

Upotreba *ChatGPT* modela u visokom obrazovanju: percepcije studenata

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Apstrakt

Ubrzani razvoj tehnologije doveo je do kreiranja modela veštačke inteligencije *ChatGPT* koji omogućava generisanje tekstova na temelju upita korisnika. Premda predstavlja inovaciju u domenu veštačke inteligencije, ovaj model još uvek nije dovoljno istražen kroz empirijske studije. Stoga je sprovedeno istraživanje kako bi se dublje istražile percepcije studenata u vezi sa upotrebom *ChatGPT*-a u visokom obrazovanju. Uzorkom je obuhvaćeno 200 studenata Univerziteta u Novom Sadu, a podaci su analizirani korišćenjem mera deskriptivne statistike, uz korišćenje programa *SPSS*. Rezultati istraživanja upućuju na to da studenti u velikoj meri koriste *ChatGPT* u akademske svrhe, prepoznajući prednosti poput uštede vremena i personalizovanog iskustva učenja. Međutim, rezultati isto tako pokazuju zabrinutost studenata u vezi s mogućim smanjenjem kreativnosti i kritičkog mišljenja, kao i s rizicima po privatnost korisnika. Dodatno, većina studenata nije imala iskustva s obrazovnim radionicama ili kursovima usmerenim na korišćenje *ChatGPT*-a u akademskom kontekstu. Na osnovu ovih nalaza, zaključuje se da postoji potreba za edukacijom studenata o efikasnijem i odgovornijem korišćenju *ChatGPT*-a u visokom obrazovanju. Takođe, naglašava se važnost daljeg istraživanja i razvoja resursa kako bi se studentima pružila adekvatna podrška u primeni ovog tehnološkog alata.

Ključne reči: *ChatGPT, studenti, veštačka inteligencija, visoko obrazovanje.*

Uvod

ChatGPT je model veštačke inteligencije koji je kreiran tako da može da razume jezik i pruži relevantne odgovore na pitanja korisnika. Pitanje obrazovnih potencijala *ChatGPT*

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modela bilo je predmet različitih istraživanja u poslednje dve godine (Grassini 2023; Ouyang et al., 2022; Rawas, 2023; Sok & Heng, 2024; Tlili et al., 2023; Zawacki et al., 2023). *ChatGPT* nudi mnogobrojne mogućnosti u okviru visokog obrazovanja: podršku u nastavi, inovacije u proceni znanja studenata, pomoć prilikom akademskog pisanja, ali i administrativnu pomoć i produktivnost (Sok & Heng, 2024). Ipak, korišćenje *ChatGPT* modela u visokom obrazovanju može da prouzrokuje i niz izazova u vezi s bezbednošću, privatnošću, tačnošću informacija, kao i s akademskim integritetom nastavnika (Sok & Heng, 2024).

Kada se govori o upotrebi *ChatGPT-a* u visokom obrazovanju, izuzetno je važno ispitati njegov uticaj na akademsku uspešnost studenata, proces učenja, kao i dugoročne implikacije na obrazovni sistem. S tim u vezi, da bi se ispitala uspešnost ovog modela, neophodno je identifikovati ograničenja prethodnih istraživanja i postaviti temelje za dalja istraživanja koje će doprineti boljem razumevanju njegove upotrebe u visokom obrazovanju. Cilj realizovanog istraživanja odnosio se na ispitivanje percepcije studenata Univerziteta u Novom Sadu o upotrebi *ChatGPT-a* u visokom obrazovanju. U teorijskom okviru rada, prikazani su rezultati prethodnih istraživanja koja su se bavila ovom temom. Metodologija istraživanja je detaljno opisana, uz prikaz dobijenih rezultata, diskusiju, zaključke i navedene pedagoške implikacije.

Teorijska osnova rada

U skladu s konstruktivističkom teorijom učenja, učenje bi trebalo organizovati kao priliku za konstruisanje znanja. Prema navedenoj teoriji, znanje se ne prenosi pasivno, već ga aktivno konstruišu studenti. Uloga nastavnika u okviru konstruktivističke teorije predstavljena je kroz pružanje podrške studentima u procesu učenja (Makewa, 2019). Tehnološkim razvojem, bar prema rezultatima nekih istraživanja, mentorsku ulogu u procesu učenja mogu preuzeti modeli veštačke inteligencije. Istraživanje Makeve (Makewa, 2019) upućuje na to da tehnologija može ubrzati interaktivna iskustva učenja, jer studentima osigurava eksperimentisanje i istraživanje. Tako, *ChatGPT* omogućava studentima da brže dođu do određenih saznanja (Rasul et al., 2023). Povratne informacije koje im pruža, podsticanje i usmeravanje mogu dovesti do konstrukcije novih znanja. Pored navedenog, konstruktivistička teorija naglašava važnost autentične procene koja ocenjuje osposobljenost studenata da primene znanje i veštine u stvarnim situacijama (Rasul et al., 2023).

Prvo istraživanje grupe autora (Ouyang et al., 2022) koje će biti predstavljeno bilo je usmereno na upotrebu veštačke inteligencije u onlajn visokom obrazovanju. Ouyang i saradnici (Ouyang et al., 2022) su u radu pružili uvid u empirijska istraživanja o primeni veštačke inteligencije. Ovakav pregled literature analizira funkcije veštačke inteligencije, algoritme koji se najčešće koriste, efekte i implikacije koje proizilaze iz ovih istraživanja (Ouyang et al., 2022). Rezultati pokazuju da su funkcije aplikacija veštačke inteligencije u onlajn visokom obrazovanju raznovrsne, uključujući predviđanje statusa učenja, učinka ili zadovoljstva, preporuku resursa, automatsku procenu i poboljšanje iskustva učenja. Efekti koje generišu aplikacije veštačke inteligencije uključuju visok kvalitet predviđanja, visok kvalitet preporuka zasnovanih na karakteristikama studenata, poboljšanje akademskog učinka i poboljšanje onlajn angažovanja i učešća (Ouyang et al., 2022). Ovaj sistematski

pregled literature ukazuje na nekoliko teorijskih, tehnoloških i praktičnih implikacija. Jedna od implikacija je da primena veštačke inteligencije u obrazovanju treba da se osloni na utemeljene teorije učenja i obrazovanja, kao i da koristi napredne tehnologije za prikupljanje i analizu podataka u realnom vremenu (Ouyang et al., 2022).

Relevantno istraživanje usmereno na čit-botove (eng. chatbot) u visokom obrazovanju je istraživanje Demperea i njegovih saradnika (Dempere et al., 2023). U ovom opsežnom istraživanju, autori su koristili različite baze podataka poput Pab-Meda (eng. PubMed-a), IEEE-Iksplora (eng. IEEE Explore), i Gugl-Skolara (eng. Google Scholar), kako bi istražili literaturu koja se bavi uticajem čit-botova (chatbot) veštačke inteligencije u visokom obrazovanju. Autori su identifikovali brojne prednosti *ChatGPT-a*, uključujući podršku u istraživanju, automatizovano ocenjivanje, unapređenu interakciju između korisnika i računara, olakšano prijavljivanje, poboljšane studentske usluge, unapređenje nastave. Međutim, istraživanje je identifikovalo nekoliko problema, kao što su: bezbednost onlajn testiranja, jaz u digitalnoj pismenosti, anksioznost koja je prouzrokovana veštačkom inteligencijom, kršenje privatnosti, zloupotreba, pristrasnost, dezinformacije, smanjena interakcija među ljudima, problemi pristupačnosti i nestanak pojedinih radnih mesta.

Naredno značajno istraživanje obuhvatilo je upotrebu *ChatGPT-a* u visokom obrazovanju, s posebnim naglaskom na učestalost korišćenja i uticaj na produktivnost nastavnika (Firaina & Sulisworo, 2023). Cilj navedenog istraživanja odnosio se na procenu optimizma nastavnika u vezi s korišćenjem *ChatGPT-a*. Pokazano je da većina nastavnika izražava optimizam u vezi s primenom *ChatGPT-a* u nastavi. Ipak, istraživanjem je takođe utvrđeno da postoji i izvestan broj nastavnika koji su bili manje optimistični. To sugerise da postoji određeni stepen sumnje među nastavnicima u vezi s primenom ovog modela u nastavi (Firaina & Sulisworo, 2023).

Cilj istraživanja autora Ljujića i saradnika (2023) odnosio se na ispitivanje performansi *ChatGPT-a* u pisanju akademskih zadataka i upoređivanje tih performansi s performansama studenata. Glavni izvori podataka uključivali su: predispitne zadatke koje su napisali studenti andragogije na Univerzitetu u Beogradu i eseje generisane od strane *ChatGPT-a*. Naime, i studenti i *ChatGPT* dobili su zadatak da napišu andragošku analizu određenog multimedijalnog sadržaja (Ljujić et al., 2023). Komparativna analiza sadržaja sprovedena je na osnovu kriterijuma koji su se koristili za ocenjivanje pomenutih predispitnih zadataka. Ovi kriterijumi obuhvatali su različite aspekte, uključujući gramatiku, organizaciju i strukturu sadržaja, relevantnost za datu temu, praksu citiranja, dubinu razumevanja i znanja, integraciju teorijskih, istraživačkih i iskustvenih uvida, kvalitet argumentacije i diskusije, nivo refleksije i kritičke analize, kao i originalnost i kreativnost (Ljujić et al., 2023). Rezultati su pokazali da *ChatGPT* poseduje lingvističke i semantičke algoritme koji omogućavaju automatsku evaluaciju, ispravke i povratne informacije u vezi s gramatikom i vokabularom. Međutim, iako prilično strukturirani i logično organizovani, eseji koje je generisao *ChatGPT* sadržali su bazične tekstualne jedinice, dok su eseji studenata bili složenije strukture. Razlika u kvalitetu sadržaja bila je velika, pri čemu su radovi studenata pokazivali veću integraciju teorijskih i iskustvenih uvida. Dakle, rezultati jasno ukazuju na to da su ljudska intervencija i interakcija nezamenljive u sastavljanju iskustvenog pisanog sadržaja (Ljujić et al., 2023).

Istraživanje grupe autora (Huallpa et al., 2023) imalo je za cilj ispitivanje stavova studenata u vezi s integracijom *ChatGPT-a* u njihova obrazovna iskustva. U istraživanju je učestvovalo 220 studenata osnovnih studija na Univerzitetu u Peruu. Upitnik se sastojao od zatvorenih i otvorenih pitanja, kako bi se prikupili kvantitativni i kvalitativni podaci. Rezultati su pokazali da studenti razumeju vrednost *ChatGPT-a* u kreiranju personalizovanih obrazovnih mogućnosti. Takođe, studenti su istakli neophodnost jasnih, institucionalnih standarda u vezi s privatnošću i bezbednošću podataka (Huallpa et al., 2023). Dodatno, rezultati su pokazali da su se stavovi korisnika u vezi sa *ChatGPT-om* menjali pod uticajem različitih faktora, uključujući demografske faktore (kao što su pol, starost i percepcija dostupnosti), društvene stavove, iskustva, kao i brige u vezi s privatnošću i bezbednošću podataka. Kako bi se sačuvala privatnost studenata, institucije bi trebalo da uspostave standarde i etičke okvire za korišćenje *ChatGPT-a* (Huallpa et al., 2023).

Istraživanje Salivana i saradnika (Sullivan et al., 2023) o tome kako *ChatGPT* utiče na visoko obrazovanje je obuhvatilo analizu dve oblasti. Prva se odnosila na istraživanje ključnih tema u novinskim člancima o *ChatGPT-u* u kontekstu visokog obrazovanja, a druga na procenu u kojoj meri ove diskusije percipiraju *ChatGPT* kao potencijalno sredstvo za učenje i podršku različitim studentima, umesto kao rizik po akademski integritet (Sullivan et al., 2023). Kroz analizu sadržaja 100 medijskih članaka, tekst je kodiran kako bi istražio nekoliko ključnih tema u vezi s uticajem *ChatGPT-a* na visoko obrazovanje. Ove teme obuhvataju odgovore zaposlenih na univerzitetu, brige o akademskom integritetu, ograničenja i slabosti alata veštačke inteligencije, kao i mogućnosti za učenje studenata (Sullivan et al., 2023). Analizom sadržaja novinskih članaka, utvrđeno je da su odgovori zaposlenih na univerzitetu o *ChatGPT-u* uglavnom usredsređeni na pitanje akademske ispravnosti i novih pristupa ocenjivanju. Primetno je da je u navedenom istraživanju zanemarena perspektiva studenata na čiji se akademski uspeh reflektuju uticaji modela veštačke inteligencije (Sullivan et al., 2023). Takođe, zanimljivo je uočiti da je podjednako zastupljeno i pitanje koje se tiče načina na koji će se studenti podstaći da izbegavaju *ChatGPT*, dok je u okviru manjeg broja članaka eksplicitno uspostavljena korelacija između upotrebe modela veštačke inteligencije i ishoda učenja. Ova studija sugerise da veći broj ustanova visokog obrazovanja zabranjuje upotrebu *ChatGPT-a*.

Metodologija istraživanja

Cilj istraživanja odnosio se na ispitivanje percepcija studenata u vezi s upotrebom *ChatGPT-a* u visokom obrazovanju. Na osnovu formulisanoog cilja, postavljeni su sledeći istraživački zadaci:

1. Proceniti informisanost studenata o upotrebi *ChatGPT-a* u obrazovne svrhe;
2. Ispitati percepciju studenata o mogućnostima upotrebe *ChatGPT-a* u visokom obrazovanju (pitanje promena u obrazovanju, kvaliteta studiranja);
3. Ispitati percepciju studenata o potencijalnim izazovima upotrebe *ChatGPT-a* u visokom obrazovanju (pitanje „zamene“ profesora, kreativnosti i privatnosti).

Za ispitivanje upotrebe *ChatGPT-a* u visokom obrazovanju korišćen je upitnik koji je konstruisala grupa autora (Abbas et al., 2023). Originalni upitnik se sastoji od 19 pitanja zatvorenog tipa. Instrument je namenjen za merenje efekata integracije *ChatGPT-a* u

obrazovanju i istraživanju. Za potrebe ovog rada autori su adaptirali i validirali prethodno naveden instrument za srpsko govorno područje. Kao i originalna verzija, instrument je obuhvatao 19 pitanja zatvorenog tipa. Pitanja u originalnom radu se odnose na upotrebu *ChatGPT-a* u obrazovne i istraživačke svrhe, dok su za potrebe ovog rada odabrana samo pitanja usmerena na ispitivanje upotrebe *ChatGPT* modela u obrazovne svrhe.

U ovom istraživanju biće predstavljena pitanja koja se odnose na informisanost studenata o upotrebi *ChatGPT-a* u obrazovne svrhe, njihovo prisustvo na radionicama ili kursevima o upotrebi navedenog modela, pitanja o mogućnostima primene, ali i izazovima upotrebe *ChatGPT-a* u visokom obrazovanju. Podaci o sociodemografskim karakteristikama ispitanika odnosili su se na: pol, godinu studija, oblast studiranja (prirodne ili društvene nauke) i prosečnu ocenu na studijama. U istraživanju je učestvovalo 200 studenata Univerziteta u Novom Sadu, reč je o prigodnom uzorku. Istraživanje je sprovedeno online, putem Gugl Forms (eng. Google Forms) platforme, u periodu od januara do marta 2024. godine. Podaci dobijeni ovim istraživanjem obrađeni su statističkim programom *IBM SPSS for Windows* (verzija 26). Primenjeni su deskriptivni statistički pokazatelji.

Tabela 1
Struktura ispitanika

	N	%
Pol		
Muški	101	50.5
Ženski	99	49.5
Godina studija		
Druga godina	58	29.0
Treća godina	88	44.0
Četvrta godina	54	27.0
Ukupno	200	100

Napomena: N – broj ispitanika

Prikaz rezultata istraživanja

Informisanost studenata o upotrebi *ChatGPT-a* u obrazovanju. Većina ispitanika, odnosno 77%, izjavila je da im je poznata upotreba *ChatGPT-a* u obrazovanju, dok je 23% ispitanika izjavilo suprotno. Visok stepen znanja o upotrebi *ChatGPT-a* u obrazovanju sugerise da je ovaj model široko prepoznat među studentskom populacijom, što ukazuje na potencijalno značajnu ulogu koju može imati u obrazovnom procesu. Takođe, u okviru istraživanja postavljeno je pitanje koje se odnosilo na pohađanje dodatne obuke za korišćenje *ChatGPT-a* u akademske svrhe. Samo 15,5% ispitanika je učestvovalo ili pohađalo kurs upotrebe *ChatGPT-a* u akademskom kontekstu, dok je većina, tačnije 84,5%, odgovorila da nije. Ovi rezultati ukazuju na to da većina ispitanika nije učestvovala u dodatnoj obuci ili kursu za korišćenje *ChatGPT-a* u akademskom kontekstu. To dalje implicira da su studenti samostalno istraživali ili koristili *ChatGPT* bez formalne obuke. Ova saznanja

mogu biti korisna za obrazovne institucije i akademsku zajednicu kako bi bolje razumeli potrebe studenata i pružili odgovarajuću podršku i resurse za efikasno korišćenje *ChatGPT-a* u obrazovanju.

Percepcija studenata o mogućnostima upotrebe *ChatGPT-a* u visokom obrazovanju. Većina ispitanika, tačnije 74,5%, smatra da *ChatGPT* ima potencijal da promeni obrazovni proces. S druge strane, 25,5% ispitanika nije saglasno s ovom tvrdnjom. Ovo izraženo uverenje među studentima o potencijalu *ChatGPT-a* da promeni obrazovni proces naglašava značajnu ulogu koju ovaj model može imati u budućnosti visokog obrazovanja i istraživanja. Takođe, većina ispitanika, tačnije 63,5%, smatra da *ChatGPT* može da poboljša kvalitet studiranja. S druge strane, 36,5% ispitanika nije saglasno s ovom tvrdnjom. Pozitivan stav većine studenata o potencijalu *ChatGPT-a* da poboljša kvalitet studiranja naglašava važnost tehnoloških inovacija u obrazovanju. Ispitanici koji podržavaju ovu ideju mogu percipirati *ChatGPT* kao korisan model koji osigurava dodatnu podršku u učenju i istraživanju, doprinoseći produktivnijem obrazovnom iskustvu. Dodatno, ovo otvara mogućnosti za dalje istraživanje i implementaciju *ChatGPT-a* u obrazovnom procesu kako bi se razumelo u čemu studenti vide potencijalno poboljšanje i kako bi se unapredio kvalitet studiranja.

Percepcija studenata o potencijalnim izazovima upotrebe *ChatGPT-a* u visokom obrazovanju. Ispitivanjem percepcije studenata o tome da li smatraju da *ChatGPT* može da zameni nastavnike, većina ispitanika (82%) istakla je da ne veruje u ovu mogućnost, dok manji procenat (18%) smatra da je moguće da *ChatGPT* zameni nastavnike. Dalje, ovo sugerise da postoji opšti stav među studentima da modeli veštačke inteligencije, poput *ChatGPT-a*, ne mogu u potpunosti zameniti ulogu i kompetencije nastavnika u obrazovnom procesu. Takođe, većina ispitanika (63%) smatra da *ChatGPT* može dovesti do smanjenja kreativnosti i kritičkog mišljenja među studentima, dok je manji procenat (37%) izrazio suprotno mišljenje. Rezultati upućuju na to da postoji zabrinutost među većinom ispitanika da bi korišćenje *ChatGPT-a* moglo dovesti do smanjenja kreativnosti i kritičkog mišljenja. Međutim, važno je napomenuti da manji procenat ispitanika ima suprotno mišljenje, što može ukazivati na različite perspektive i stavove o uticaju *ChatGPT* tehnologije na kreativnost i kritičko razmišljanje. Analizirajući odgovore ispitanika na pitanje o tome da li misle da *ChatGPT* može biti pretnja i opasnost po njihovu privatnost, većina ispitanika (58%) izrazila je zabrinutost, dok je manji broj ispitanika (42%) odgovorio negativno. Ovi rezultati ukazuju na to da većina ispitanih studenata smatra da *ChatGPT* predstavlja pretnju privatnosti. To naglašava važnost pažljivog upravljanja podacima i primene adekvatnih mera zaštite privatnosti prilikom implementacije ove tehnologije u obrazovnom kontekstu.

Diskusija

Cilj ovog istraživanja odnosio se na ispitivanje percepcija studenata u vezi sa upotrebom *ChatGPT-a* u visokom obrazovanju. Prema našim saznanjima, malo empirijskih istraživanja sprovedeno je na teritoriji Republike Srbije u vezi s upotrebom *ChatGPT-a* u obrazovnom kontekstu. Na osnovu rezultata našeg istraživanja, čak 77% studenata navelo je da su informisani

o upotrebi *ChatGPT-a* u visokom obrazovanju. Analiza relevantne literature koja se bavi ovom temom, posebno iz perspektive studenata u Srbiji, naglašava da postoji visok nivo upoznatosti s ovim virtuelnim asistentom među studentskom populacijom (Ljujić et al., 2023). Dodatno, rezultati istraživanja su pokazali da većina studenata nije učestvovala u dodatnim obukama za korišćenje *ChatGPT-a* u akademske svrhe. Ovi podaci ukazuju na vrlo zabrinjavajuću situaciju s obzirom na sveprisutnost i rasprostranjenost modela veštačke inteligencije. S ciljem iskoriscavanja svih benefita koje nudi *ChatGPT*, kao i radi anuliranja i izbegavanja njegovih nedostataka koji se često odnose na zloupotrebu i plagijarizam, ključno je uspostaviti sistem obuka za adekvatnu upotrebu *ChatGPT-a* u obrazovne svrhe.

Ispitivanje percepcije studenata o potencijalnim mogućnostima i izazovima u vezi s upotrebom *ChatGPT-a* u visokom obrazovanju obuhvatilo je pitanje o potencijalu *ChatGPT* u oblasti visokog obrazovanja. Našim istraživanjem utvrđeno je da većina ispitanika smatra da *ChatGPT* ima potencijal da promeni oblast visokog obrazovanja i istraživanja. Navedeni nalazi su u skladu s istraživanjem Oranga u kome se, na osnovu analize relevantne literature, ističe da *ChatGPT* otvara mogućnost za personalizovano učenje, neprekidan pristup velikom broju informacija, instantne povratne informacije i kontinuiranu pomoć prilikom učenja (Oranga, 2023). Individualizovano učenje, fleksibilnost i povratna informacija su uočeni kao benefiti i u drugim istraživanjima (Huallpa et al., 2023). Studija Firata takođe ističe potencijalne mogućnosti upotrebe modela veštačke inteligencije u obrazovanju poput individualizovanog učenja i veće angažovanosti studenata, ali i izazove kao što su nedovoljna digitalna pismenost i problemi s etičnošću korišćenja *ChatGPT-a* (Firat, 2023). Dalje, rezultati istraživanja koji su predstavljeni u ovom radu pokazali su da više od polovine studenata smatra da *ChatGPT* može pozitivno da utiče na kvalitet studija. Navedeni nalazi su u suprotnosti s istraživanjem Hualpa i saradnika koji su istakli dominaciju neutralnog stava studenata prema obrazovnoj ulozi *ChatGPT-a*. Prema ovom istraživanju, studenti smatraju da su podaci koje generiše *ChatGPT* besmisleni i neupotrebljivi bez ljudske konstrukcije konteksta i interpretacije (Huallpa et al., 2023). S druge strane, istraživanje Limne i saradnika (Limna et al., 2023) pokazalo je da profesori i studenti percipiraju *ChatGPT* kao dragoceni dodatak obrazovnom iskustvu, ali i veruju da se kontinuiranom upotrebom navedenog modela može obezbediti poboljšanje ishoda učenja studenata. Dodatno, istraživanje Demperea i saradnika (Dempere et al., 2023) ukazuje na brojne prednosti upotrebe *ChatGPT-a* u visokom obrazovanju, poput podrške u istraživanju i mogućnosti da se unapredi nastava. U prilog ovom nalazu govore i rezultati drugih istraživanja: profesori izražavaju optimizam u korišćenju *ChatGPT-a* u visokom obrazovanju, navodeći produktivnost studenata kao ključni element upotrebe navedenog modela (Firaina & Sulisworo, 2023); korišćenje veštačke inteligencije u visokom obrazovanju ima potencijal da poboljša akademski učinak studenata (Ouyang et al., 2022). Ovi nalazi su u saglasnosti i s rezultatima prethodno navedenih istraživanja, ali i s nalazima našeg istraživanja.

Ispitivanje percepcije studenata o potencijalnim izazovima u vezi s upotrebom *ChatGPT-a* u visokom obrazovanju obuhvatilo je pitanje o mogućnosti da nastavnici budu zamenjeni modelima veštačke inteligencije. Dobijeni nalazi ukazuju na to da većina ispitanika studenata nije saglasna s navedenom tvrdnjom. Ovakvi nalazi su u skladu s istraživanjem Firata, koji naglašava da upotreba modela veštačke inteligencije može osloboditi

profesore rutinskih zadataka i omogućiti im da se posvete mentorstvu i podsticanju razvoja, tzv. veština višeg reda (Firat, 2023). Dalje, to bi podrazumevalo da upotreba *ChatGPT-a* u visokom obrazovanju može promeniti ulogu nastavnika, ali ne i zameniti nastavnika. Shodno tome, zasad se ne uviđa opasnost da *ChatGPT* može postati zamena za personalizovanu podršku i vođstvo koje pružaju nastavnici.

Neophodno je održati balans između tehnologije i ljudske interakcije u učionici (Limna et al., 2023). Takođe, kada se govori o izazovima upotrebe *ChatGPT-a* u visokom obrazovanju, navodi se i potencijalni rizik za razvoj kritičkog mišljenja i kreativnosti. Većina studenata smatra da bi ovaj model veštačke inteligencije mogao da dovede do opadanja nivoa kreativnosti i kritičkog razmišljanja među studentskom populacijom. Posebno je važno istaći nedostatke upotrebe *ChatGPT-a*, kao što su potencijalna netačnost i nepouzdanost informacija, nedovoljna razmotrenost, ali i mogućnost kontekstualne neadekvatnosti i pristrasnosti (Oranga, 2023). Iz navedenog proizilazi potreba za podsticanjem razvoja kritičkog mišljenja među studentima. U drugoj studiji Šidik (Shidiq, 2023) ukazuje na potencijalne negativne efekte upotrebe modela veštačke inteligencije na veštine kreativnog pisanja. Ovaj nalaz je u saglasnosti s mišljenjem ispitanih studenata u našem istraživanju, koji takođe veruju da bi *ChatGPT* mogao da smanji kreativnost studenata. Salivan i saradnici (Sullivan et al., 2023) su istakli opasnost od nedostatka razvoja kritičkog mišljenja, upozoravajući na to da studenti mogu izgubiti fokus prilikom razumevanja gradiva.

Kao jedan od izazova upotrebe *ChatGPT-a* u visokom obrazovanju navodi se i rizik koji se odnosi na privatnost podataka studenata. Analiza rezultata ukazuje da određen broj studenata (58%) smatra da *ChatGPT* može ugroziti privatnost njihovih podataka. Prema studiji Orange (Oranga, 2023), postoji zabrinutost u vezi s privatnošću podataka, s obzirom na to da su razgovori s ovim modelom podložni snimanju i memorisanju. Ova zabrinutost za bezbednost podataka takođe je izražena i u drugim istraživanjima (Dempere et al., 2023; Limna et al., 2023), naglašavajući snažnu potrebu za merama zaštite podataka, kako bi se osiguralo da se lične informacije studenata koriste isključivo u svrhu za koju su namenjene.

Zaključak

Svrha realizovanog istraživanja odnosila se na ispitivanje percepcija studenata u vezi upotrebom *ChatGPT-a* u visokom obrazovanju. Navedeni cilj je operacionalizovan kroz sledeće istraživačke zadatke: proceniti informisanost studenata o upotrebi *ChatGPT-a* u obrazovne svrhe; ispitati percepciju studenata o mogućnostima upotrebe *ChatGPT-a* u visokom obrazovanju; ispitati percepciju studenata o potencijalnim izazovima upotrebe *ChatGPT-a* u visokom obrazovanju. Rezultati realizovanog istraživanja pokazali su da je većina ispitanih studenata navela da je upoznata s upotrebom *ChatGPT-a* u visokom obrazovanju, kao i da su prepoznali potencijal navedenog modela veštačke inteligencije u unapređenju kvaliteta studiranja. Naime, rezultati našeg istraživanja ukazuju na mogućnosti upotrebe *ChatGPT* modela u visokom obrazovanju koje se ogledaju u podsticanju personalizovanog učenja, pravovremenim povratnim informacijama nastavnika

i bržem pristupu različitim relevantnim izvorima. Dalje, nalazi istraživanja pokazuju da većina ispitanih studenata nije učestvovala na obukama ili kursevima u vezi s navedenim modelom. S obzirom na to da težimo da obezbedimo etički, pouzdan i efikasan kontekst korišćenja *ChatGPT-a*, neophodno je da profesori i studenti budu edukovani u oblasti korišćenja veštačke inteligencije (Rasul et al., 2023). Kursevi ili radionice koje bi organizovale obrazovne institucije omogućile bi stručno vođenje i resurse koji bi pomogli studentima da bolje razumeju funkcije i mogućnosti *ChatGPT-a*, kao i da razviju veštine za efektivno korišćenje alata u svojim akademskim aktivnostima.

Percepcije studenata su prikazane i kroz identifikovanje izazova i mogućnosti upotrebe modela *ChatGPT-a* u visokom obrazovanju. Rezultati realizovanog istraživanja ukazuju na određene izazove upotrebe *ChatGPT-a* koji se odnose na pitanja ljudske interakcije, razvoja kritičkog mišljenja i kreativnosti, opasnost od akademske nečestitosti, pristrasnosti, ugroženost privatnosti podataka i pitanja etike. S tim u vezi, neupitno je važna uloga obrazovnih institucija u neutralizaciji ili ublažavanju ovih izazova, osiguravajući da veštačka inteligencija služi kao dopuna ljudskoj interakciji, a ne kao njena zamena. Kako bi se sačuvala privatnost podataka studenata, nužno je da obrazovne institucije preuzmu odgovornost i uspostave etičke smernice za korišćenje modela veštačke inteligencije (Huallpa et al., 2023). Takođe, obrazovne institucije bi trebalo da razvijaju strategije kako bi podstakle kritičko razmišljanje među studentima u vezi s korišćenjem modela veštačke inteligencije, kao što je *ChatGPT*. To uključuje podsticanje studenata da analiziraju informacije koje dobijaju putem ovih modela, prepoznaju potencijalne nedostatke ili pristrasnosti i razvijaju sposobnost kritičkog procenjivanja informacija.

Postojeći rad može poslužiti kao osnova za dalja istraživanja koja će se baviti specifičnim aspektima upotrebe *ChatGPT-a* u visokom obrazovanju. To može uključivati istraživanje uticaja dugoročne upotrebe *ChatGPT* modela na akademske performanse studenata ili istraživanje različitih obuka za korišćenje modela veštačke inteligencije. Takođe, važno je istaći da prigodan uzorak ispitanika ograničava generalizaciju dobijenih rezultata istraživanja, kao i da korišćenje samo pitanja zatvorenog tipa može onemogućiti dublje razumevanje percepcija studenata. Osim toga, obuhvaćene su samo percepcije studenata, pa bi uključivanje perspektive nastavnika ili stručnjaka iz oblasti veštačke inteligencije moglo pružiti dodatnu dubinu analize. Uzimajući u obzir navedene pedagoške implikacije i identifikovana ograničenja, buduće istraživanje može dodatno doprineti ispitivanju uticaja *ChatGPT-a* modela na oblast visokog obrazovanja, ali i podržati dalji razvoj pedagoških praksa u digitalnom dobu.

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The Use of ChatGPT in Higher Education: Students' Perceptions

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Abstract

The rapid development of technology has led to the creation of the artificial intelligence model ChatGPT, which enables the generation of texts based on user queries. Although it represents an innovation in the domain of artificial intelligence, this model is still insufficiently explored through empirical studies. Therefore, a study was conducted to further explore students' perceptions regarding the use of ChatGPT in higher education. The sample included 200 students from the University of Novi Sad, and the data were analyzed using SPSS and descriptive statistics measures. The research results indicate that students extensively use ChatGPT for academic purposes, recognizing benefits such as time-saving and personalized learning experiences. However, the results also show students' concerns about the potential reduction of creativity and critical thinking, as well as privacy risks. Additionally, most students had no experience with educational workshops or courses focused on using ChatGPT in an academic context. Based on these findings, it is concluded that there is a need for educating students on a more efficient and responsible use of ChatGPT in higher education. Furthermore, the importance of further research and the development of resources to provide adequate support for students in applying this technological tool is emphasized.

Keywords: ChatGPT, students, artificial intelligence, higher education.

Introduction

ChatGPT is an artificial intelligence model designed to understand language and provide relevant responses to user queries. The educational potential of the ChatGPT model has been the subject of various studies over the past two years (Grassini, 2023;

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Ouyang et al., 2022; Rawas, 2023; Sok & Heng, 2024; Tlili et al., 2023; Zawacki et al., 2023). ChatGPT offers numerous possibilities within higher education: support in teaching, innovations in student knowledge assessment, assistance with academic writing, as well as administrative help and productivity (Sok & Heng, 2024). However, the use of the ChatGPT model in higher education may also present a range of challenges related to security, privacy, information accuracy, and the academic integrity of educators (Sok & Heng, 2024).

When discussing the use of ChatGPT in higher education, it is crucial to examine its impact on students' academic success, the learning process, and the long-term implications for the educational system. In this regard, to assess the effectiveness of this model, it is essential to identify the limitations of previous research and lay the foundations for future studies that will contribute to a better understanding of its use in higher education. The aim of this research was to examine the perceptions of students at the University of Novi Sad regarding the use of ChatGPT in higher education. The theoretical framework of the paper presents the results of previous research that dealt with this topic. The research methodology is described in detail, followed by a presentation of the obtained results, discussion, conclusions, and pedagogical implications.

Theoretical Framework

According to constructivist learning theory, learning should be organized as an opportunity for constructing knowledge. According to this theory, knowledge is not passively transmitted but actively constructed by the student. The role of the teacher within constructivist theory is represented by providing support to students in the learning process (Makewa, 2019). With technological development, according to some research findings, artificial intelligence models can take on a mentoring role in the learning process. Research by Makewa (Makewa, 2019) indicates that technology can accelerate interactive learning experiences by allowing students to experiment and explore. For example, ChatGPT enables students to reach certain insights more quickly (Rasul et al., 2023). The feedback it provides, encouragement, and guidance can lead to the construction of new knowledge. Additionally, constructivist theory emphasizes the importance of authentic assessment, which evaluates students' ability to apply knowledge and skills in real-world situations (Rasul et al., 2023).

The first study (Ouyang et al., 2022) to be presented focused on the use of artificial intelligence in online higher education. Ouyang and colleagues (Ouyang et al., 2022) provided insights into empirical research on the application of artificial intelligence. This literature review analyzed the functions of artificial intelligence applications, the algorithms most commonly used, effects, and implications arising from these studies (Ouyang et al., 2022). The results show that the functions of artificial intelligence applications in online higher education are diverse, including predicting learning status, performance or satisfaction, recommending resources, automatic assessment, and improving the learning experience. The effects generated by artificial intelligence applications include high-quality predictions, high-quality recommendations based on student characteristics, improved academic performance, and enhanced online engagement and participation (Ouyang et

al., 2022). This systematic literature review points to several theoretical, technological, and practical implications. One implication is that the application of artificial intelligence in education should rely on established learning and educational theories and use advanced technologies to collect and analyze data in real-time (Ouyang et al., 2022).

A relevant study focusing on chatbots in higher education is by Dempere and colleagues (Dempere et al., 2023). In this extensive research, the authors used various databases such as PubMed, IEEE Explore, and Google Scholar to explore the literature on the impact of chatbot artificial intelligence in higher education. The authors identified numerous benefits of ChatGPT, including support in research, automated assessment, enhanced user-computer interaction, simplified registration, improved student services, and enhanced teaching. However, the research also identified several issues, such as on-line testing security, digital literacy gaps, anxiety caused by artificial intelligence, privacy violations, misuse, bias, misinformation, reduced human interaction, accessibility issues, and the disappearance of certain jobs.

Another significant study covered the use of ChatGPT in higher education, with a special emphasis on the frequency of use and its impact on teacher productivity (Firaina & Sulisworo, 2023). The aim of this study was to assess teachers' optimism regarding the use of ChatGPT. It was shown that most teachers expressed optimism about the application of ChatGPT in teaching. However, the research also found that there is a certain level of skepticism among teachers regarding the use of this model in teaching (Firaina & Sulisworo, 2023).

The goal of the research by Ljujić and colleagues (2023) was to examine ChatGPT's performance in writing academic assignments and compare these performances with those of students. The main data sources included pre-exam assignments written by Andragogy students at the University of Belgrade and essays generated by ChatGPT. Both students and ChatGPT were tasked with writing an andragogical analysis of a multimedia content (Ljujić et al., 2023). The comparative content analysis was conducted based on criteria used to evaluate the pre-exam assignments. These criteria included various aspects such as grammar, organization and structure of content, relevance to the given topic, citation practice, depth of understanding and knowledge, integration of theoretical, research, and experiential insights, quality of argumentation and discussion, level of reflection and critical analysis, and originality and creativity (Ljujić et al., 2023). The results showed that ChatGPT has linguistic and semantic algorithms that enable automatic evaluation, corrections, and feedback regarding grammar and vocabulary. However, although quite structured and logically organized, the essays generated by ChatGPT contained basic textual units, while student essays exhibited more complex structures. The difference in content quality was significant, with student papers showing greater integration of theoretical and experiential insights. Thus, the results clearly indicate that human intervention and interaction are indispensable in composing experiential written content (Ljujić et al., 2023).

The research by Huallpa and colleagues (2023) aimed to investigate students' attitudes toward the integration of ChatGPT into their educational experiences. The study involved 220 undergraduate students at the University of Peru. The questionnaire consisted of closed and open-ended questions to gather both quantitative and qualitative data.

The results showed that students recognize the value of ChatGPT in creating personalized educational opportunities. Additionally, students highlighted the need for clear institutional standards regarding data privacy and security (Huallpa et al., 2023). Furthermore, the results indicated that users' attitudes toward ChatGPT changed under the influence of various factors, including demographic factors (such as gender, age, and perceived accessibility), social attitudes, experiences, and concerns about data privacy and security. To maintain students' privacy, institutions should establish standards and ethical frameworks for the use of ChatGPT (Huallpa et al., 2023).

The study by Sullivan and colleagues (Sullivan et al., 2023) on the impact of ChatGPT on higher education covered two areas. The first was the investigation of key themes in newspaper articles about ChatGPT in the context of higher education, and the second was the assessment of how these discussions perceive ChatGPT as a potential learning tool and support for different students, rather than a risk to academic integrity (Sullivan et al., 2023). Through content analysis of 100 media articles, the text was coded to explore several key themes regarding the impact of ChatGPT on higher education. These themes included university employees' responses to ChatGPT, concerns about academic integrity, the limitations and weaknesses of artificial intelligence tools, and opportunities for student learning (Sullivan et al., 2023). Content analysis of newspaper articles revealed that university employees' responses to ChatGPT were mainly focused on concerns about academic integrity and new approaches to assessment. It is noteworthy that the study neglected the students' perspective, whose academic success is affected by the impacts of artificial intelligence models (Sullivan et al., 2023). Additionally, it is interesting to note that there is an equal representation of issues related to how students will be encouraged to avoid ChatGPT, while a smaller number of articles explicitly established a correlation between the use of artificial intelligence models and learning outcomes. This study suggests that a larger number of higher education institutions prohibit the use of ChatGPT compared to those that do not.

Research Methodology

The aim of the research was to investigate students' perceptions regarding the use of ChatGPT in higher education. Based on this aim, the following research tasks were set:

1. To assess students' awareness of the use of ChatGPT for educational purposes;
2. To examine students' perceptions of the potential applications of ChatGPT in higher education (including changes in education and the quality of studying);
3. To investigate students' perceptions of the potential challenges associated with the use of ChatGPT in higher education (including issues related to «replacement» of professors, creativity, and privacy).

To explore the use of ChatGPT in higher education, a questionnaire developed by Abbas and colleagues (Abbas et al., 2023) was used. The original questionnaire consists of 19 closed-ended questions. This instrument is intended to measure the effects of integrating ChatGPT into education and research. For the purposes of this study, the authors adapted and validated the previously mentioned instrument for the Serbian-speaking

area. Like the original version, the adapted instrument included 19 closed-ended questions. While the original study addressed the use of ChatGPT for educational and research purposes, only questions focused on examining the use of ChatGPT models for educational purposes were selected for this study.

This research will present questions related to students' awareness of the use of ChatGPT for educational purposes, their participation in workshops or courses on the use of this model, questions about potential applications, as well as challenges associated with the use of ChatGPT in higher education. Data on the socio-demographic characteristics of the respondents included: gender, year of study, field of study (natural or social sciences), and average grade. The study involved 200 students from the University of Novi Sad, using a convenience sample. The research was conducted online via the Google Forms platform from January to March 2024. The data obtained from this research were analyzed using the IBM SPSS for Windows statistical software (version 26). Descriptive statistical indicators were applied.

Table 1
Structure of respondents

	N	%
Gender		
Male	101	50.5
Female	99	49.5
Year of study		
Second year	58	29.0
Third year	88	44.0
Fourth year	54	27.0
Total	200	100

Note. N – number of respondents

Results

Students' Awareness of the Use of ChatGPT in Education. The majority of respondents, 77.0%, reported being aware of the use of ChatGPT in education, while 23.0% stated otherwise. The high level of awareness of the use of ChatGPT in education suggests that this model is widely recognized among the student population, indicating it could play a potentially significant role in the educational process. Additionally, the survey included a question about attending additional training for using ChatGPT in academic contexts. Only 15.5% of respondents had participated in or attended a course on using ChatGPT in an academic context, while the majority, 84.5%, had not. These results indicate that most respondents have not engaged in additional training or courses for using ChatGPT in academic settings, implying that students have explored or used ChatGPT independently without formal training. This finding could be useful for educational

institutions and the academic community to better understand students' needs and provide appropriate support and resources for effective use of ChatGPT in education.

Students' Perception of the Potential of ChatGPT in Higher Education. The majority of respondents, 74.5%, believe that ChatGPT has the potential to change the educational process. On the other hand, 25.5% disagree with this statement. This expressed belief among students about ChatGPT's potential to alter the educational process highlights the significant role this model could play in the future of higher education and research. Furthermore, the majority of respondents, 63.5%, think that ChatGPT could improve the quality of studying. Conversely, 36.5% did not agree with this statement. The positive view of the majority of students regarding ChatGPT's potential to enhance the quality of studying underscores the importance of technological innovations in education. Respondents supporting this idea may perceive ChatGPT as a helpful model that provides additional support in learning and research, contributing to a more productive educational experience. Additionally, this opens up opportunities for further research and implementation of ChatGPT in the educational process to understand where students see potential improvements and how to enhance the quality of studying.

Students' Perception of the Potential Challenges of Using ChatGPT in Higher Education. When examining students' perceptions about whether ChatGPT could replace teachers, the majority of respondents (82.0%) indicated that they do not believe this is possible, while a smaller percentage (18.0%) thought that ChatGPT might replace teachers. This suggests a general view among students that artificial intelligence models like ChatGPT cannot fully replace the role and competencies of teachers in the educational process. Additionally, the majority of respondents (63.0%) believe that ChatGPT could lead to a decrease in creativity and critical thinking among students, while a smaller percentage (37.0%) hold the opposite view. The results suggest that there is concern among most respondents that using ChatGPT could reduce creativity and critical thinking. However, it is important to note that a smaller percentage of respondents hold a contrary view, which may indicate varying perspectives and attitudes about the impact of ChatGPT technology on creativity and critical thinking. Analyzing respondents' answers regarding whether they think ChatGPT could be a threat to their privacy, the majority (58.0%) expressed concern, while a smaller number (42.0%) answered negatively. These results indicate that most students consider ChatGPT to be a threat to privacy, highlighting the importance of careful data management and the implementation of adequate privacy protection measures when integrating this technology into an educational context.

Discussion

The aim of this study was to examine students' perceptions regarding the use of ChatGPT in higher education. According to our findings, there is a limited amount of empirical research conducted in the Republic of Serbia concerning the use of ChatGPT in an educational context. Based on the results of our study, 77% of students reported being aware of the use of ChatGPT in higher education. An analysis of the relevant literature on this topic, especially from the perspective of students in Serbia, highlights a high level

of awareness of this virtual assistant among the student population (Ljujić et al., 2023). Furthermore, the research results show that most students have not participated in additional training for using ChatGPT for academic purposes. This data points to a concerning situation, given the widespread presence and diffusion of artificial intelligence models. To leverage all the benefits ChatGPT offers, and to address and avoid its shortcomings, which often relate to misuse and plagiarism, it is crucial to establish a training system for the appropriate use of ChatGPT in educational contexts.

Examining students' perceptions of the potential benefits and challenges of using ChatGPT in higher education included questions about ChatGPT's potential in the field of higher education. Our research found that most respondents believe ChatGPT has the potential to change the higher education and research landscape. These findings are consistent with research by Oranga, which highlights that ChatGPT opens up possibilities for personalized learning, continuous access to a vast amount of information, instant feedback, and ongoing assistance in learning (Oranga, 2023). Personalized learning, flexibility, and feedback have been recognized as benefits in other studies as well (Huallpa et al., 2023). Firat's study also emphasizes the potential benefits of artificial intelligence models in education, such as personalized learning and increased student engagement, but also challenges such as insufficient digital literacy and ethical issues surrounding the use of ChatGPT (Firat, 2023). Moreover, the results presented in this paper show that more than half of the students believe ChatGPT could positively impact the quality of studying. These findings contrast with Huallpa et al.'s research, which highlighted a dominant neutral stance among students towards ChatGPT's educational role. According to this research, students consider the information generated by ChatGPT to be meaningless and unusable without human contextualization and interpretation (Huallpa et al., 2023). On the other hand, Limna et al.'s research (Limna et al., 2023) showed that both professors and students perceive ChatGPT as a valuable addition to the educational experience and believe that continuous use of this model can improve students' learning outcomes. Additionally, Dempere et al. (Dempere et al., 2023) highlight numerous advantages of using ChatGPT in higher education, such as support in research and the potential to enhance teaching. This finding is supported by other research – professors express optimism about using ChatGPT in higher education, citing student productivity as a key element of using this model (Firaina & Sulisworo, 2023); the use of artificial intelligence in higher education has the potential to improve students' academic performance (Ouyang et al., 2022). These findings align with previously mentioned studies and the results of our research.

Examining students' perceptions of potential challenges associated with using ChatGPT in higher education included questions about whether artificial intelligence models could replace teachers. The findings indicate that most students do not agree with this statement. These findings align with Firat's research, which emphasizes that the use of artificial intelligence models can free professors from routine tasks and allow them to focus on mentoring and fostering development, i.e., higher-order skills (Firat, 2023). This implies that while the use of ChatGPT in higher education might change the role of teachers, it does not replace them. Therefore, there is currently no perceived risk that ChatGPT could replace the personalized support and guidance provided by teachers. It is essential

to maintain a balance between technology and human interaction in the classroom (Limna et al., 2023).

Furthermore, when discussing the challenges associated with the use of ChatGPT in higher education, the potential risks to the development of critical thinking and creativity are also mentioned. Most students believe that this artificial intelligence model could lead to a decrease in creativity and critical thinking among students. It is particularly important to highlight the shortcomings of using ChatGPT, such as potential inaccuracies and unreliability of information, insufficient consideration, and possible contextual inadequacies and biases (Oranga, 2023). This underscores the need to promote the development of critical thinking among students. Shidiq's study (Shidiq, 2023) also points to the potential negative effects of using artificial intelligence models on creative writing skills. This finding is consistent with the opinions of respondents in our study, who also believe that ChatGPT might reduce students' creativity. Sullivan et al. (Sullivan et al., 2023) highlight the danger of a lack of critical thinking development, warning that students might lose focus when understanding the material.

Another challenge associated with using ChatGPT in higher education is the risk related to students' data privacy. The analysis of results indicates that a certain number of students (58%) believe that ChatGPT could threaten their data privacy. According to Oranga's study (Oranga, 2023), there is concern about data privacy, as interactions with this model are subject to recording and memorization. This concern about data security is also expressed in other research (Dempere et al., 2023; Limna et al., 2023), emphasizing a strong need for data protection measures to ensure that students' personal information is used solely for its intended purpose.

Conclusion

The purpose of the conducted research was to examine students' perceptions regarding the use of ChatGPT in higher education. This objective was operationalized through the following research tasks: to assess students' awareness of the use of ChatGPT for educational purposes; to explore students' perceptions of the potential uses of ChatGPT in higher education; and to investigate students' perceptions of the potential challenges of using ChatGPT in higher education. The results of the research showed that most of the surveyed students were aware of the use of ChatGPT in higher education and recognized the potential of this artificial intelligence model to improve the quality of studying. Specifically, our research results indicate the potential uses of the ChatGPT model in higher education, which include fostering personalized learning, providing timely feedback from instructors, and faster access to various relevant sources. Furthermore, the findings indicate that most students have not participated in training or courses related to this model. Given the goal of ensuring an ethical, reliable, and effective context for using ChatGPT, it is necessary for both professors and students to be educated in the field of artificial intelligence (Rasul et al., 2023). Courses or workshops organized by educational institutions could provide expert guidance and resources to help students better understand

the functions and capabilities of ChatGPT and to develop skills for the effective use of the tool in their academic activities.

Students' perceptions were also illustrated through the identification of challenges and opportunities associated with using the ChatGPT model in higher education. The results of the research indicate certain challenges related to the use of ChatGPT, including the issues of human interaction, the development of critical thinking and creativity, the risk of academic dishonesty, biases, privacy concerns, and ethical issues. In this regard, the role of educational institutions is undeniably crucial in neutralizing or mitigating these challenges, ensuring that artificial intelligence serves as a complement to human interaction rather than a replacement. To protect students' data privacy, educational institutions must take responsibility and establish ethical guidelines for using artificial intelligence models (Huallpa et al., 2023). Additionally, educational institutions should develop strategies to encourage critical thinking among students regarding the use of artificial intelligence models such as ChatGPT. This includes encouraging students to analyze the information provided by these models, recognize potential flaws or biases, and develop the ability to critically evaluate information.

The existing work can serve as a foundation for further research that explores specific aspects of using ChatGPT in higher education. This could include investigating the impact of long-term use of the ChatGPT model on students' academic performance or exploring various training programs for using artificial intelligence models. It is also important to note that the convenience sample of respondents limits the generalizability of the research results, and using only closed-ended questions may prevent a deeper understanding of students' perceptions. Moreover, only students' perceptions were covered, so including the perspectives of instructors or experts in artificial intelligence could provide additional depth to the analysis. Considering these pedagogical implications and identified limitations, future research can further contribute to examining the impact of the ChatGPT model on the field of higher education and support the continued development of pedagogical practices in the digital age.

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