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Top-ranked U.S. and U.K.'s universities' first responses to GenAI: key themes, emotions, and pedagogical implications for teaching and learning

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Abstract
The emergence of ChatGPT, a Generative AI program, has sparked discussions about its teaching and learning value, and concerns about academic integrity in higher education (HE). An extant review of the literature indicates that a scarcity of research exists on GenAI, specifically a synthesis of the official views, guidelines and articles of top-ranked universities on the use, limitations, challenges, and opportunities brought by ChatGPT in the early phase when ChatGPT was released in 2022 until early May 2023, which can offer insights into the concerns and recommendations for educators. Using the corpus assisted discourse analysis approach, this study identified the key themes and emotions elicited by evaluations of the ChatGPT situation from a self-built corpus containing 151 articles from 47 top-ranked U.S. universities and 34 U.K. ones. Our findings indicated three prominent themes discussed on official websites, including ChatGPT as a text and content generator, use of ChatGPT in teaching and learning, and potential implications and opportunities of using ChatGPT in HE. Further examination revealed that bias, concern, worry, threat, fear, and trust were the prevailing emotions relating to ChatGPT. Illustrated with examples collected from our corpus, this paper offers an in-depth discussion of universities' first responses to the use of ChatGPT. The insights gained have some pedagogical implications for academics, researchers and educators and may inform policy and practice in HE on the use of GenAI.

Keywords Generative AI · ChatGPT · Higher education · Theme analysis · Emotion analysis · Corpus assisted discourse analysis

1 Introduction

Generative AI (GenAI) is a kind of artificial intelligence technology that is capable of generating a variety of content including text, videos, images and others [1] and has many applications in the Higher Education (HE) sector [2]. The advent of ChatGPT, designed by OpenAI and launched on 30 November 2022, has attracted tremendous attention [3]. ChatGPT is a GenAI program or tool that contains a language database to generate human-like text-based input and has immense potential in understanding language and retaining knowledge; it can simulate human-like conversations

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with users, and users can ask questions while the system replies speedily [4, 5]. Research on GenAI has thus become a significant topic in HE.

GenAI has led to a transformation in teaching and learning in HE, yet mixed views still surround GenAI and its implications for practice. While some academics contend it should be banned as academic integrity issues arise [e.g. 6], others believe that it can promote teaching and learning e.g. [2, 7, 8]. Indeed, GenAI can provide personalized learning experiences, create content, and minimize language barriers for socially disadvantaged students, thereby facilitating learning [7, 9]. There are also calls to modify assessment practices to keep up with GenAI developments alongside equipping students with the digital competence to use it appropriately [4, 5]. In contrast, some educators are not quite receptive to adopting GenAI stemming from concerns about job displacement and a negative perception of GenAI's impact on HE [9].

A review of studies on GenAI, specifically ChatGPT, has indicated that very few academic studies were published on how ChatGPT was viewed by the global HE sector from November 2022 when it was released to the emergence of ChatGPT 3 and 4 until early May 2023. Most research at that time revolved around discussions, commentaries and newspaper articles about how GenAI might affect educators' evaluation of students' learning [8, 10]. Concerning the limited studies done in HE at that time, one focused on news articles on how ChatGPT was affecting HE in Australia, New Zealand, the U.K. and U.S., indicating there were divided discussions and university responses to ChatGPT, focusing mainly on academic integrity and the need for modifying assessments [10]. In fact, educators and policymakers are the most important stakeholders in HE apart from students, and thus, it is essential to comprehend GenAI's impact on HE from educators' and policymakers' perspective. Since it is not feasible to analyze all views towards ChatGPT by universities worldwide, our study focused on the top-ranked universities in the U.K. and U.S. recognised by the QS World University Rankings. Official views and policies exhibited on websites from top-ranked universities often draw considerable public attention and serve as models to other HE institutions in terms of guidance and policymaking, as well as have some impact on the teaching and learning policies and practices adopted by other institutions [11]. University websites serve an important role in explicitly indicating the institution's policies, practices, mission, stance; this information is helpful to prospective students, educators, and stakeholders such as the public and government officials [12].

It should be noted that university educators and policymakers may have little knowledge of GenAI, which can be disruptive and emerging, and therefore, mixed views on GenAI are evident among HE institutions, centering on discussions about its impact on teaching, policy development, and assessments [2]. There is scarce research on key stakeholders' perspectives, specifically the official viewpoints of educators and policymakers, which can offer insights into the impact that GenAI will have on HE in the areas of learning, teaching, assessment, and administration. A synthesis of views from top-ranked universities in the U.S. and U.K. can contribute to a more nuanced analysis of the opportunities, challenges, and implications of GenAI for teaching and learning in HE in the future. This paper is framed as a historical study that documents the first responses of leading universities in the U.S. and U.K. when ChatGPT was released in November 2022 until early May 2023, given that ChatGPT during that time generated some panic. To the best of our knowledge, this study is one of the first investigations into how GenAI, specifically ChatGPT, is viewed by top-ranked U.S. and U.K. universities, which has some practical significance for universities in the global context.

Our study focuses on two key areas, namely exploring the official viewpoints, news/articles, and guidelines on ChatGPT expressed by leading U.S. and U.K. universities on their official websites, by using Corpus Assisted Discourse Analysis (CADA) to uncover the prominent keywords, themes and sub-themes. It is one of the first studies investigating the coverage of ChatGPT in two different nations by examining their themes exhibited in their messages on their websites. We also deemed that it is worth exploring the emotions embedded in the official discourse of the ChatGPT issue to provide more in-depth insights into the topic. The following section reviews prior research on GenAI. The research design is then explained followed by the findings and discussion. This paper offers pedagogical implications of GenAI alongside opportunities for integrating it into teaching and learning in HE based on the findings.

2 Diverse views towards the use of GenAI

GenAI, more specifically ChatGPT, is a versatile tool considering that it can explain complex concepts, generate educational materials, offer personalized feedback on assignments, automate administrative tasks to save educators' time, and support students' self-directed learning [5, 10, 13]. Prior research has focused on applying ChatGPT to teaching and learning in different fields in HE [4, 5, 14]. For example, ChatGPT3 could provide a reference guide for self-directed study for Chinese medicine students taking pharmacology courses in Malaysia [15], while it performed like year 3 medical students in answering questions on the U.S. Medical Licensing examination, and hence, the researchers concluded

that ChatGPT can serve as a medical education tool [16]. Dowling and Lucey [17] suggested that ChatGPT can facilitate research on finance by helping students brainstorm ideas, synthesize the literature and collate the data, and it can also help compose medical discharge summaries of patients [18].

Research on GenAI suggests mixed views with some being in favor of it whereas others being concerned about the academic integrity problems that arise with its use. In particular, GenAI's capacity to create content, engage in conversations, and provide correct, speedy texts has prompted concerns about how students might use it unethically for their assessments, thus raising concerns about academic integrity [6, 7, 19]. Further, the text generated by GenAI may be inaccurate or biased, thereby leading to misleading information [9]. These issues pose a threat to HE [20], prompting academics to formulate policies guiding the use of AI tools ethically to mitigate the risks stemming from GenAI [21].

Previous literature on GenAI has explored the perspectives of different stakeholders such as students and scholars using qualitative research, or mainly centered on sentiment analysis, or offered opinion-based discussions about the potential benefits, opportunities, and challenges brought by GenAI. For example, a study involving 21 scholars' and students' views on ChatGPT was done using thematic analysis where it was found that the learning and education systems were evolving, the role of educators was changing, and GenAI had an impact on assessment [22]. Malik et al. [23] conducted interviews with 15 staff and 14 students from April–May 2023 to examine how students and academic staff perceived GenAI in HE; it was found that both parties acknowledged the use of GenAI to facilitate learning but academic staff experienced difficulties in designing assessments that would deter students from using GenAI and students felt that the guidance and policy on how they could use AI tools was unclear. Chiu's [2] research focused on students' perspective by examining the impact of ChatGPT on students' learning outcomes and assessments, offering a range of recommendations such as equipping students with AI literacy. Other research has followed an opinion-based narrative, offering general guidance on the use of GenAI and opportunities and challenges associated with its use. For example, Kasneci et al. [7] and Alasadi and Baiz [8] explored the potential benefits and challenges of ChatGPT in education, while Willems [24] focused on the ethical implications of using GenAI in HE. Rudolph et al.'s review of the literature [5] highlighted ChatGPT's potential impact on traditional assessments and its useful features in HE. Halaweh [25] argued for the ethical use of ChatGPT in education and Crawford et al. [26] suggested that appropriate leadership is required for the ethical use of ChatGPT in education. Other studies have conducted sentiment analysis, for example, Tlili et al. [27] found that public views on ChatGPT were generally positive on Twitter.

Only few studies have used a combination of different types of analyses to investigate the effect of GenAI on HE. Of these, an analysis of key themes in 100 news articles on how GenAI, specifically ChatGPT, was impacting HE in Australia, New Zealand, the U.K. and U.S. from November 2022-February 2023, conducted by Sullivan et al. [10], suggests that most views expressed in the news were divided, and university responses to ChatGPT were primarily concerned with academic integrity and designing new assessments to deter students from using it, rather than using it to promote teaching and learning. Sentiment analysis from this study revealed that a similar number of articles contained positive and negative language. We contend that it is worth examining the GenAI issue from a unique angle by exploring the discourse of policymakers and educators in HE to offer a more comprehensive perspective on how they viewed the concerns and benefits of Gen AI, providing the HE sector valuable insights. We focused on uncovering the key themes and sub-themes that illustrate the nature of discussions on ChatGPT or first responses to ChatGPT by leading U.S. and U.K. universities on their official websites as well as identifying the predominant emotions embedded in their discourse when ChatGPT was released in November 2022 until early May 2023 amidst the anxiety and panic associated with this new type of GenAI. As indicated, official views and policies on university websites draw plenty of public attention and serve as models to other HE institutions [11], and hence, it is worth analyzing them to offer insights into the potential, limitations, and opportunities for utilizing GenAI in HE in future. Our study stands apart from other studies in two ways. First, we applied Corpus Assisted Discourse Analysis (CADA) to uncover the prominent keywords, themes and sub-themes exhibited in messages on university websites. Second, we analyzed the emotions embedded in the official university discourse on their websites to further provide useful insights and practical implications.

Emotions are often evoked by new controversial topics and crises, and can affect attitudes and behavior; such emotions can be positive like pride [28] or negative like fear and anxiety [29]. ChatGPT, a GenAI program, is a controversial issue generating heated discussion in HE given that academics have to grapple with ethical issues, and modify assessments while leveraging its use. The following research questions (RQ) are thus posed:

RQ 1: What are the key themes and sub-themes exhibited in the official news, viewpoints, articles, and guidelines relating to ChatGPT disseminated on the official websites of top-ranked U.S. and U.K. universities?

RQ 2: What predominant emotions are exhibited in the views on ChatGPT embedded in the official news, viewpoints, articles, and guidelines disseminated on the official websites of top-ranked U.S. and U.K. universities?

3 Method

3.1 Data source and collection

To determine the themes of discussion of ChatGPT, this study manually screened and captured the official news, viewpoints, articles, and guidelines relating to the use of ChatGPT from the official websites of the top 50 U.S. and U.K. universities ranked in the QS World University Rankings index. Research on ChatGPT studies in professional contexts, unofficial news, informal guidelines for students, and events such as webinars were excluded. The screening and capturing of the texts were undertaken by a postgraduate student majoring in communication studies in late May 2023. Ten hours of training on website screening and capturing, and supervision during the collection period were provided by the first author, who has substantial experience in conducting empirical research in media and communication studies. From the time ChatGPT was released in November 2022 until early May 2023, texts from the top 50 U.S. and U.K. universities ranked in the QS index were screened and captured. This period was selected as there was a lot of panic surrounding the ChatGPT issue at that time.

Of the 100 universities examined, 47 U.S. and 34 U.K. universities (n = 81, 81%) published official news, viewpoints, articles, and guidelines on the use of GenAI on their official websites. All the related texts were captured for the creation of a study corpus of ChatGPT. 96 pieces of news, articles, and guidelines from U.S. universities and 55 pieces from U.K. universities were archived. By combining the 151 pieces of texts from both U.S and U.K. universities, a study corpus of 165,683 tokens was created. See Appendix I for the U.S. and U.K. universities, article titles and source links of the texts.

3.2 Data analysis

To reveal the themes and emotions of ChatGPT from leading U.S. and U.K. universities, this study employed Corpus Assisted Discourse Analysis (CADA) approach, a widely adopted approach in theme and sentiment analysis [29] to examine the extensive corpus of collected data. Unlike traditional thematic analysis relying on researchers' interpretation of the text for coding, CADA offers a bottom-up approach to reduce researchers' bias [30] and enables qualitative analysis of the ideologies and meanings embedded in texts [29].

The corpus linguistics software, Wmatrix 5.0 [31] was used to perform CADA. Wmatrix is a software tool for corpus analysis and comparison which supports a wide range of corpus linguistics methodologies, including USAS and CLAWS corpus annotation tools, keyness analysis, and key semantic domain categorizations, especially the "Emotion" (E) domain [31]. Wmatrix is recognized for its robustness in identifying keywords and key semantic categories since its overall accuracy rate in semantic tagging is 91% [31].

To perform data analysis using the corpus linguistics software mentioned, we first inputted and tagged the self-collected GenAI corpus (aka the study corpus) into the web interface of WMatrix. American English 2006 (AmE06), a one-million-word corpus consisting of published general written American English, was chosen as the reference corpus because the majority of texts were collected from U.S. universities (i.e. 96 texts out of a total of 151 texts).

For thematic analysis, we employed WMatrix to generate a list of keywords using the keyness function where keywords were identified based on their frequency, clusters or categories in the study corpus against the reference corpus [30]. The output of keywords was ranked based on their log-likelihood (LL) values, with higher LL suggesting a greater difference between the relative frequencies of a word based on the sizes of the two corpora [32] and keywords with LL value over 7 having 99% confidence level [33]. Using 100 as the cut-off value of LL, the top 178 keywords were harvested for concordance analysis whereby words, phrases and collocates related to the keywords in the concordance lines were displayed according to their occurrence in the corpus [34]. See Appendix II for the keywords with LL value over 100. Although keyness and concordance were employed, the thematic analysis in the discourse relied heavily on the researchers' interpretation. The integrated use of these corpus linguistics methods provided a more comprehensive view on the keywords in context that facilitated our identification and interpretation of the key themes [35].

For emotion analysis, we first investigated the sentiments embedded in the semantic category of emotion using WMatrix. WMatrix is recognized for its ability to tag and group the tokens denoting emotional actions, states, and processes in a systematic way in which the domain of emotion was further subdivided into 6 subcategories with 14 descriptive labels (See Table 1) [34, 35].

By examining the list of emotion words generated by WMatrix, we uncovered the subcategories of emotions that yielded significant LL values (p-value of < 0.0001) when compared to the reference corpus [31]. Apart from the emotion

subcategories with significant difference of LL, we scrutinized the emotion words with high frequency/occurrences. Then we used the concordance function of Wmatrix to retrieve the concordance lines of the key tokens in the emotion subcategories that yielded significant LL to carefully examine the evaluation of ChatGPT in terms of the emotions aroused. To further explain the results, we included some examples from the study corpus below to illustrate the key emotion token.

4 Findings

4.1 ChatGPT-related key themes exhibited on official websites of leading U.S. and U.K. universities

For RQ1 regarding the most prevalent themes illustrating the nature of discussions about ChatGPT exhibited on the official websites of top-ranked U.S. and U.K. universities, three key themes and ten sub-themes from the corpus linguistics analysis of the keywords with high LL values were found (See Table 2 for the Key Themes, Sub-themes and related Keywords identified). The first predominant theme was concerned with the emergence, design and function of the new digital AI chatbot in HE: ChatGPT as an AI text and content generator. It consisted of three sub-themes: (1.1) the emergence of ChatGPT as a new technology that will impact the future of HE, (1.2) ChatGPT as a generative AI chatbot trained on language models released by OpenAI, and (1.3) ChatGPT as a content creation tool which can generate human-like text. These results are aligned with prior discussions and news about the development of the AI chatbot [3], ChatGPT's possible impact on HE [5, 9], and the ability of ChatGPT to create text-based input requested by users and simulate human-like conversations with users [4, 5]. By using the CADA approach to uncover the themes, our research findings contribute to the literature on ChatGPT in HE and add weight to the current discussions.

Some example sentences exhibiting the three sub-themes are indicated below with the keywords italicized:

1.1 *AI* has also quietly been taking an increasing role in *Higher Education*.
1.2 In the words of ChatGPT, ChatGPT is a large *language model* developed by *OpenAI*.
1.3 It is trained on a massive amount of *text* data and is designed to *generate human*-like *text*.

The second salient theme revolved around the use of ChatGPT in teaching and learning. Four sub-themes were subsumed under this theme: (2.1) how students can use ChatGPT to write and support their learning in a course, (2.2) how educators/instructors can use ChatGPT to guide teaching and learning, (2.3) the use and impact of ChatGPT in assessment design and practice, particularly assignments and exams, and (2.4) using ChatGPT to teach writing skills and develop critical research and thinking skills.

See the following example sentences showing the sub-themes with the keywords in italics:

Table 1 Subcategories and Descriptive labels of emotions in USAS annotation

Subcategories	Descriptive labels	
E1. Emotional actions, states and processes general	E1 + Emotional E1-Unemotional	
E2. Liking	E2 + Like E2-Dislike	
E3. Calm/violent/angry	E3 + Calm E3-Violent/Angry	
E4. Happiness and contentment	E4.1 Happy/sad	E4.1 + Happy E4.1- Sad
	E4.2 Contentment	E4.2 + Content E4.2-Discontent
E5. Bravery and fear	E5 + Bravery E5-Fear/shock	
E6. Worry and confidence	E6 + Confident E6-Worry	

Table 2 Key themes, sub-themes, and related keywords identified

Key Themes	Sub-themes emerging from the context of keyword retrieved	Keyword	Rank	Frequency	Log Likelihood (LL)	LogRatio
1. ChatGPT as an AI text and content generator	1.1 The emergence of AI as a new technology that will impact the future of HE	AI	2	601	6031.90	8.91
		Artificial_intelligence	12	246	959.00	11.53
		technology	10	464	1213.72	4.38
		technologies	45	142	374.17	4.42
		future	107	160	177.22	2.16
		higher education	33	128	411.85	5.78
		education	86	196	212.03	2.12
	1.2 ChatGPT is a generative AI chatbot trained on language models released by OpenAI	generative	13	228	888.83	11.42
		generate	23	185	575.57	5.48
		generated	79	88	220.93	4.19
		AI-generated	89	54	212.03	2.12
		language	25	300	518.82	2.99
		models	29	197	475.25	4.02
		model	93	156	201.26	2.40
		openAI	42	97	378.14	10.19
		chatbot	28	122	475.6	10.52
		chatbots	66	68	265.09	9.68
	1.3 ChatGPT is a content creation tool that can generate human-like text	tools	11	607	2037.78	6.25
		generate	13	185	575.57	5.48
		produce	96	116	200.30	2.99
		human	95	209	200.41	1.96
		text	14	292	851.82	5.00
		content	20	224	593. 211.7024	4.44
		create	87	127	2037.78	2.91

Table 2 (continued)

Key Themes	Sub-themes emerging from the context of keyword retrieved	Keyword	Rank	Frequency	Log Likelihood (LL)	LogRatio
2. Use of ChatGPT in teaching and learning	2.1 How students can use ChatGPT/AI digital tools to write and support their learning in a course	students	3	1423	3986.68	4.75
		student	21	258	588.56	3.81
		use	6	830	1533.53	3.16
		course	44	193	375.77	3.30
		write	35	191	399.02	3.51
		learning	8	525	1304.23	4.14
		digital	98	77	199.39	4.33
	2.2 How educators/instructors can use ChatGPT to guide teaching and learning	educators	52	115	309.68	4.53
		professor	46	160	364.66	3.80
		professors	49	102	347.81	6.46
		instructors	26	147	501.71	6.47
		teaching	16	301	809.21	4.52
		learning	8	525	1304.23	4.14
		guidance	97	78	200.15	4.29
	2.3 The use and impact of ChatGPT in assessment design and practice, particularly assignments and exams	assessment	22	232	583.59	4.20
		assessments	34	128	403.44	5.59
		assignments	15	233	822.02	7.00
		assignment	68	94	251.78	4.50
		exams	88	60	210.70	6.91
	2.4 Using ChatGPT to teach writing skills, and develop critical research and thinking skills	students	3	1423,	3986.68	4.75
		student	21	258	588.56	3.81
		writing	9	526	1304.23	4.14
		critical	130	105	144.16	2.51
		thinking	99	159	195.35	2.32
		research	81	218	216.72	2.01
		skills	47	164	363.00	3.70

Table 2 (continued)

Key Themes	Sub-themes emerging from the context of keyword retrieved	Keyword	Rank	Frequency	Log Likelihood (LL)	LogRatio
3. Potential implications and opportunities of using ChatGPT in HE landscapes	3.1 Transforming or disrupting work and industries	potential	64	170	275.08	2.84
		work		402	310.10	1.70
	3.2 As an educational tool, ChatGPT may help with materials and assessment development	opportunities	111	94	169.84	3.10
		educational	170	69	108.00	2.77
		tools	11	607	2037.78	6.25
		assessment	22	232	583.59	4.20
		assessments	34	128	403.44	5.59
	3.3 Misuse of ChatGPT may cause potential threat to academic integrity like academic dishonesty, misconduct, cheating, plagiarism	academic	5	513	1691.46	6.04
		integrity	18	227	742.93	5.96
		ethical	73	92	234.29	4.26
		misconduct	92	66	205.02	5.46
		cheating	36	112	396.84	7.08
		dishonesty	71	64	239.47	8.59
		plagiarism	41	97	378.14	10.19
		limitations	75	91	223.57	4.10

2.1 ChatGPT and other generative AI technologies can help *students* learn things that aren't always easy to teach. There are many ways to *write* a book summary, and it's sometimes hard to help *students* see they have a range of choices and perspectives.
2.2 Some *educators* may want to make explicit use of AI (e.g. asking students to analyse and critique the content it generates), while others may specify that AI should not be used, or only used in specific ways, and that is appropriate.
2.3 In such cases, consider designing *assignments* that ask students to engage with AI tools and AI-generated materials.
2.4 What these tools can provide, however, is an opportunity to build *critical* analysis and evaluation *skills*—perhaps by studying and critiquing what they produce, and making judgements about whether what they produce is actually valid and believable.

While there are discussions that assessments should focus more on critical thinking skills so that students are unable to rely on ChatGPT for generating answers [36], our study uncovered the sub-theme that top-ranked universities had concrete guidelines on using ChatGPT to develop students' capacity to think critically and conduct research, which is not consistent with the existing literature. This indicates that ChatGPT is being leveraged by these universities to train students' critical thinking and research skills. Additionally, the sub-theme of using ChatGPT in assessment design departs from prior findings [4, 10], which indicate that educators need to outsmart ChatGPT by modifying assessments that are not likely to generate answers using ChatGPT prompts. Other findings are aligned with previous studies suggesting that ChatGPT can support students by offering personalized feedback on writing and explaining complex concepts, while for educators, it can provide various resources for students [10, 13].

The third theme revolving around the potential implications and opportunities of using ChatGPT in HE comprised three sub-themes: (3.1) how ChatGPT has transformed or disrupted work and industries, (3.2) how ChatGPT may help with materials and assessment development as a new educational tool, and (3.3) the potential threat to academic integrity like academic dishonesty, misconduct, cheating, plagiarism caused by the misuse of ChatGPT.

See the following example sentences exhibiting the sub-themes with the keywords in italics:

3.1 In contrast if we take this opportunity to reflect on what we might use this technology for as scholars and why, this could herald an exciting shift in how we *work* which reduces the time spent on routine tasks and contributes to a more creatively fulfilling life of the mind.
3.2 These models could be a useful tool for educators, in terms of structuring teaching or learning design, incorporating it into more interactive and engaging learning materials, providing more personalised instruction and immediate feedback. These *tools* could even be used to help mark assignments and exams, providing more 'accurate' and consistent evaluations, reducing subjectivity across markers (and hence have the potential to reduce complaints about 'generous' or 'harsh' markers).
3.3 There's definitely an issue with regulation and we have to be respectful of the need for universities and schools to protect *academic* and educational *integri*ty. That's why some universities have taken the view that if students use ChatGPT to generate content, it's *misconduct*.

Discussion relating to how ChatGPT may displace jobs exists [9], particularly during the early phase when ChatGPT was released, so our uncovering of this sub-theme confirms this. However, ChatGPT's potential value for assessment development has not been highlighted since prior research mainly called for redesigning assessments in ways that ChatGPT will find it difficult to generate answers and students will be discouraged from using it [5, 10]. Therefore, our study contributes to the literature by highlighting the potential value of ChatGPT for assessment development. As revealed from the findings, there was widespread panic about academic integrity issues arising from ChatGPT when it was released [6, 7, 19]. This is because it can draft grammatically accurate essays and generate text on different topics, and some students might use the generated text and submit it as their assignments, thus sparking concerns about plagiarism, dishonesty, and cheating [37, 38].

4.2 Analysis of ChatGPT through emotion keywords

Regarding RQ2 which examined the emotion keywords exhibited in the study corpus, we identified two subcategories of emotions that yielded significant LL values, namely E2 + Like and E6- Worry. The frequency, LL. % of difference and typical tokens are displayed in Table 3. The first responses of top-ranked U.S. and U.K. universities from November 2022 to early May 2023 were mainly negative possibly due to the panic created by ChatGPT. A predominance of negative emotions

was evoked by evaluations of the ChatGPT issue. In the following, some typical tokens from the two significant emotion subcategories are elaborated, and examples are drawn from the study corpus to reveal the evaluations of ChatGPT by faculty from top universities in the U.K. and U.S.

4.2.1 The emotion token of *bias*

In the positive emotion keyword list, the number of occurrences of bias(s/ed) accounted for 83 (bias: n = 39, 47%; biases: n = 26, 31%; biased: n = 18, 22%) which largely outweighed the others based on their frequency and LL. These occurrences mainly focused on the content bias produced by ChatGPT in four aspects: the cause of the bias, the consequences of biased content created, measures to reduce bias, and correct usage of ChatGPT. As indicated from the concordance lines, biases in ChatGPT could be associated with gender, race, minority group, culture, language, and ideology (n = 11, 13.3%). Since GenAI programs are trained on large language models and databases from the Internet and other sources, they may inherit biases from the training database and human analysts, particularly when the data collected is highly skewed (n = 41, 49.4%). As a result, the content synthesized from all sources and created by ChatGPT might be prone to bias as it does not check its source for bias nor factuality, while it may not even notice that biased answers were produced. See the extracted example below:

> *"Owing to the way the tool operates, it sometimes generates untruths and presents them as facts. This is a particular risk for anyone without sufficient knowledge to identify these untruths e.g. students. Due to bias in its training and the way it was trained, ChatGPT does not always provide ethical, unbiased answers and can provide answers which perpetuate bias and discrimination, e.g. cultural, racial, gender." (University A)*

Although gender, race, and cultural biases were often discussed in the concordance lines, 9 (10.8%) occurrences indicated linguistic bias. Linguistic bias embedded in English language is also ingrained in ChatGPT which leads one to overcomplicate things by adding for improvement instead of subtraction. Researchers from University B warned that: *"The positive addition bias in the English language is something we should all be aware of. It can influence our decisions and mean we are pre-disposed to add more layers, more levels, more things when in fact we might actually benefit from removing or simplifying." (University B*).

The perpetuated biases in the generated output could adversely affect the learning process and objectives, and attitudes of students (n = 1, 1.2%). Despite the major shortcomings discussed, most faculty was positive about the use of ChatGPT as it is the *"quantum leap in writing technology" (University C)*.

4.2.2 The emotion token of concern and worry

Regarding evaluations relating to the subcategory of Worry, a high frequency of use (n = 172) was exhibited in the emotion word of *concern(s/ed)* and *worry(ied/ ies*). Concerns (n = 103, 59.9%), concern (n = 48, 27.9%) and concerned (n = 21, 12.2%) in the emotion sub-category largely outweighed the remaining emotion tokens. Of the 172 occurrences of concern (s/ed), 48 (27.9%) indicated that faculty was concerned about academic integrity, honesty, ethics and misconduct, especially how students may be tempted to commit cheating or plagiarism, or produce unauthentic work. See the extract below:

> *"The immediate concern (dating back to the release of GPT-2 in 2019) is the use of this technology for cheating. And in fact, we are hearing those concerns from colleagues as well as people outside academia." (University D)*

Another major concern pertained to ChatGPT itself (n = 34, 19.8%). Faculty was concerned about the accuracy of ChatGPT's response, particularly when fake, deceptive, plausible or biased content was generated based on skewed and

Table 3 Key tokens from the emotion subcategories with significant LL in study corpus

Rank	Sub-category	Study corpus Freq	%	Reference corpus Freq	%	LL	% DIFF	Key Tokens
1	E2 + Like	95	0.06	152	0.02	87.90	276.44	*Bias (39), biases (26), biased (18)*
2	E6-Worry	275	0.17	1119	0.12	31.30	48.02	*concerns (103), concern (48), concerned (21), worried (15), worry (10), worries (6), anxiety (13)*

biased training data used. The possible spread of misinformation via GenAI also worried faculty. Some universities' faculty expressed concerns about the transparency and robustness of the AI training method, control of AI, and the increasing dominance of AI corporations.

"the most controversial developments identified by UK experts concern the underlying technical architecture of contemporary AI and how it is currently controlled by a limited number of powerful tech companies. The experts said that people should be most concerned about lack of public knowledge and oversight around the origins of the data AI is trained on; for example, where the data comes from and whether consent has been obtained to use that data." (University E)

Some universities' faculty were concerned about students' misuse of GenAI as a shortcut in their learning (n = 17, 9.9%) in that students may rely on such tools to write their essays and produce passable and mediocre work.

"I'm not opposed to it in general. The reason I wanted to start working on it right away was because I was concerned about students using it as a shortcut, rather than as a tool to their learning." (University F)

Other concerns comprised job displacement and ethical issues related to labor practices, privacy, and intellectual property violations (n = 8, 5%). See the examples below:

"show "Westworld" to tools like the AI writing assistant Grammarly. But ChatGPT is on a different scale, spurring concerns about white-collar job displacement, the ethics of certain applications, disinformation and more." (University G)
"The use of AI in academia raises ethical concerns around labor practices, privacy, and intellectual property violations, and there is inconsistent guidance on how to properly cite and acknowledge AI in academic work, highlighting the need for transparency and more discussion as the technology evolves." (University H)

Unlike the emotion word of *concern(s/ed)* which was mainly related to academic integrity, accuracy, and safety of the AI tools and job displacement, worry (ied/ies) were mostly related to how GenAI should be used in HE. Most occurrences of worry (ied/ies) were related to how GenAI should be used in a safe, effective and appropriate manner. Faculty worried about how GenAI was used in assessed work such as essay writing in humanities or college admissions (n = 5, 16.1%). Five occurrences (16.1%) focused on the issue of academic integrity/honesty as faculty worried that the emergence of ChatGPT may tempt students to commit academic misconduct and lead to plagiarism. See the extracted example below:

… "to answer follow-up questions and provide personalised information to its users. However, Universities have been worried that this may tempt students to commit academic misconduct and lead them to plagiarisation in their work." (University I)

Some faculty (n = 3, 9.7%) worried that the emphasis placed on guiding, policing and monitoring student work for possible ChatGPT use may damage the learning environment and undermine the teacher-student relationship, as evidenced in the extract below:

"Despite the enthusiasm some will no doubt feel for ChatGPT, a large number of teachers feel a potential loss of engagement, purpose, and identity as they learn about the power of ChatGPT," said Jim Burke, an educator and author of several books on teaching writing who attended the webinar and shared his thoughts afterward... Along with these problems, teachers worry that such applications as ChatGPT will fundamentally change the nature of their relationship with their discipline and students, forcing them (as many already feel the need to do now) to worry more about catching than teaching kids," Burke added." (University C)

A few occurrences were related to the worry of people losing their thinking skills (n = 1, 3.2%) and human gullibility towards biased answers generated in a neat manner (n = 1, 3.2%). Others (n = 2, 6.4%) worried about the possible job disruption brought by GenAI for traditional white-collar professions.

4.2.3 The emotions of threat, fear, and trust

Apart from the emotion subcategories which yielded significant difference from the reference corpus, some emotion keywords with high frequency of use like *threat(s)* (frequency: 32; relative frequency: 0.01) from the subcategory of E3- Violent/ Angry, *fear(s)* (frequency: 28; relative frequency: 0.01) from the subcategory of E5- Fear/shock, and *trust* (frequency: 14; relative frequency: 0.01) from the subcategory of E6 + Confident were also worth noting.

4.2.4 The emotion token of threat

Out of the 32 occurrences of threat(s), 17 (53.1%) highlighted the threat of GenAI including the threat to academic integrity (n = 7, 21.8%), teaching and learning such as writing instruction and assessment design (n = 5, 15.6%), knowledge workers and job disruption (n = 2, 6.3%), global health management (n = 1, 3.1%), human intelligence (n = 1, 3.1%), and cybersecurity (n = 1, 3.1%). It is not surprising to observe that many faculty expressed concerns about academic integrity issues arising from ChatGPT:

"What are some potential threats that ChatGPT or other generative language models can pose to assessment practices in higher education ? One of them would be causing academic integrity issues including plagiarism and cheating in and outside the classroom." (University J)

Yet there were also voices that provided a more balanced view on the use of ChatGPT (n = 12, 37.5%). Some faculty suggested that ChatGPT brought both opportunities and threats (n = 6, 18.8%) and a few even advised against viewing ChatGPT as a threat (n = 4, 12.5%). There were faculty who urged others in HE to rethink and reflect on how ChatGPT could be integrated or used in HE teaching and learning (n = 2, 6.3%). See the extracts below:

"Obviously, these kinds of situations represent a challenge for universities and business schools; but instead of taking ChatGPT as a threat, educators and their institutions should nevertheless analyze its advantages and use them in favor of the student to achieve their educational objectives." (University K)
"This quotes several French lecturers excited by the opportunities presented by this new tool rather than focusing solely on the potential threat to academic integrity." (University D)

4.2.5 The emotion token of fear

28 occurrences of fear centered on two themes: (1) the use of ChatGPT leading to academic misconduct and intrusion on teaching and learning (n = 13, 46.4%), and (2) fear of ChatGPT in replacing humans (n = 8, 28.6%). For the former, 8 (28.6%) occurrences were directly related to the fear of students using ChatGPT to behave dishonestly like using ChatGPT to write their assignments, or cheating or plagiarizing. Universities' faculty feared that ChatGPT may impair students' critical thinking skills. The examples below reveal such fears:

"Some highlight the possible opportunities such software could offer staff, for instance in writing lesson plans or policy documents. However, when it comes to students, the conversation is dominated by fears that it will be used to 'cheat' on assignments, leading some to take extreme measures." (University L)

Eight (28.6%) occurrences of fear suggested that over-reliance on technology may lead to the replacement of humans by AI, resulting in job displacement and disruption in the long-term. See the extract below:

"One of the biggest concerns about AI in higher education is the potential for job displacement. As AI becomes increasingly sophisticated, there is a growing fear that many jobs will be automated, leaving people without work." (University M)

4.2.6 The emotion token of trust

It is interesting to note that 8 out of 14 (57%) occurrences of "trust" were related to faculty-student trust. Faculty worried that doubts raised about the authenticity and originality of students' work may harm faculty-student trust (see the extracts below). This could be aggravated by teachers who focus too much on the authenticity of students' work rather than teaching effectiveness.

"This issue not only affects the quality of student writing, but can undermine the faculty-student trust on whether a student is producing original work or not. Taken a step farther, this can even shake the confidence in the quality of higher learning in general." (University N)
"…Trust is essential for collective growth, vulnerability and compassion; traits essential for human development. Without foundational trust, it can create a tone where instructors become suspicious of the authenticity and origi-

nality of a students work instead of focusing on effectively teaching their course. What's more, even developers of ChatGPT readily mention its limitations, which is clearly stated on its website." (University N)

Concerns also revolved around the misuse of GenAI in information environments that may push people towards an increasingly homogenous community (n = 2, 14%). Other concerns included over-trusting GenAI and over-depending on technology (n = 1, 1%), with the possibility of job disruption (n = 1, 1%), and the need for AI developers to earn trust from system users, governments and the public (n = 1, 1%).

… *"human judgement, critical thinking, and the ability to question or challenge the status quo. "By placing too much trust in AI and blockchain we risk creating a society that's overly dependent on technology, susceptible to manipulation, and disengaged from ethical considerations." (University E)*

5 Discussion and pedagogical implications

This article investigated the salient themes exhibited in the discourse on the websites of world-leading U.S. and U.K. universities which indicated these universities' first responses to GenAI, specifically ChatGPT, in the early phase when it was released, and how this ChatGPT issue evoked a variety of emotions from faculty. The motivation for this study stemmed from the lack of a synthesis of views expressed by top-ranked universities on ChatGPT to offer evidence-based practice and some pedagogical implications to educators and practitioners in HE globally. The predominant identified themes were: (1) the emergence, design and function of the new digital AI chatbot in HE: ChatGPT as an AI text and content generator, (2). use of ChatGPT in teaching and learning, and (3) potential implications and opportunities of using ChatGPT in HE. While some themes uncovered resonate with discussions in prior studies [5, 10], previous studies on ChatGPT followed opinion-based discussions, involved a qualitative study or conducted a literature review e.g. [4, 22, 23] without offering a rigorous research design to identify the key themes embedded in ChatGPT discourse. By utilizing the CADA approach, our findings affirm the important themes, contributing to the literature on ChatGPT in HE. Notably, our results highlight that ChatGPT can be leveraged as a tool to develop students' critical thinking and research skills and for assessment design, which diverges from existing studies that advocate modifying assessments so that students will be deterred from using ChatGPT [5, 10, 23]. This was seen in the discourse of universities even in the early phase of the release of ChatGPT, suggesting that ChatGPT was embraced despite generating negative emotions. However, the findings should be interpreted with caution as they only apply to the sample of universities that we studied in the U.K. and U.S.

Despite most themes illustrating the potential benefits of GenAI for teaching and learning, a greater prevalence of negative emotions was evidenced in these universities' first responses to ChatGPT. This might be attributed to faculty still grappling with the challenges and risks posed by ChatGPT when it was released in 2022 until May 2023. Specifically, responses to ChatGPT evoked many negative emotions such as bias, concern, worry, threat, fear, and trust, and our study offered an in-depth understanding of these emotions. Biases linked to ChatGPT focused on content bias comprising gender, race, culture and language, adversely affecting students' learning. Several measures were suggested to tackle the biased information from the corpus. One way involves training GenAI programs with unbiased data. Other measures comprise: (1) developing students' AI literacy by discussing with students how the tools are made and work, their strengths and limitations, and advising students to check the accuracy of the information presented and interpret it carefully; and (2) making AI models' information such as model cards, model evaluations, risks, limitations, and biases more accessible and transparent.

Negative evaluations of ChatGPT by faculty triggered concerns and fear about students' submitted assessments/essays and academic dishonesty, as well as the accuracy of ChatGPT responses which may impair students' writing, critical thinking, and creativity. This resonates with the literature that GenAI may affect students' critical thinking [7, 8], thereby posing a threat to HE; yet our study found empirical support for this from leading universities' faculty. Concerns and fear about job displacement were observed while other concerns consisted of ethical issues related to labor practices and intellectual property violations. Another noteworthy finding is that worries and feelings related to trust were evoked since faculty had concerns that an over-emphasis on academic integrity issues such as cheating and plagiarism may negatively affect the teacher-student trust relationship. These issues have rarely been discussed in prior literature, so our findings enrich our understanding of universities' first responses to ChatGPT in HE.

Compared with a predominance of positive sentiments in the public discourse on ChatGPT on Twitter in Tlili et al.'s [27] study, where users felt that GenAI can revolutionize the way people learn, our study revealed mostly negative emotions. This may be attributed to university website discourse which is more concerned with preparing students for the

future workplace, where they are expected to possess a range of skills such as critical thinking, less biased thinking and integrity, so faculty and policymakers might be concerned that GenAI may undermine students' development in these areas. Other concerns and fear were related to the impact on society, specifically relating to white-collar job displacement brought by the ability of GenAI to perform many tasks for educators in HE, and intellectual property violation, which could compromise academic research. The former might indicate a sense of insecurity among HE faculty in keeping up with the pace of technological advances in GenAI and the latter is a prevalent concern about GenAI in relation to how the inputted data is used.

Although this study investigated the ChatGPT discourse of leading universities in the U.K. and U.S. from late November 2022 to early May 2023 when the release of ChatGPT in general generated panic and brought disruption in academia, some pedagogical implications emerging from this study can still inform current practice. Considering that many negative emotions triggered by evaluations of ChatGPT were associated with concern, worry, threat, fear, and trust among faculty involving the misuse of ChatGPT in learning, and students' academic integrity issues, it is recommended that students be equipped with AI literacy [2]. This consists of: (1) technological skills in using GenAI effectively and appropriately with integrity alongside impressing upon students the need for checking the accuracy of generated information, (2) pedagogical skills in using GenAI for feedback and self-directed learning, and most importantly, (3). critical social awareness involving an understanding of how GenAI tools such as ChatGPT are made and how they work, their strengths, limitations, biases, privacy, and ethical issues. Likewise, faculty needs to possess AI literacy. To allay faculty's worries, fear, and concerns about students' academic integrity and to foster trust between faculty and students in the learning environment, HE institutions should formulate clear policies and guidelines on using GenAI in assessments [23], how GenAI sources used should be properly cited by students, while keeping up with the pace of GenAI developments to minimize the fear of staff being displaced. Most importantly, it is vital for AI corporations to train GenAI programs with unbiased data relating to culture, gender, race, and other aspects so that there is less content bias in GenAI, as well as providing more transparency and accountability of GenAI training methods to the public.

Indeed, GenAI offers vast potential and opportunities to facilitate students' learning in HE. For example, in relation to writing, GenAI can help students brainstorm ideas, offer personalized feedback, present ideas in a coherent way before students further develop more robust arguments [2, 8]. Faculty need to remind students that GenAI should be used as a tool to develop their writing skills rather than a replacement of their own writing. The focus by faculty can then be placed more on developing students' critical thinking and research skills by teaching them to check the accuracy of generated information, identify if there is any biased content, and raise their awareness of how GenAI is trained. For faculty, design of course materials and even assessments can be done, important knowledge can be summarized, and automatic feedback can be given on students' essays [8]. As for the future, assessment design will require more critical thinking, creativity and research skills, alongside authentic and personalized assessments.

6 Limitations, further research and conclusion

Despite offering evidence-informed findings to contribute to the literature on ChatGPT's themes discussed by world-leading universities in the U.K. and U.S., a limitation of this study is that only universities' official views were studied, mainly focusing on faculty voices. Universities in other countries such as Asian ones were not examined. Future studies can examine students' discourse on GenAI in HE in different cultural contexts to provide more insights by considering different voices. Data were collected from the launch of ChatGPT in 2022 until early May 2023, and would warrant further studies at other times given that new advances in ChatGPT are made very quickly. More research attention should be accorded to GenAI's impact on job displacement in HE. Even with these limitations, the implications are valuable for other HE contexts to leverage GenAI for teaching and learning, assessment design, and equipping students with AI literacy, as well as the need for AI corporations to train GenAI programs with unbiased data on culture, gender, race, and other areas so that there is less content bias in GenAI. The insights potentially inform policy and practice in HE with respect to teaching and learning, assessment design, academic integrity, and ethical use of GenAI.

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