich, Yuri Otrosh. Overview of the modeling approaches of the technical condition of used building structures under force, deformation and high-temperature influences. The authors reviewed approaches to determine the technical condition and residual resource of both individual structures and buildings and structures as a whole under force, deformation, and high-temperature influences. It was established that the difficulty of solving the problems of the theory and practice of construction in complex soil conditions with the possibility of high-temperature effects during a fire is due to the uncertainty of the initial information, the uncertainty and diversity of structures, the variability of the effects, the properties of building materials, and their insufficiently studied limit state.

3.17. Olha Rudachenko, Vitalina Konenko. Analysis of the current state of digital transformation of business processes in business activities of Ukraine. In this section, the role of digitalization entrepreneurial activity and in the economy of Ukraine as a whole, providing an incremental-iterative methodology that allows narrowing down the scope and research issues using a multiplicative effect. Explanations

for the concepts of «platform», «digital transformation», and «business process management» are provided. An overview of methods for transforming business processes is presented. An analytical review of the characteristics of business processes and platforms is conducted.

3.18. Alexander Sklyarenko. Digital economy and its significance for the development of modern innovative society. The purpose of the article is to study the theoretical foundations and aspects of the development of the digital economy and further informatisation in general, its features, problems and development trends in Ukraine. The paper examines the need for transition of the economy from a traditional format to a digital one in the context of global development of the information and innovation society. The material presented in the article shows that the latest technologies penetrate all spheres of society, thereby affecting the economy, its essence and forming structural innovative changes in it.

3.19. Leonid Tsubov, Oresta Shcherban. Management of life activities of territorial communities under the conditions of marital state. The purpose of the article is to study the peculiarities of managing the financial resources of territorial communities in the conditions of martial law in Ukraine. This article examines the management of financial resources of territorial communities. It is substantiated that one of the key problems faced by the United Territorial Communities (UTCs) is to ensure the proper performance of their duties. This includes the ability to effectively form a budget, accumulate sufficient financial resources to cover urgent social needs of citizens, in accordance with the principle of subsidiarity, and implement strategies for their economic and technological development. The key sources of funding to support the development of territorial communities in Ukraine against the background of decentralization processes are outlined. The importance of financial support in the process of development of local communities is emphasized. The management of financial resources of territorial communities in Ukraine acquires special relevance in the current conditions of wartime. Therefore, finding effective ways of financing territorial communities for their development, managing local budgets becomes a relevant aspect of scientific research. Successful management of this process involves using the unique capabilities of each territory, attracting various sources of financing, accumulating and effectively distributing resources, creating favorable conditions for the implementation of economic initiatives and local social programs. The main sources of funding for the development of local communities include revenues from local budgets, financial support from the state for local self-government, as well as the attraction of additional financial resources by local authorities through the use of the development potential of the territory. The dynamics and structure of revenues of local budgets, as well as their share in the consolidated budget of the country in recent years, were analyzed. The factors affecting financial management in united territorial communities are highlighted, and the positive influence of community unification on local financial management is emphasized. The contribution of territorial communities to the strengthening of the financial situation and the efficiency of filling the Unified Treasury Account is significant. Attention is focused on the fact that it is communities who take responsibility for financing a large number of powers, both delegated and their own, which have not yet been clearly defined in the Budget Code. These duties form the basis for local budgets, as they form the foundation for the stability of local finances.

3.20. *Olena Shevchenko, Svitlana Shcherbinina.* Financial technologies development and their role in improving of financial inclusion in the digital economy.

An analysis of scientific views on the essence of financial technologies was carried out, and the economic essence of this category was clarified. Emphasis is placed, first of all, on the fact that fintech is a synthesis of digital technologies and innovations in the financial sphere, which are used to provide, expand and distribute financial services by technological companies. The global experience of the functioning of the financial technology market in the modern conditions of geopolitical uncertainties and macroeconomic problems was analyzed and it was found that the most popular segments of investing funds are remittances and payments, blockchain and cryptocurrency, and regulatory technologies. It has been proven that fintech performs an important function – expanding access to digital financial services for all segments of society without any economic or non-economic barriers. The advantages of financial technologies in improving financial inclusion are studied, which include: ensuring economic stability in the financial market in conditions of increasing risks, reducing income inequality and increasing the general well-being of the country, economic growth through the mobilization of population savings, investments in the development of the economy.

Part 4. Innovative approaches in digital healthcare and rehabilitation

4.1. *Anastasiia Bondarenko, Tetiana Buhaienko.* Using experience of physical therapy

tools for rheumatoid arthritis. The paper analyzes the etiology, pathogenesis, clinical picture and methods of treatment of rheumatoid arthritis. The experience of various authors regarding the use of physical therapy in the conservative treatment of rheumatoid arthritis was studied. It has been established that physical therapy intervention is aimed at maximally improving the function of the affected joints and preventing the destruction and deformation of the joints.

4.2. *Svitlana Gvozdetska.* The correction of memory index of six-age children with a delay of mental development with the help of physical training.

The article is dedicated to the problem of wing physical training in the correction of memory levels of six-age children with a delay of mental development. Correctional employment by the offered technique has allowed to raise a level of formation of memory at children. Improvement of parameters of formation of memory at children of experimental group has allowed 65% of them to reach a level of normally advanced coevals. It has allowed them to go to a comprehensive school together with normally advanced children.

4.3. Viktoriia Horoshko, Andrii Horoshko, Oksana Hordiienko. The path to digitalization in medical applications: analysis, problems and perspectives.

The global healthcare system is going through a period of complex change due to global changes in technology and treatment methods. There is currently a large gap between the provision of skills at various levels of the education system and the demands of digital health. To train specialists in digital health, the state needs to provide knowledge related to both medicine and computer science. Mixed reality, artificial intelligence and quantum computing are key technologies in the implementation of current innovation strategies. However, the experience of emerging countries over the past decade also shows the risks that such medicine poses to patients. The use of medical mobile applications is a promising method, especially in the field of preventive medicine. Further research is needed on the relationship between health mobile application features such as psychological support for healthcare providers, automated feedback, medication adherence monitoring, reminders, and exercise prescription. Further developments should focus on strengthening the evidence base and implementation in developing countries.

4.4. Yana Kopytina. Development of an instrument for assessment of activities of day living / instrumental activities of day living (IADL / ADL) for visually impaired and blind persons.

The publication highlights the process of developing an Activities of Day Living / Instrumental Activities of Day Living (IADL / ADL) profile assessment tool for blind and partially sighted people. The prerequisites for its development are indicated, the features of the content of its constituent thematic blocks are revealed. Practical recommendations for the use of this tool are provided.

4.5. Serhii Lazorenko, Yuri Kurnyshev, Tetiana Kozhemiako. Methodological principles of forming the information and digital culture of future specialists in the field of physical culture and sports.

The modern Ukrainian system of higher education is experiencing rather deep transformational problems. Affiliation with the European academic space, autonomy of higher education institutions, actualization of scientific and creative activities of students (student-centrism), adaptation to the conditions of remote teaching of academic disciplines due to the epidemiological activation of coronavirus infections, full-scale war, etc. Distance learning platforms, which are organically connected with the use of information and communication technologies, are designed to solve the last problem. And in this context, the process of forming the information and digital culture of future specialists, in our case – the sphere of physical culture and sports, is quite promising. Therefore, in this scientific publication, we analyzed the methodological principles that will help speed up the educational processes of forming such education.

4.6. Vitalina Lytvynenko, Natalia Kuksa, Yulia Maliarova. Application of art therapy with the help of video information tools in the rehabilitation of post-stroke patients.

The article is devoted to the actual problem of using video information in art therapy in the context of rehabilitation of post-stroke patients. The scientific approaches to the interpretation of the art-therapy concept are described, the peculiarities of the use some types of art therapy with post-stroke patients are investigated, and the possibilities practical implementation of video information means with patients of this nosological group are considered.

- 4.7. Oleksandr Mishchenko, Tetiana Buhaienko, Olena Vaida. Features of physical therapy for people with post-traumatic gonarthrosis in the post-acute period of rehabilitation.** The etiology, pathogenesis and modern approaches to the treatment of gonarthrosis are analyzed. An analysis of modern approaches and general recommendations for the use of physical therapy in post-traumatic gonarthrosis was carried out.
- 4.8. Mariya Nutrichina, Jevgenija Nevedomsjka. Segmental and reflex massage in the physical rehabilitation of patients with cervical osteochondrosis.** The purpose of the study was to evaluate the effectiveness of segmental-reflex massage for osteochondrosis of the cervical spine. The experimental study included 20 people, including 14 women (70%) and 6 men (30%), diagnosed with osteochondrosis of the cervical spine. Patients of the experimental group (EG) with a diagnosis of osteochondrosis of the cervical spine were offered a physical rehabilitation program developed by us, which included segmental-reflex massage in a complex with therapeutic exercises and mechanotherapy classes on Bubnovsky multifunctional simulators, and patients of the control group (CG) underwent a similar course rehabilitation, but without the use of a course of segmental-reflex massage. According to the results of a scientific study, it was proved that the use of segmental-reflex massage in the complex of physical therapy of persons with osteochondrosis of the cervical spine is effective. Positive dynamics of the mobility indicators of the cervical spine during flexion and extension were observed, as well as quantitative changes in the level of pain sensations in the cervical spine and the impact of pain on the daily life of patients according to the Ukrainian version of the Neck Disability Index.
- 4.9. Oksana Polianska, Igor Polyanskyi, Olha Hulaha, Inna Moskaliuk. Use of virtual technologies in the training of doctors at the post-graduate stage of education.** The development of innovative technologies makes it possible to improve the training of doctors and trainees with the development of a new approach to the rehabilitation of patients who experience a decrease in the quality of life after an illness or injury, which is expressed by a violation of movement coordination, a decrease in reaction speed, and loss of hand control. When conducting practical classes with trainee doctors, virtual reality technologies make it possible to create an artificial, fully controlled environment that simulates the real conditions of therapeutic exercises. With the simultaneous application of the motion capture and feedback system, it is possible to achieve complete immersion of the subject in the created virtual situation, make it interactive and correct the patient's actions in the virtual situation in real time.
- 4.10. Anna Rudenko, Oleksandr Zviriaka, Anastasiia Syvachenko. Telerehabilitation of patients with acute cerebrovascular accident in the long-term rehabilitation period.** The article considers the possibilities of implementing alternative methods of systematic and controlled recovery of patients with acute cerebrovascular accident using telerehabilitation. The organizational and methodological aspects of telerehabilitation of post-stroke patients in the long-term rehabilitation period are determined in accordance with the above problems based on the International Classification of Functioning, considering its main components at the level of function, activity and participation. The structural components of telerehabilitation intervention are formed: therapeutic exercises to increase the strength of all muscle groups; therapeutic exercises for the development of the vestibular apparatus; therapeutic exercises to improve the range of motion in the affected limbs; breathing exercises, walking.

4.11. *Iryna Skrypka, Inna Kravchenko. Social and psychological adaptation of children with special educational needs in the process of informatization of modern society.*

The article is devoted to the issues of the modern understanding of the concept of «Inclusion in sports» and the conditions and main components of creating an «Inclusive sports environment». In turn, the uniqueness and ability of sports to overcome linguistic, cultural and social barriers, i.e. problems related to norms, values and line of behavior of children with special needs and children with disabilities, were established. It was established that in order to create an inclusive sports environment for the purpose of socio-psychological adaptation of children, coaches should actively use the basic concepts of information technologies in their professional activities.

Part 5. Artificial intelligence and innovative educational approaches in digital society

5.1. *Liudmyla Bazyl, Valerii Orlov, Tetyana Nestorenko. Preparation of future specialists for a career in youth entrepreneurship: realities and perspectives.* In a scientific article «Educational programs for Combat Horting – implementation during training classes strength fitness for a successful personality: athletes (pupils, students and cadets) of Combat Horting (experimental work)» the justification of the expediency of implementation during training sessions of strength fitness for athletes (pupils, students and cadets) of Combat Horting is revealed.

Based on the theoretical and practical research of S. Sychoy and Z. Dikhtiarenko, recommendations on the use of strength fitness in training have been developed, which confirmed their effectiveness in the process of training athletes (pupils, students and cadets) in Combat Horting. Therefore, the authors of the publication considered in detail the block system of training (theoretical, physical, technical, tactical, psychological) and educational work) of Combat Horting athletes during educational and training sessions.

5.2. *Liudmyla Bazyl, Valerii Orlov, Mykola Pryhodii. Professional development of vocational teachers in the context of society digitalization.* The publication reflects the study results of the preparing teachers' problems for successful work in the digital transformation conditions of the educational environment through the prism of their professional development. The levels of digital competence of vocational teachers are characterized. It is concluded that most teachers who teach general and special disciplines need additional training in the development of e-learning resources and the use of digital technologies in the system of vocational (vocational and technical) education. The reasons that actualize the problem of developing the digital competence of vocational teachers from the standpoint of professional development are substantiated; the key philosophical and methodological principles of professional development of teachers of vocational education institutions are identified; the psychological and pedagogical substantiation of this process in the digital age is carried out. The importance of training teachers of general and special disciplines to use SMART technologies for their professional development in the digital era is revealed. Particular attention is drawn to the need to use artificial intelligence, virtual and augmented reality, which is a promising area of teachers' professional development in the digital transformation of the educational environment.

- 5.3. Olena Titova, Petro Luzan, Iryna Mosia. The concept of college teacher's professional competence development.** The research dealt with the process of professional competence development for the teachers at a college. The understanding of the fact that the teacher's professional competence is essential in the process of vocational education development under the current global and local challenges requires the college teacher to be involved in the continuing improvement of their professional knowledge and skills. The conceptual idea of the research was based on the assumption that for the purposeful development of the teacher's professional competence, it was necessary to develop a system that covers all the elements of the educational process. The conceptual model was built to illustrate the process of a college teacher's purposeful professional development.
- 5.4. Oleg Bogut, Valentyna Yuskovych-Zhukovska. Peculiarities of using artificial intelligence in the processes of training and evaluation of web programmers in IT companies.** This article explores the innovative application of artificial intelligence in IT companies with respect to the processes of training and evaluating web programmers. It examines the current state and potential of artificial intelligence technologies and the possibilities of their application to enhance the efficiency and productivity of web programmer development and evaluation programs. Key advantages and challenges associated with the use of artificial intelligence are discussed.
- 5.5. Tetiana Karpenko, Olena Lakomova, Daria Shiyan. The significance of school geographic education in Ukraine for the «green» transition.** The article is devoted to the analysis of the possibilities of geography training programs of basic general secondary education in Ukraine for the formation of an ecological style of thinking and ecological behavior among students in accordance with the «Concept of the New Ukrainian School». The greatest attention is paid to the curriculum of the 9th grade «Ukraine and the world economy», which consists of five sections. Each section opens various opportunities for the formation of knowledge about the features of the «green economy» and the policy of sustainable development, and as a result of the formation of an environmentally conscious personality.
- 5.6. Oleksandr Kondratenko, Olha Lytvynenko. Ecological safety of transport as a component of national security of Ukraine during armed aggression and as a prerequisite for a «green» transition during post-war reconstruction.** Present paper describes the results of analysis of modern and relevant issues of technogenic and ecological safety of urban systems as the component of national security of Eastern-European countries on example of Ukraine in the time of armed aggression and as a prerequisite for a «green» transition during post-war reconstruction. The purpose of the study is determining the aspects of assessment and provision of the necessary level of ecological safety of exploitation of transport, in particular units of fire and emergency rescue vehicles, as a component of Ukraine's national security in times of armed aggression as a prerequisite for a «green» transition in times of post-war reconstruction. The object of the study is ecological safety of the exploitation of transport, in particular units of fire and emergency rescue vehicles, as a component of the national security of Ukraine. The subject of the study is the aspects of assessment and providing the necessary level of indicators of the object of the study in times of armed aggression and as a prerequisite for a «green» transition in times of post-war reconstruction.

- 5.7. Oleksandr Sheremet, Valentyna Yuskovych-Zhukovska. Modern computer vision technologies.** The technologies of artificial intelligence, machine learning, neural networks, computer vision, the Internet of Things, and robotics have become trends and one of the main vectors of the development of the modern digital society. Information technologies are developing rapidly and a close relationship has formed between them. This nexus of technologies allows machines to see and understand their environment, recognize and identify objects, be independent and make decisions on their own. This, in turn, affects the development of other industries and spheres of society.
- 5.8. Valentyna Yuskovych-Zhukovska, Yurii Lotiuk. The influence of artificial intelligence on the digitalization of society.** The task of artificial intelligence technologies is development of technological solutions that work on the principle of human intelligence and solve complex practical problems in various subject areas facing society. Successful companies are focusing their attention on providing better customer service, and for this, they are increasingly implementing conversational platforms based on artificial intelligence. Accordingly, innovations in the field of artificial intelligence have a positive effect on the processes of digitization in society.
- 5.9. Wladyslaw Wornalkiewicz. Trend of application of AI in search engines.** The use of advanced artificial intelligence in search engines results in better recognition of the question addressed to the virtual database. The study focuses on the development of search engines, on the leading role of the Google search engine. It has already implemented several new algorithms for interpreting the page or website being viewed. This is to properly rank in the lists, shared pages, and entries, because of answering the questions asked by Internet users. It was pointed out that the progress in the field of software methods was possible thanks to the results of work on the functioning of the human brain, taking over by the programs the skills of current learning based on the observation of the use of the Internet by specific groups of users. The impulse in improving the «intuition» of search engines, some of which are presented in this material, is the development of an application for recognizing natural languages and directing answers, as relevant as possible in the language of the inquirer.
- 5.10. Vyacheslav Borisov, Iryna Lapshina, Svitlana Lupinovych. Methodological approaches to the formation of information security in the conditions of information warfare.** The presented study is aimed at minimizing the negative impact of Russia's full-scale aggressive attack on Ukraine, namely the use of informational hybrid weapons to destroy the mental health of children of primary school age. Primary school students are the future potential of Ukraine. The level of their civic consciousness is important for the country's development in the coming decades. During the information war, younger schoolchildren are an important target for enemy agencies to distort consciousness and involve it in sabotage and provocations. Computerization of education made it impossible to isolate children of primary school age from the global information space. A critically important and reliable way to protect children is to develop their information security skills. The monograph provides a classification of the signs of information threats and possible consequences of their influence in case of insufficient or untimely reaction.

5.11. Vyacheslav Borisov, Iryna Lapshina, Svitlana Lupinovych. Training of students majoring in elementary education for the formation of information security of elementary school students in the conditions of information warfare. Informational hybrid weapons have the potential to destroy the physical and mental health of elementary school children. This is a threat to any country. In the conditions of war, this leads to the loss of children's health and lives. It is important for younger students to develop the skills to protect themselves from dangerous information.

Citizens of our country do not have adequate experience in countering information and psychological operations and propaganda. Therefore, it is difficult for them to teach their children in the family. This is work for professional teachers and psychologists. For this, they must also undergo appropriate training. It is important to develop a methodology for teaching children safety skills and protection against disinformation. The monograph presents step-by-step proposals for the preparation of primary school teachers for the formation of information protection skills in younger schoolchildren.

5.12. Tetiana Pashchenko, Anna Ostapenko, Oleksandr Yamkovyi. Technological aspects of professional competence development of college teachers. The aim of the research is to analyze the application of educational technologies in the system of postgraduate education to develop the professional competence of college teachers. The article shows the improvement of the college teacher's professional competence in the system of continuous professional education. The characteristics of the main technologies for the development of the professional competence of the college teacher are given.

5.13. Mykola Pryhodii, Andrii Hurzhii, Oleksandr Humennyi. Preparation of vocational education teachers for activities in the conditions of digital transformation of education. The key aspects of preparing vocational teachers to work in the digital educational environment include: mastering digital tools; developing media education competencies; using interactive teaching methods; online communication skills; adapting to changes; stimulating creativity and innovation; ensuring cybersecurity. To prepare vocational teachers to work in the context of the digital transformation of education, it is necessary to systematically involve them in trainings on the use of digital technologies in the educational process, compliance with cybersecurity rules in the organization of online communication, as well as in reviewing cases to stimulate the creativity of students and introduce innovative interactive teaching methods, and conduct reflection sessions on adaptation to changes.

5.14. Valentyna Radkevych. Development of the innovative competence of teachers in vocational education institutions in the conditions of the digital transformation of society. The impact of digital transformation on the professional activities of educators in vocational education institutions has been examined. The focus is on the necessity of integrating digital technologies into the educational process to develop professional competence, critical thinking, and independence among vocational education students. Special attention is given to the use of electronic learning platforms such as Coursera, EdX, FutureLearn, LinkedIn Learning, and Google for Education, which facilitate the effective organization of the educational process and provide access to a wide range of educational resources. It is emphasized that this approach enables the most effective use of digital technologies for developing innovative competence in teachers at vocational education institutions.

5.15. *Olena Sierikova.* Implementation of the educational component «Green technologies of urban ecosystems» in the educational process. Education systems play a significant role in promoting sustainable resource management. By integrating this into the curriculum, providing hands-on learning experiences, encouraging student engagement and collaborating with external organizations, they could help to shape a more sustainable future. Therefore, it is necessary and important to develop and implement new educational components that effectively achieve the program results, and are relevant and expedient.

5.16. *Serhii Shevchenko.* Use of unmanned aircraft by fire and rescue departments of Ukraine. The article examines the process of creating the concept of using unmanned aerial vehicles in the State Emergency Service of Ukraine. According to the results of the conducted statistical research, the legal and regulatory application of unmanned aerial vehicles was considered, the number of unmanned aerial vehicles of the copter type in the State Emergency Service of Ukraine was established, an analysis was carried out by models of unmanned aerial vehicles, the technical characteristics of the most numerous model of unmanned aerial vehicles and examples of the work of operators were given. The author's conclusions are given regarding the concept of using unmanned aerial vehicles in the State Emergency Service of Ukraine.

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Part 5. Multidisciplinary dimensions of quality of life in a globalized world

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