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Generativna umetna inteligenca na Univerzi v Novem mestu

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KLJUČNE BESEDE: generativna umetna inteligenca, GUI, ChatGPT, izobraževalni proces

POVZETEK – Z javno objavo generativnega umetnointeligenčnega klepetalnika ChatGPT konec leta 2022 smo dobili novo orodje, katerega pomen nekateri primerjajo celo z revolucijo, ki jo je prinesla vzpostavitev interneta v devetdesetih letih 20. stoletja. Generativna umetna inteligenca (GenUI) je posegla na vsa področja in vsak dan se dodaja nove možnosti uporabe. Izobraževalni proces pri tem ni izjema. V tem prispevku s pomočjo deskriptivne metode s kvantitativnim raziskovalnim pristopom za pridobivanje primarnih podatkov predstavimo poznavanje in uporabo GenUI na Univerzi v Novem mestu, njen vpliv na študij ter delovanje same ustanove, etičnost uporabe in vpliv na prihodnost. Ker smo na Univerzi v Novem mestu že sprejeli smernice za etično uporabo GenUI in v šolskem letu 2023/2024 v uvajalnem tednu študente že seznanili s predstavljeno tematiko, smo ocenili, da je primeren čas za oceno razširjenosti poznavanja in uporabe GenUI. Rezultati kažejo na pomembne ugotovitve, ki bodo služile kot osnova za nadaljnje prilagajanje izobraževalnih procesov, ki jih GenUI, želimo ali ne, temeljito spreminja.

Professional article

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KEYWORDS: Generative Artificial Intelligence, GenAI, ChatGPT, educational processes

ABSTRACT – With the public release of the generative AI chatbot ChatGPT at the end of 2022, we have gained a new tool, the importance of which some compare to the revolution brought about by the internet in the 1990s. Generative Artificial Intelligence (GenAI) has reached into all fields, with new applications being discovered daily. Education has not been left behind. In this paper, we use a descriptive method with a quantitative research approach to obtain primary data to determine the knowledge and use of GenAI at the University of Novo mesto, its impact on the studies and services, the ethicality of its use and its impact on the future. As the University of Novo mesto has already adopted the guidelines for the ethical use of GenAI and has already introduced the topic to the students during the induction week in the academic year 2023/2024, we considered it an appropriate time to evaluate the prevalence of knowledge and use of GenAI.

1 Uvod

V zadnjih letih je umetna inteligenca (UI) doživela pravi razcvet, zlasti generativna umetna inteligenca (GenUI) kot ena izmed najnaprednejših vej UI, in vzbuja zanimanje raziskovalne skupnosti in industrije zaradi svojih impresivnih zmogljivosti, raznovrstnih aplikacij in obetavnih perspektiv za prihodnji razvoj. Temelji na modelih globokega učenja, ki z uporabo nevronskih mrež omogočajo ustvarjanje visokokakovostnih besedil, povzetkov, slik, zvoka in videov. Njen hiter razvoj odpira mnoga vrata in priložnosti, vendar prinaša tudi izzive, kot so vprašanja o etičnosti uporabe ter zanesljivost in točnost podatkov.

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Da bi pridobili poglobljeno razumevanje vpliva GenUI na Univerzi v Novem mestu v nadaljevanju - UNM, smo pripravili anketni vprašalnik za študente in zaposlene. Pri tem smo si postavili več specifičnih ciljev:

- Analizirati razširjenost in pogostost uporabe GenUI, da bi pridobili vpogled v priljubljenost orodij GenUI in ugotovili, v katerih kontekstih se najpogosteje uporabljajo.
- Raziskati mero zaupanja v GenUI orodja in vpliv na delo in študij, da bi ugotovili, v kolikšni meri uporabniki zaupajo rezultatom, ki jih podaja GenUI, ter kako to zaupanje vpliva na njihovo študijsko, akademsko in raziskovalno delo.
- Ugotoviti pravilnost in etičnost uporabe GenUI z namenom pridobitve izhodišča za sprejetje ukrepov za izboljšanje stanja.
- Ugotoviti, kako uporabniki čutijo trenutni nadzor nad uporabo in kakšna so stališča uporabnikov glede ustreznosti nadzora.
- Preveriti prednosti in slabosti uporabe GenUI, da bi pridobili vpogled v glavne koristi in potencialne pomanjkljivosti, ki jih uporabniki zaznavajo pri uporabi te tehnologije.

Prispevek smo razdelili na več poglavij. V drugem poglavju povzemamo zgodovino GenUI, ki je doživela izjemno hiter razvoj v zadnjih nekaj letih. V tretjem poglavju je predstavljena uporabljena raziskovalna metodologija in v četrtem pa so predstavljeni rezultati raziskave. Sledi še peto poglavje z razpravo, navedbo omejitev in predlogi za nadaljnje raziskovalno delo.

Z različnih zornih kotov so področje našega zanimanja obravnavali tudi drugi avtorji. Avtorici Chan in Hu (Chan in Hu, 2023) sta raziskovali percepcijo, prednosti in izzive GenUI v visokošolskem izobraževanju. Njune ugotovitve kažejo, da imajo študentje v večini pozitiven odnos do uporabe GenUI. Po njunem mnenju je bolje sprejeti nove tehnologije, namesto da se jim izogibamo. Kljub vsem prednostim pa so študentje pokazali skrb glede prevelikega zanašanja na te tehnologije. Kot veliko težavo sta izpostavili plagiatorstvo, ki je že dolgo časa velik problem v izobraževanju. Problem se je z uporabo GenUI le še povečal. Poleg tega se je pojavljala zaskrbljenost za človeške vrednote, v smislu, da lahko GenUI povečuje nepravičnost in neenakost med študenti, ki uporabljajo to tehnologijo, in tistimi, ki je ne. V visokem šolstvu je veliko odvisno od znanja predavateljev. Ghimire, Prather in Edwards (Ghimire, Prather in Edwards, 2024) so raziskovali izkušnje in odnos predavateljev do GenUI. Zlasti jih je zanimala stopnja ozaveščenosti glede uporabe. Ugotovili so, da GenUI 73 % predavateljem povečuje produktivnost, 68 % predstavlja pomoč pri oblikovanju idej in 53 % hitri dostop do informacij. Pri negativni strani uporabe GenUI pa so se pojavile skrbi glede goljufanja (38 %) in zmanjšanja ustvarjalnosti (38 %). Velik izziv predstavljata ugotavljanje plagiatov, narejenih s pomočjo GenUI, in ocenjevanje znanja študentov, saj tradicionalne metode ne zadostujejo več. Avtorji menijo, da bo potrebno ocenjevanje izvajati na način, ki bo testiral kritično razmišljanje. Tudi v tej raziskavi so izjavili, da se bo treba na razvoj GenUI prilagoditi, saj bo ta imel enak ali še večji vpliv na izobraževanje, kot ga je imela iznajdba interneta. Širši pregled priporočene in etične uporabe GenUI v visokošolskem sistemu je izvedel Makovec

(Makovec, 2024). V njem je med drugim predstavil predloge različnih avtorjev glede uporabe GenUI v visokem šolstvu. Ugotavljal je, da še ni generalno sprejetega načina in da še poteka preizkušanje različnih pristopov.

2 Zgodovina generativne umetne inteligence

Na zgodovino GenUI moramo gledati v luči razvoja UI, saj je GenUI samo del UI. Tudi avtorji, ki so opisovali zgodovino UI, si niso povsem enotni, kaj izpostaviti. Razvoj UI se je začel z modelom umetnega nevrona, ki sta ga leta 1943 predlagala Warren McCulloch in Walter Pitts (IFLA, 2020; Lawton, 2023; Dash, 2023; Jaiswal, b. d.; Levine, 2023; Karjian, 2023; Nadeem, 2023 in Coursera Staff, 2024). Leta 1950 je matematik Alan Turing objavil članek z naslovom Computing Machinery and Intelligence. Predlagal je poskus, danes imenovan Turingov test, za ugotavljanje inteligentnega vedenja stroja (Karjian, 2023; Mijwel, 2015). Leto pozneje, leta 1951, sta Marvin Minsky in Dean Edmonds sestavila prvo umetno nevronsko mrežo, imenovano SNARC. Posnemala je delovanje 40 nevronov. Leta 1956 so John McCarthy, Marvin Minsky in Claude Shannon v Dartmouthu (USA) organizirali poletno delavnico za raziskovalce. Ta delavnica je pripeljala do nove znanosti, poimenovane umetna inteligenca (Jaiswal, b. d.). Leta 1966 je Joseph Weizenbaum (MIT) ustvaril prvi klepatalni robot ELIZA, ki je simuliral terapevtske pogovore. Številni uporabniki so mislili, da se pogovarjajo s človekom (Coursera Staff, 2024). Leta 1968 je Terry Winograda ustvaril prvo multimodalno umetno inteligenco SHRDLU (Lawton, 2023).

Med letoma 1974 in 1980 se je začela prva »zima« umetne inteligence. V tem obdobju sta se bistveno zmanjšala financiranje raziskav in zanimanje za UI (Haenlein in Kaplan, 2019). Leta 1980 se je UI vrnila z ekspretnimi sistemi, ki so bili programirani za posnemanje človeškega obnašanja. Leta 1981 je Danny Hillis ustvaril vzporedne računalnike za umetno inteligenco (Jaiswal, b. d.). Nemški znanstvenik Ernst Dickmanns je leta 1986 izumil prvi samovozeči avtomobil. To je bil mercedesov kombi, ki ga je sam opremil z računalniškim sistemom in senzorji (Coursera Staff, 2024).

Leta 1987 se je začela še druga »zima« umetne inteligence, ki je trajala do leta 1993. Vlada in vlagatelji so ponovno prenehali financirati raziskave, vendar se razvoj vseeno ni popolnoma ustavil (Jaiswal, b. d.). IBM-ov ekspertni sistem Deep Blue je leta 1997 dosegel zgodovinski mejnik, ko je v šahu premagal svetovnega prvaka Garija Kasparova (Dash, 2023). Istega leta pa sta Sepp Hochreiter in Jürgen Schmidhuber predstavila nevronsko mrežo s kratkoročnim pomnilnikom (Jaiswal, b. d.). Leta 2000 so na Univerzi v Montrealu v članku predlagali metodo za modeliranje jezika s pomočjo nevronskih mrež (Lawton, 2023). V naše domove je UI prvič vstopila leta 2002 v obliki sesalnika (Jaiswal, b. d.). Dve leti kasneje je tudi NASA na Mars poslala dva roverja, opremljena z UI (Coursera Staff, 2024).

Leto 2009 je bilo ključno za razcvet UI, saj je Fei-Fei Li začel ustvarjati vizualno podatkovno zbirko ImageNet, Rajat Raina, Anand Madhavan in Andrew Ng pa so predstavili idejo o uporabi grafičnih procesorjev (angl. graphics processing unit

– GPU) za usposabljanje nevronskih mrež (Karjian, 2023). Naslednji velik dogodek je bila predstavitev glasovne pomočnice Siri podjetja Apple leta 2011, ki ustvarja odgovore in izvaja dejanja na glasovni ukaz (Dash, 2023). Tri leta kasneje je Amazon predstavil inteligentno virtualno pomočnico Alexo, ki ima glasovni vmesnik za opravljanje nakupovalnih nalog (Coursera Staff, 2024). Istega leta je Eugene Goostman ustvaril klepetalni robot EUGENE, Facebook pa je razvil DeepFace za prepoznavo obrazov na slikah. Leta 2016 je program AlphaGo v Seulu premagal znanega igralca igre Go Leeja Sedola. Istega leta je Uber v Pittsburghu začel izvajati programe za samovozeče avtomobile (Jaiswal, b. d.).

Za razvoj velikih jezikovnih modelov, kot so GPT-3.5, GPT-4, Gemini, Claude, LLaMA in drugi, je bilo odločilno leto 2017, ko je razvojna skupina Google Brain objavila koncept nevronske mreže, imenovane Transformer. Novo je bilo to, da zna nevronska mreža zakodirati poleg besed tudi kontekst besed v stavkih (Lawton, 2023). Leta 2018 je podjetje OpenAI predstavilo GPT-1 (angl. Generative Pre-trained Transformer – GPT). Nevronska mreža tega prvega jezikovnega modela je vsebovala 117 milijonov parametrov. Uspešnost nenadzorovanega učenja pri razumevanju jezikovnih nalog je bila že zelo prepričljiva. Februarja 2019 je bil predstavljen ChatGPT-2 z 1,5 milijarde parametrov. Generiranje besedila je postalo zmogljivejše in ga zaradi bojazni pred njegovo zlorabo sprva javnosti niso pokazali. S postopnim uvajanjem so novembra 2019 objavili GPT-2 (Levine, 2023). S GPT-3 je bil junija 2020 narejen še korak naprej s 175 milijardami parametrov. Imel je napredne možnosti ustvarjanja besedila. Lahko je tudi odgovarjal na zastavljena vprašanja in prevajal v tuje jezike. Novembra 2022 je OpenAI objavil klepetalnik ChatGPT 3.5 (temelji na modelu GPT-3.5) in leta 2023 je izšla nova verzija ChatGPT 4 (Coursera Staff, 2024). Danes podjetja tekmujejo med sabo, katero bo izdalo boljši jezikovni model oziroma katero ga bo bolje vključilo kot pomoč pri vsakdanjem delu. GenUI je postala novo orodje in njen pomen nekateri primerjajo s pojavom interneta v 90. letih prejšnjega stoletja (Nadeem, 2023).

3 Metodologija

V raziskavi smo uporabili deskriptivno metodo dela s kvantitativnim raziskovalnim pristopom za pridobivanje primarnih podatkov. Glede na namen raziskave in zastavljene cilje je bila uporaba kvantitativnega pristopa najustreznejša, saj smo potrebovali zanesljive, objektive in empirične podatke, ki omogočajo robustno statistično analizo ter odkrivanje vzorcev uporabe GenUI.

Uporabili smo nenaključno vzorčenje, saj so podatki zbrani od specifične ciljne populacije, to so bili študenti in zaposleni na UNM. Nenaključno vzorčenje je bilo izbrano, da bi zagotovili osredotočenost na specifično populacijo, neposredno povezano s preučevano tematiko, kar je bilo ključno za verodostojnost in natančnost naših ugotovitev.

Podatke smo zbrali s tehniko spletnega anketiranja, pri čemer smo uporabili strukturiran anketni vprašalnik, sestavljen iz skrbno formuliranih, jasnih in razumljivih vprašanj. Uporaba strukturiranega pristopa je omogočila primerljivost podatkov in zmanjšala verjetnost napačne interpretacije vprašanj s strani anketirancev. Anketni vprašalnik je bil implementiran na spletnem portalu 1ka. To je omogočilo učinkovito distribucijo in spremljanje odzivov v realnem času. Vabilo za sodelovanje smo po elektronski pošti poslali vsem študentom in zaposlenim na UNM. S tem smo tudi zagotovili širok doseg in učinkovito zajemanje ciljne populacije.

Anketiranje je potekalo od 12. do 28. aprila 2024. V tem času smo prejeli zadostno število odgovorov za izvedbo statistično zanesljive analize. Rezultate smo zbrali, obdelali s kvantitativnimi statističnimi metodami in grafično predstavili. S kritično analizo rezultatov smo dosegli cilje raziskave in dodatno osvetlili izzive in priložnosti, povezane z uporabo GenUI v izobraževalnem okolju.

4 Izvedba raziskave in rezultati

Anketo je sestavljalo 16 vprašanj, od tega štiri sociodemografska. Vprašanja so bila različnih vrst, nekaj jih je bilo odprtega tipa, nekaj zaprtega ali kombiniranega. Uporabili smo tudi 5-stopenjsko Likertovo lestvico, da so lahko anketiranci označevali stopnjo strinjanja s postavljenimi trditvami. Raziskovalno populacijo so sestavljali študenti in zaposleni na UNM. Anketni vprašalnik sta rešila 302 anketiranca. Izločili smo vse, ki so bili nepopolni oziroma delno izpolnjeni. V celoti je anketni vprašalnik izpolnilo 147 anketirancev. Vprašalnik je izpolnilo več žensk (59 %). Največ (50 %) anketirancev je starih med 12 in 25 let, najmanj (7 %) pa 56 let in več. Malo več kot polovica (57 %) anketirancev je študentov in študentk 1. stopnje, sledijo jim študenti in študentke 2. stopnje (18 %) in redni oz. pogodbeni zaposleni (15 %). Glede na študijsko oz. zaposlitveno usmeritev je največ anketirancev s Fakultete za zdravstvene vede (41 %) in Fakultete za ekonomijo in informatiko (41 %). V tabeli 1 je predstavljena analiza sociodemografskih vprašanj. Za obdelavo podatkov smo uporabili osnovno opisno statistično analizo, ki vključuje predstavitev velikosti vzorca (n), odstotkov (%), frekvenc (f), srednjih vrednosti (μ) in standardnega odklona (σ). Podatke smo analizirali in obdelali s pomočjo spletne strani 1ka in računalniškega programa Excel.

Tabela 1

Značilnosti anketirancev – sociodemografska vprašanja ankete (n = 147)

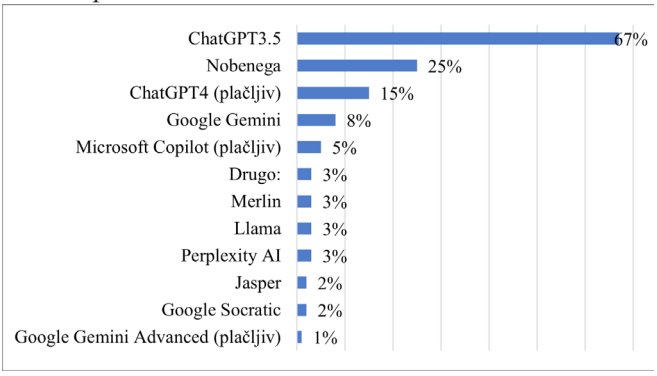
Značilnosti	Kategorija	f	f%
Spol	moški	60	41%
	ženski	87	59%
Starost	18-25	73	50%
	26-40	36	24%
	41-55	27	18%
	56 in več	11	7%

Status na univerzi	študent/ka 1.stopnje	84	57%
	študent/ka 2.stopnje	26	18%
	študent/ka 3.stopnje	6	4%
	zaposleni (redno/pogodbeno) predavatelj/ica	22	15%
	administrativni ali drugi sodelavec/ka	9	6%
Študij ali zaposlitev	Fakulteti za zdravstvene vede	60	41%
	Fakulteti za poslovne in upravne vede	2	1%
	Fakulteti za ekonomijo in informatiko	61	41%
	Fakulteti za strojništvo	16	11%
	Univerzi v Novem mestu	8	5%

Graf 1 prikazuje klepetalnike GenUI, ki jih anketiranci uporabljajo.

Graf 1

Uporaba GenUI klepetalnikov

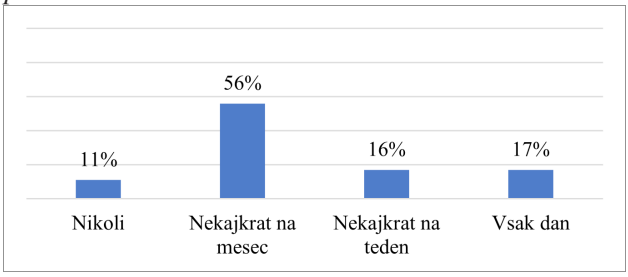


Največ (67 %) jih uporablja brezplačno verzijo ChatGPT 3.5, plačljivo verzijo ChatGPT 4 pa jih uporablja kar 15 %. Skupaj uporablja plačljive verzije 21 % anketirancev. Uporaba drugih klepetalnikov se je gibala od 2 do 8 %. 3 % anketirancev so izbrali odgovor »drugo«, kjer so našteli klepetalnike Blackbox ai, Phind in Aria. Četrtina (25 %) anketirancev je po tem vprašanju z anketo zaključila, saj niso še nikoli uporabljali klepetalnikov GenUI, zato niso mogli odgovarjati na nadaljnja vprašanja o njihovi uporabi.

Graf 2 prikazuje pogostost uporabe prej omenjenih klepetalnikov med anketiranci. Želeli smo izvedeti, kako pogosto in intenzivno se uporablja klepetalnike.

Graf 2

Pogostost uporabe GenUI

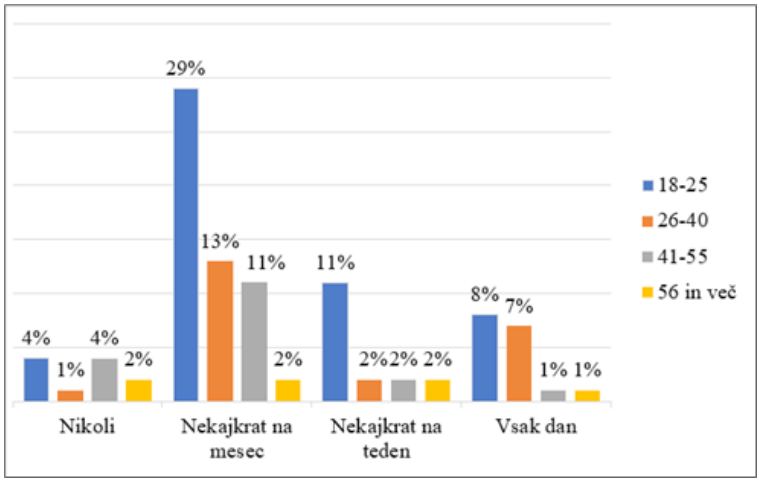


Največji delež anketirancev (56 %) klepetalnike GenUI uporablja nekajkrat na mesec, največ, 45 %, študenti. Manjši delež (17 %) jih uporablja vsak dan, pri čemer delež študentov predstavlja 14 %. Malo manjši delež (16 %) jih uporablja nekajkrat na teden, v tem delu predstavljajo zaposleni le 4 %, najmanj (11 %) jih sploh nikoli ne uporablja, pri čemer kar 8 % predstavljajo študenti. Srednja vrednost (μ) je 2,39, kar kaže, da anketiranci v povprečju klepetalnike GenUI uporabljajo redko, torej nekajkrat na mesec. Nizek standardni odklon pa (0,89) nakazuje, da so odgovori zbrani predvsem okoli vrednosti »nekajkrat na mesec«.

Če k pogostosti uporabe dodamo še spremenljivko leta anketirancev, dobimo informacijo za primerjavo uporabe po starosti (graf 3).

Graf 3

Pogostost uporabe po starosti anketirancev

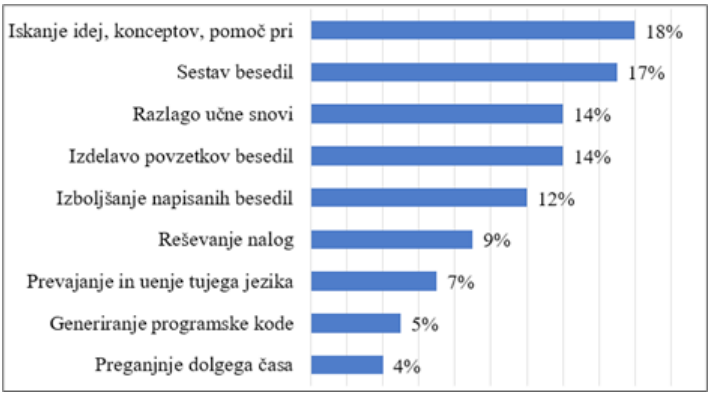


Graf kaže pogostost uporabe in absolutno število odgovorov po letih. Na hitro bi lahko sklepali, da starejše generacije manj pogosto uporabljajo GenUI od mlajših generacij. Vendar temu vseeno ni tako. Če pri pregledu tega grafa upoštevamo število anketirancev po letih (tabela 1), pridemo do zanimive ugotovitve, da pri najbolj pogosti uporabi (nekajkrat na teden in vsak dan) pravzaprav ni velikih razlik med generacijami. Primer za najpogostejšo uporabo (vsak dan): 1 % pri vseh odgovorih je za najstarejšo generacijo skoraj enak kot 8 % za najmlajšo generacijo (1 % * 50 %/7 % = 7,1 %). Iz grafa tudi razberemo, da je najstarejša generacija (56 let in več) zelo enakomerno odgovorila glede na dane možnosti pogostosti uporabe (2 %, 2 %, 2 %, 1 %). Pri mlajših generacijah je delež odgovorov največji pri uporabi nekajkrat na mesec. Vsekakor pri pregledu pogostosti uporabe ne moremo trditi, da mlajše generacije pogosteje uporabljajo GenUI kot starejše.

Želeli smo tudi izvedeti, za kaj konkretno anketiranci najpogosteje uporabljajo GenUI in v kolikšni meri. Anketiranci so lahko izbrali največ štiri odgovore. Rezultati so predstavljeni z grafom 4.

Graf 4

Namen uporabe GenUI

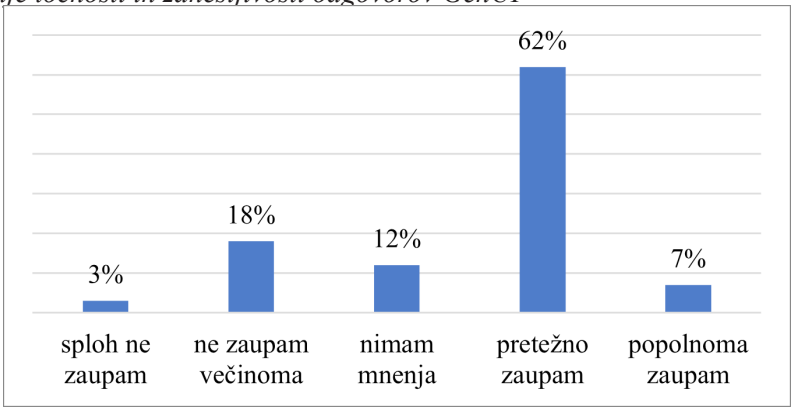


Največ anketirancev (18 %) uporablja GenUI za iskanje idej, konceptov in pomoč pri raziskavah, malo manj (17 %) pa za sestavo besedil. Najmanj (4 %) vprašanih jo uporablja za preganjanje dolgčasa, kar ni presenetljivo, saj imamo danes na voljo mnogo drugih stvari, s katerimi se lahko zamotimo. Relativno malo jih uporablja GenUI za generiranje programske kode (5 %) ter prevajanje in učenje tujega jezika (7 %). To je zanimiv podatek, saj je GenUI ravno na teh dveh področjih zelo močna. Razvidno je, da nobeden od odgovorov ne prevladuje, kar kaže na vsestranskost GenUI in njene uporabe na mnogih področjih.

Ena od slabosti GenUI je haluciniranje oziroma sestavljanje besedil, ki so videti verodostojna, a so faktografsko napačna. V grafu 5 so zbrani rezultati glede zaupanja anketirancev v odgovore, ki jih poda GenUI. S prikazom stopnje zaupanja lahko bolje razumemo pripravljenost anketirancev za uporabo GenUI.

Graf 5

Zaupanje točnosti in zanesljivosti odgovorov GenUI



Največ anketirancev (62 %) pretežno zaupa v točnost odgovorov, ki jih poda GenUI. Na višjo stopnjo zaupanja kaže tudi stopnja uporabe te tehnologije. Zelo majhen

odstotek (7 %) anketirancev popolnoma zaupa GenUI, še manjši (3 %) pa ji sploh ne zaupa. Srednja vrednost (3,525) kaže, da anketiranci na splošno pretežno zaupajo odgovorom, ki jih generirajo klepetalniki GenUI. Nizek standardni odklon (0,94) nam pove, da so odgovori anketirancev pretežno zbrani okoli odgovora 4, kar kaže na pretežno zaupanje.

Za oceno vpliva GenUI na študij oz. zaposlitev smo postavili tri vprašanja. Anketirance smo prosili, da na Likertovi lestvici označijo stopnjo strinjanja s podanimi izjavami. Za lažjo preglednost smo rezultate prikazali v tabeli 2.

Tabela 2

Tri trditve o vplivu GenUI

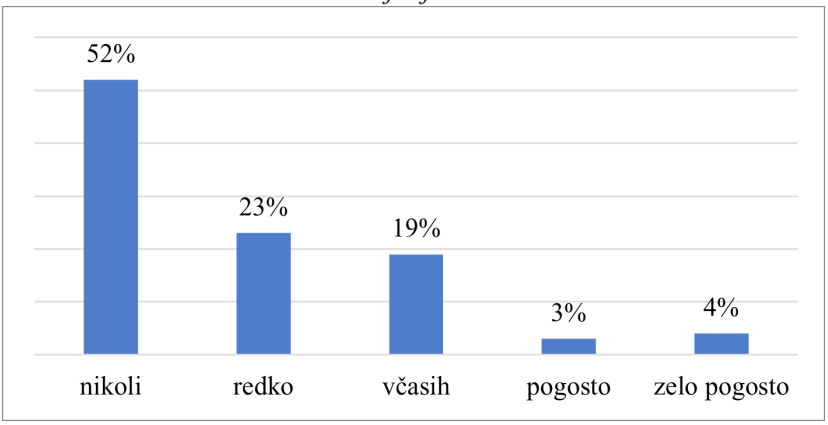
Trditve	Odgovori				
	Nikakor se ne strinjam	se ne strinjam	Niti se ne strinjam niti se strinjam	se strinjam	popolnoma se strinjam
Uporaba GenUI ima pozitiven vpliv na moj študij/delo.	5%	4%	17%	49%	25%
GenUI skrajša čas potreben za izvedbo dela.	3%	5%	16%	43%	33%
Menim, da bo uporaba GenUI pozitivno spremenila visokošolsko izobraževanje na splošno.	5%	10%	23%	33%	28%

Anketiranci so morali izraziti svoje strinjanje s podanimi trditvami na 5-stopenjski Likertovi lestvici. Z vsemi tremi trditvami se večina anketirancev strinja oz. popolnoma strinja. Skoraj polovica (49 %) se jih strinja s prvo trditvijo, četrtina (25 %) pa se z njo popolnoma strinja. Podobno je pri drugi trditvi: 43 % se jih strinja s trditvijo, 33 % pa se jih popolnoma strinja. Malo manj strinjanja je bilo pri zadnji trditvi, in sicer tretjina (33 %) se z njo strinja, 28 % pa se jih popolnoma strinja s trditvijo. Vse tri srednje vrednosti (3,85; 3,975; 3,7) nakazujejo strnjenost odgovorov okoli kategorije 4 (se strinjam). Najmanjši standardni odklon (0,99) je bil pri drugi trditvi, kar nam pove, da se v tej točki anketiranci najbolj strinjajo. Največji standardni odklon (1,28) je imela trditev tri, kar kaže na večje odstopanje pri tem odgovoru, vendar še vedno prevladuje strinjanje s podano izjavo.

Velika skrb pri uporabi GenUI je potencialno plagiatorstvo. Z vprašanjem o etični uporabi GenUI smo ugotavljali, v kolikšni meri študentje in zaposleni etično uporabljajo GenUI. Rezultati so predstavljeni z grafom 6.

Graf 6

Uporaba rezultatov GenUI brez navajanja vira

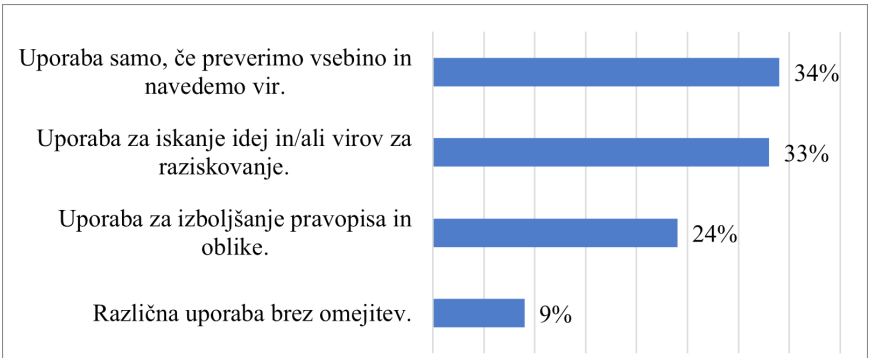


Približno polovica (52 %) anketirancev ni nikoli uporabila rezultatov GenUI brez navedbe vira. Manj kot četrtina (23 %) jih to stori redko, zelo malo anketirancev pa to počne pogosto (3 %) ali zelo pogosto (4 %). To potrjuje tudi srednja vrednost (1,85), ki nam pove, da večina anketirancev nikoli ali redko uporablja rezultate, pridobljene z GenUI, kot svoje. Nizek standardni odklon (1,08) kaže, da je večina odgovorov zbranih okoli odgovora 2 (redko). To nam pove, da študenti in zaposleni v veliki meri etično uporabljajo GenUI.

Pri tem je bilo pomembno tudi vedeti, kaj študentje in zaposleni sploh razumejo pod etično uporabo GenUI, predvsem pri pisanju pisnih izdelkov, kar smo ugotavljali z naslednjim vprašanjem (graf 7).

Graf 7

Kakšna uporaba GenUI pri pisanju pisnih izdelkov je pravilna oz. etična



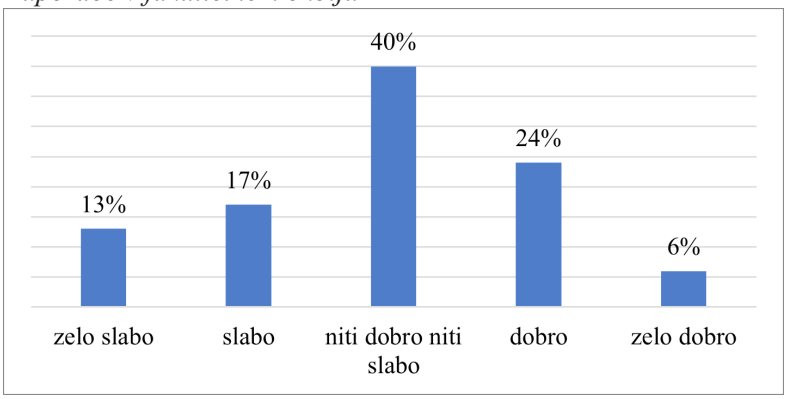
Večina anketirancev (34 %) ocenjuje, da je etična uporaba GenUI pri pisanju pisnih izdelkov, če preverimo vsebino in pravilno navedemo vir. Malo manj (33 %) jih meni, da je etično, če jo uporabljamo za iskanje idej in/ali virov. Najmanj (9 %) pa jih meni, da je etična uporaba brez omejitev. Rezultati povedo, da se študentje in

zaposleni v veliki večini zavedajo etične uporabe GenUI in potrebe po preverjanju in navajanju virov.

Poleg etične uporabe nas je zanimalo tudi, kako dobro je po mnenju anketirancev uporaba GenUI nadzirana v fakultetnem okolju (graf 8). S tem smo želeli spoznati, kako dobro se je UNM prilagodila novi tehnologiji in ali bodo potrebne še nadaljnje izboljšave na tem področju.

Graf 8

Nadzor uporabe v fakultetnem okolju

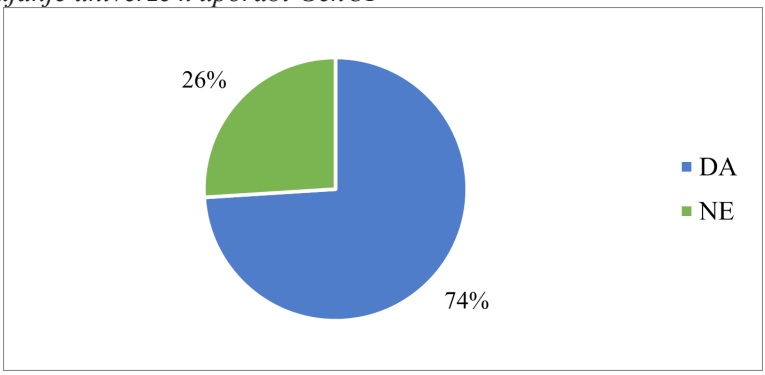


Večina (40 %) anketirancev meni, da uporaba GenUI ni ne dobro ne slabo nadzirana, 30 % jih meni, da je nadzor slabo ali zelo slabo izveden, 30 % pa jih meni, da je dobro ali zelo dobro izveden. Na takšno ravnovesje odgovorov kaže tudi srednja vrednost (2,917), ki jo podpira tudi nizek standardni odklon (1,07). To nam pove, da so odgovori zbrani predvsem okoli odgovora 3 (niti dobro niti slabo). Rezultati kažejo na razdeljeno mnenje o nadzoru, kar lahko razumemo, da je potrebno izboljšanje in bolj skrbno izvajanje pravil glede uporabe GenUI.

V grafu 9 predstavljamo odgovore anketirancev na vprašanje glede potrebne angažiranosti UNM pri uporabi GenUI.

Graf 9

Spodbujanje univerze k uporabi GenUI

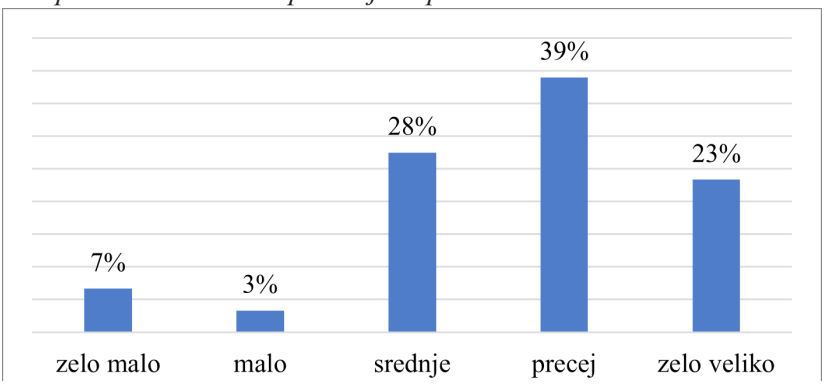


Večina (74 %) anketirancev meni, da bi UNM morala bolj spodbujati uporabo GenUI.

Posledično smo želeli ugotoviti mnenje anketirancev, ali se bo GenUI uporabljalo v njihovi prihodnosti in v kolikšni meri. Rezultate predstavljamo z grafom 10.

Graf 10

GenUI uporaba na delovnih področjih v prihodnosti



Največ (39 %) anketirancev pravi, da se bo GenUI v njihovi prihodnosti precej uporabljalo. Najmanj (3 %) jih meni, da bodo GenUI v prihodnosti malo uporabljali. Srednja vrednost (3,658) nakazuje, da velika večina anketirancev meni, da bo tehnologija GenUI igrala pomembno vlogo na njihovem delovnem področju v prihodnosti, kar potrjuje tudi nizek standardni odklon (1,07).

Naslednji dve vprašanji smo zaradi boljše preglednosti prikazali v obliki besednega oblaka. Zanimalo nas je mnenje anketirancev o prednostih in slabostih GenUI. Večja kot je neka beseda, večkrat je bila zapisana kot odgovor. Na sliki 1 vidimo, da je za anketirance najpomembnejša in najprepoznavnejša prednost GenUI njena hitrost, sledijo pa ji dostopnost, pospešitev, pomoč, ideje in učinkovitost.

Slika 1

Največje prednosti GenUI.

Na sliki 2 so prikazani odgovori glede največjih slabosti GenUI. Večina anketirancev

pravi, da je največja slabost GenUI podpiranje lenobe. Največkrat so omenili nepreverljivost, poneumljanje, nezanesljivost, netočnost in haluciniranje.

Slika 2

Največje slabosti GenUI

6 Razprava

Raziskava je dosegla vse v uvodu navedene cilje. Odgovori po posameznih ciljih so navedeni pri analizi rezultatov v poglavju Izvedba raziskave in rezultati. Tu naj navedemo samo nekaj ključnih področij, kot so uporaba GenUI, vpliv na študijski in službeni del življenja, etičnost uporabe in pogled na prihodnost.

Glede uporabe GenUI (graf 1) ugotavljamo, da velike jezikovne modele uporablja 75 % anketirancev. Pomemben delež anketirancev (21 %) uporablja plačljive verzije, kar kaže na prepoznano vrednost teh orodij. Razpršen namen uporabe (graf 4) in pretežno zaupanje v odgovore GenUI (graf 5) kažeta, da so anketiranci ugotovili uporabnost na različnih domenskih področjih.

Glede vpliva GenUI (tabela 2) na študij oz. zaposlitev raziskava ugotavlja, da se anketiranci strinjajo o pozitivnem vplivu, skrajšanju časa dela in da bo prišlo do sprememb visokošolskega izobraževanja. To potrjuje tudi graf 10. Zavedanje o pomenu in vplivu GenUI na delovna mesta v prihodnosti je večinsko. To in mnenje treh četrtin anketirancev (graf 9), da bi morala UNM spodbujati uporabo GenUI, sta kazalca razumevanja, kakšno orodje smo z GenUI dobili.

Glede etične uporabe (grafi 6–8) je raziskava pokazala, da anketiranci GenUI večinoma uporabljajo etično, vendar je ta večina zgolj 52-odstotna. Sicer je etična uporaba GenUI slabo regulirano področje, ker ni načina, s katerim bi lahko 100-odstotno preverili, ali je tekst sestavila GenUI ali človek. V več virih (Eke, 2023; Generative AI, 2024; Memarian in Doleck, 2023; Nagpal, 2024; Spencer, 2024) je navedeno, da je uporaba generiranih tekstov brez navedbe vira plagiatorstvo. Še vedno potekajo razprave, ali lahko GenUI modele navajamo kot avtorje. Dilema je v tem, ker GenUI modeli tekst ne generirajo samostojno, ampak na osnovi našega ukaza (prompt). Torej teksta v celoti ne generira niti model niti mi. Rešitev verjetno ni samo v sankcioniranju

prepovedane uporabe, ampak tudi v integraciji uporabe. GenUI je postala novo orodje, na uporabo katerega se bomo morali šele navaditi.

Pri uporabi GenUI na delovnih področjih v prihodnosti (graf 10) je 62 % anketirancev menilo, da se bo GenUI precej oziroma zelo veliko uporabljalo. To kaže, da je večina anketirancev že prepoznala koristnost novih orodij.

Raziskava ima nekaj omejitev. Izpostavimo manjše število anketirancev in prostovoljnost njihovega sodelovanja, kar lahko vodi do pristranskosti odgovorov.

Izboljšave so možne. Za nadaljnje raziskovalno delo predlagamo:

razširitev vzorca: raziskavo bi lahko izvedli v okviru vaj, kar bi zagotovilo večje število anketirancev in odpravilo pristranskost, ki izhaja iz prostovoljnega sodelovanja;

izvedbo primerjalne raziskave med fakultetami in med študenti ter zaposlenimi;

izvedbo longitudinalne raziskave oziroma ponovitev raziskave čez kako leto, ko bo lahko sodelovala že nova generacija in ko bo praktična uporaba GenUI še večja;

premik raziskave od uporabe na vsebino uporabe, obenem bi bilo dobro raziskati tudi poznavanje načinov uporabe GenUI.

7 Zaključek

Namen raziskave je bil ugotoviti uporabo in vpliv GenUI na UNM. Prva ugotovitev je bila, da 75 % študentov in zaposlenih že uporablja GenUI na sicer zelo razpršenih področjih. GenUI anketirancem skrajšuje čas dela in ima pozitiven vpliv na njihovo delo in študij. Pri tem se zavedajo etičnosti uporabe, zlasti v povezavi s plagiatorstvom in navajanjem virov. Večina anketirancev se zaveda potrebe po etični uporabi GenUI, vendar je po njihovi oceni nadzor nad njeno uporabo povprečen, kar nakazuje na potrebo po izboljšanju. UNM je že naredila prve korake v tej smeri z implementacijo Smernic za odgovorno uporabo orodij generativne umetne inteligence.

Ugotovitev raziskave je tudi, da ima že sedaj GenUI velik vpliv na izobraževanje, ki se bo v prihodnosti brez dvoma še povečeval. Večinsko mnenje anketirancev, da bi morale fakultete bolj spodbujati uporabo GenUI, daje sporočilo, da se mora visokošolski izobraževalni sistem hitro prilagoditi potrebam prihodnosti, saj se anketiranci zavedajo, da bo GenUI imela velik vpliv na njihovo prihodnost. Kako to storiti, je morda tema druge razprave. Ker sprememba kurikulov traja nekaj časa in tega časa ni, menimo, da je rešitev v organiziranju izobraževalnih delavnic, seminarjev in vključitvi GenUI pri vajah različnih predmetov.

GenUI je naša prihodnost, uporabna vrednost je dokazana na praktično vseh področjih človekovega delovanja. Da bodo študenti pridobili potrebna znanja, so odgovorne tudi univerze. Razprave in predlogi o vključevanju GenUI v kurikulum bodo zagotovo sledili. Ne nazadnje gre za povečanje digitalne pismenosti. Zavedati se moramo, da bodo študenti s poznavanjem GenUI bolj konkurenčni na trgu in zaposleni na univerzah bolj učinkoviti.

Marija Žugič, Uroš Gal, Igor Makovec, MsC

Generative Artificial Intelligence at the University of Novo mesto

Artificial Intelligence (AI) has experienced rapid growth in recent years, particularly in the field of Generative Artificial Intelligence (GenAI). GenAI, as one of the most advanced branches of AI, has captured the interest of both the research community and industry due to its impressive capabilities, diverse applications, and promising prospects for future development. It utilizes deep learning models using neural networks to generate high-quality text, summaries, images, audio, and video. While its rapid development opens many doors and opportunities, it also brings challenges, such as ethical concerns about its use and questions regarding the reliability and accuracy of the generated data.

To gain a deeper understanding of the impact of GenAI at the University of Novo mesto, we have developed a survey questionnaire for students and staff. In doing so, we established several specific objectives:

- *To analyze the prevalence and frequency of GenAI use, providing insight into the popularity of GenAI tools and identifying the contexts in which they are most commonly used.*
- *To investigate the level of trust in GenAI tools and their impact on work and study, determining to what extent users trust the outputs of GenAI and how this trust affects their academic, study, and research activities.*
- *To assess the regularity and ethicality of GenAI use, establishing a baseline for taking actions to improve any identified issues.*
- *To assess user opinions regarding the current controls of the GenAI use and assess their views on the adequacy of these controls.*
- *To examine the advantages and disadvantages of using GenAI, providing insights into the main benefits and potential drawbacks perceived by users when employing this technology.*

The paper is divided into several chapters. In Chapter 2, the paper summarises the history of generative artificial intelligence, which has developed very rapidly in the last few years. Chapter 3 presents the research methodology used and Chapter 4 presents the results. This is followed by a fifth chapter discussing limitations and suggestions for further research work.

In this condensed version of the paper, we summarize only the latest part of the historical development that led to GenAI. The decisive year for the development of large language models, including today's ChatGPT, Gemini, Claude, Llama, and others, was 2017, when the Google Brain development team published the concept of a neural network called the Transformer. The novelty was that the neural network could encode not only words but also the context of words in sentences (Lawton, 2023). In 2018, OpenAI introduced GPT-1 (Generative Pre-trained Transformer). The neural network of this first language model contained 117 million parameters. The success of unsu-

pervised learning in understanding language tasks was already very convincing. In February 2019, GPT-2 with 1.5 billion parameters was demonstrated. Text generation became more powerful, and due to fears of misuse, it was initially not released to the public. GPT-2 was released in November 2019 (Levine, 2023). GPT-3 took another step forward in June 2020 with 175 billion parameters. It had advanced text generation capabilities and could also answer questions and translate into foreign languages. In November 2022, OpenAI released the chatbot ChatGPT 3.5, and in 2023, a new version, ChatGPT 4, was published (Coursera Staff, 2024). Today, companies are competing over who will release a better language model or better integrate it to assist in everyday work. GenAI has become a new tool and its importance has been compared by some to the emergence of the internet in the 1990s (Nadeem, 2023).

Artificial Intelligence (AI) has experienced rapid growth in recent years, particularly in the field of Generative Artificial Intelligence (GenAI). GenAI, as one of the most advanced branches of AI, has captured the interest of both the research community and industry due to its impressive capabilities, diverse applications, and promising prospects for future development. It utilizes deep learning models using neural networks to generate high-quality text, summaries, images, audio, and video. While its rapid development opens many doors and opportunities, it also brings challenges, such as ethical concerns about its use and questions regarding the reliability and accuracy of the generated data.

The study used a descriptive method of working with a quantitative research approach to obtain primary data. Given the purpose of the research and the objectives, the use of a quantitative approach was most appropriate as we needed reliable, objective, and empirical data to enable robust statistical analysis and to detect patterns of GenAI use.

We used non-random sampling as the data were collected from a specific target population, i.e. students and employees at the University of Novo mesto. Non-random sampling was chosen to ensure the focus on a specific population directly related to the topic under study, which was crucial for the credibility and accuracy of our findings.

Data were collected using an online survey technique, employing a structured questionnaire consisting of carefully worded, clear, and understandable questions. The use of a structured approach allowed for the comparability of data and reduced the likelihood of misinterpretation of questions by the respondents. The questionnaire was implemented on the 1ka web portal, allowing for efficient distribution and real-time monitoring of responses. The invitation to participate was sent by email to all students and employees of the University of Novo mesto, ensuring a wide reach and effective coverage of the target population.

The survey was conducted from April 12 to 28, 2024, during which time we received a sufficient number of responses to perform a statistically reliable analysis. The results were compiled, processed using quantitative statistical methods, and presented graphically. A critical analysis of the results helped us achieve the objectives of the survey and provide additional insights into the challenges and opportunities related to the use of GenAI in an educational context.

The survey included 16 questions, four of which focused on socio-demographic information. The questions varied in format, including open-ended, closed-ended, and combined types. A 5-point Likert scale was also utilized to capture respondents' levels of agreement with specific statements. The research population consisted of students and employees from the University of Novo Mesto. A total of 302 respondents began the survey. All incomplete or partially completed questionnaires were discarded. Ultimately, 147 respondents provided complete and usable responses.

Table 1 provides an analysis of the socio-demographic questions. Basic descriptive statistical methods were used to process the data, including sample size (n), percentages (%), frequencies (f), means (μ), and standard deviation (σ). The data were analyzed using the 1ka website and Microsoft Excel. The majority of respondents (50%) are between the ages of 12 and 25, while only 7% are aged 56 or older. Slightly over half (57%) of the respondents are undergraduate students, followed by postgraduate students (18%) and full-time or contract employees (15%). Regarding study or employment orientation, the largest number of respondents come from the Faculty of Health Sciences (41%) and the Faculty of Economics and Informatics (41%).

Graph 1 shows the GenAI chatbots used by the respondents. The majority (67%) use the free version of ChatGPT 3.5, while 15% use the paid version of ChatGPT 4. In total, 21% of the respondents use paid versions. The use of other chatbots ranged from 2% to 8%. Three percent of the respondents chose the answer "other," listing chatbots like Blackbox AI, Phind, and Aria. A quarter (25%) of the respondents ended the survey after this question, as they had never used GenAI chatbots and could not answer further questions about their use.

Graph 2 shows the frequency of use of the GenAI chatbots among the respondents. We aimed to discover how often and intensively the chatbots are used. The largest share of the respondents (56%) use GenAI chatbots a few times a month; 17% use them a few times a week, another 17% use them daily, and 11% never use them. The mean value (μ) is 2.39, indicating that the respondents, on average, use GenAI chatbots infrequently – that is, a few times a month. The low standard deviation (0.89) suggests that responses are mainly clustered around "a few times a month."

Graph 3 is essentially Graph 2 with the added variable of the year of age of the respondents.

*The graph illustrates the frequency of use and the absolute number of the responses by year of age. At first look, it may appear that older generations use GenUI less frequently compared to younger generations. However, this is not actually the case. By examining the graph in conjunction with the respondent numbers by year (Table 1), we reach an interesting conclusion: there are no significant generational differences in the highest frequency of use (i.e. "Several times a week" and "Every day"). For instance, when considering the most frequent use ("Every day"), the percentage of the responses is almost identical across generations – 1% for the oldest generation is comparable to 8% for the youngest when adjusted for the proportion of the respondents (1% * 50% / 7% = 7.1%). Additionally, the graph shows that the oldest generation (aged 56 and over) has a consistent distribution of responses across all frequencies*

of use (2%, 2%, 2%, 1%). For younger generations, the most common frequency is "A few times a month".

Overall, when analyzing the frequency of use, it cannot be conclusively said that younger generations use GenUI more frequently than older generations.

We also wanted to determine for what specific purposes the respondents most frequently use GenAI and to what extent. The respondents could select up to four answers. The results are presented in Graph 4. The largest number of the respondents (18%) use GenAI for searching for ideas, concepts, and assistance in research; a slightly fewer number (17%) use it for composing texts. The fewest (4%) use it to pass the time, which is not surprising given the many other activities available today. Relatively few use GenAI for generating program code (5%) and for translating and learning a foreign language (7%). This is an interesting finding, as GenAI is particularly strong in these two areas. It is evident that none of the answers dominates, indicating the versatility of GenAI and its application across many fields.

One of the weaknesses of GenAI is hallucination or composing texts that appear credible but are factually incorrect. Graph 5 presents the results regarding the respondents' trust in the answers provided by GenAI. By showing the level of trust, we can better understand the respondents' willingness to use GenAI. The majority of the respondents (62%) mostly trust the accuracy of the answers provided by GenAI. A higher level of trust correlates with greater use of this technology. A very small percentage (7%) of the respondents completely trust GenAI, and even fewer (3%) do not trust it at all. The mean value (3.525) indicates that the respondents generally mostly trust the answers generated by GenAI chatbots. The low standard deviation (0.94) shows that the respondents' answers are mainly clustered around "mostly trust," indicating a predominant level of trust.

To assess the impact of GenAI on their study or professional life, we asked three questions. The respondents were asked to indicate their level of agreement with the statements on a Likert scale. For clarity, we presented the results in Table 2. The respondents had to express their agreement with the statements on a 5-point Likert scale. Almost half (49%) agree with the first statement, and a quarter (25%) completely agree. Similar results were seen with the second statement: 43% agree, and 33% completely agree. There was slightly less agreement with the last statement; a third (33%) agree, and 28% completely agree. All three mean values (3.85; 3.97; 3.70) indicate that the responses cluster around "agree." The smallest standard deviation (0.99) was for the second statement, which tells us that the respondents agree most on this point. The largest standard deviation (1.28) was for the third statement, showing a greater variation in the responses, but agreement with the statement still prevails.

A major concern with the use of GenAI is the potential for plagiarism. The question on ethical use of GenUI asked to what extent students and staff use GenUI ethically. The results are presented in Graph 6. Approximately half (52%) of the respondents have never used GenAI results without citing sources. Less than a quarter (23%) do this rarely, and very few respondents do this often (3%) or very often (4%). The mean value (1.85) tells us that the majority of the respondents never or rarely use the results

obtained from GenAI as their own. The low standard deviation (1.08) indicates that most answers are clustered around "rarely." This suggests that students and staff largely use GenAI ethically.

It was also important to understand what the students and staff actually consider ethical use of GenAI, especially in writing assignments, which we investigated with a separate question (Graph 7). The majority of the respondents (34%) believe that the ethical use of GenAI in writing assignments is when we verify the content and correctly cite the source. Slightly fewer (33%) think it is ethical to use it for searching for ideas and/or sources. The fewest (9%) believe that unrestricted use is ethical. The results indicate that the vast majority of the students and staff are aware of the ethical considerations when using GenAI and the need for verification and citation of sources.

In addition to ethical use, we were also interested in how well the respondents thought GenUI is controlled in the faculty environment (Graph 8). We wanted to determine how well our university has adapted to the new technology and whether further improvements are necessary in this area. The majority (40%) of the respondents believe that the use of GenAI is neither well nor poorly monitored; 30% think that the monitoring of GenAI is poorly or very poorly executed, and 30% believe that it is well or very well executed. This balance of the responses is also indicated by the mean value (2.917), supported by the low standard deviation (1.07). The results show a divided opinion on supervision, which can be understood as a need for improvement and more careful implementation of the rules on the use of GenUI.

In Graph 9, we present the responses of the respondents to the question on the necessary engagement of the university in the use of GenUI. The majority (74%) of the respondents thought that the university should do more to promote the use of GenUI.

Consequently, we wanted to determine the respondents' opinions on whether GenAI will be used in their future and to what extent. We presented the results Graph 10. The majority (39%) of the respondents say that GenUI will be used a lot in their future. The lowest (3%) say they will use GenUI a little in their future. The mean value (3.66) indicates that the vast majority of the respondents think that the GenUI technology will play an important role in their work area in the future, which is also confirmed by the low standard deviation (1.07).

For better clarity, we presented the next two questions in the form of a word cloud. We were interested in the respondents' opinions on the advantages and disadvantages of GenAI. The larger a word is, the more frequently it was mentioned. In Figure 1, we see that for the respondents, the most important and recognizable advantage of GenAI is its speed, followed by accessibility, acceleration, assistance, ideas and efficiency. Figure 2 shows the responses on the biggest weaknesses of GenUI. The majority of the respondents say that the biggest weakness of GenUI is supporting laziness. The most frequently mentioned were unverifiability, misunderstanding, unreliability, inaccuracy and hallucination.

The survey successfully met all the objectives outlined in the introduction. The detailed responses to each objective are provided in the chapter "Survey Implementation

and Results". Here, we highlight a few key areas, including the use of GenUI, its impact on study and work life, the ethical considerations of its use, and future prospects.

Regarding the use of GenUI (Graphs 1), we find that 75% of the respondents use large language models. A significant proportion of the respondents (21%) use the paid versions, indicating the recognised value of these tools. The diverse purposes of use (Graph 4) and predominant trust in GenAI's answers (Graph 5) show that rthe espondents have recognized its utility across various domains.

Regarding the impact of GenUI (Table 2) on the study/work part of the lived experience, the survey finds that the respondents agree on the positive impact, the reduction of working time and that there will be changes in higher education. This is also confirmed by Graph 10. There is a widespread awareness of the importance and impact of GenAI on future jobs. Additionally, three-quarters of the respondents (Graph 9) believe that the University should promote the use of GenAI, indicating the understanding of the significance of this tool.

Regarding ethical use (Graphs 6–8), the research showed that the respondents mostly use GenAI ethically, but this majority is only 52%. Ethical use of GenAI is a poorly regulated area, because there is no way to verify with absolute certainty whether a text was composed by GenAI or a human. Several sources (Eke, 2023; Generative AI, 2024; Memarian & Doleck, 2023; Nagpal, 2024; Spencer, 2024) argue that using a generated text without acknowledging the source constitutes plagiarism. The question of whether GenUI models can be cited as authors remains unresolved. The core of the dilemma lies in the fact that GenUI models do not create text independently but rather generate content based on user input (prompts). Thus, neither the model nor the user can be considered the sole author of the generated text. A potential solution is not simply to sanction unauthorized usage but to integrate the GenUI use into acceptable practices. GenUI has become a new tool that we will need to adapt to and incorporate.

Regarding the future use of GenUI in various fields (Graph 10), 62% of the respondents believe that it will be used extensively or very extensively. This indicates that the majority of the respondents have already recognized the potential usefulness of these new tools.

The research has some limitations. We highlight the small number of the respondents and the voluntary nature of their participation, which can lead to response bias. Improvements are possible. For further research, we propose:

- *Expanding the sample size – conducting the research within course activities to ensure a larger sample size and eliminate bias from voluntary participation;*
- *Conducting comparative studies between faculties and between students and staff;*
- *Implementing a longitudinal study or repeating the research in about a year, when a new generation may participate and the practical use of GenAI will be even greater;*
- *Shifting the research focus from usage patterns to the content of use and exploring the knowledge of methods for using GenAI.*

In conclusion, the aim of the study was to determine the use and impact of GenAI at the University of Novo mesto. The first finding was that 75% of the students and staff are already using GenAI in otherwise widely dispersed areas. GenAI is reducing the work time for the respondents and having a positive impact on their work and studies. They are aware of the ethical use of GenAI, especially in relation to plagiarism and citation of sources. Most respondents are aware of the need for an ethical use of GenAI, but their perception of the control over its use is average, suggesting a need for improvement. The University of Novo mesto has already taken the first steps in this direction by implementing the Guidelines for the Responsible Use of Generative Artificial Intelligence Tools. The research has also found that GenAI is already having a significant impact on education, which will no doubt increase in the future. The majority of the respondents believe that faculties should do more to promote the use of GenAI, sending a clear message that the higher education system needs to adapt quickly to the demands of the future, as respondents recognize that GenAI will significantly impact their future. How to achieve this may be a topic for another discussion. Given that curriculum change takes time – and time is limited – we believe that educational workshops, seminars, and incorporating GenAI into exercises across various subjects could provide a viable solution.

GenAI is our future; its utility value is proven in practically all fields of human work. It is also the responsibility of the University to ensure that the students acquire the necessary knowledge. Discussions and proposals on the integration of GenAI in the curriculum will surely follow. After all, it is about increasing digital literacy. We need to be aware that the students with knowledge of GenAI will be more competitive in the market and university staff more efficient.

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