Effective Generative AI Implementation in Developing Country Universities

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Abstract— **This paper explores the integration of Generative Artificial Intelligence (Gen AI) into the teaching-learning-assessment processes within Higher Education Institutions (HEIs), particularly those located in developing countries. Through a mixed-methods approach, utilizing both qualitative insights from ChatGPT 4.0-generated 'Personas' representing international experts and quantitative analysis, this study evaluates the potential risks and delineates strategic pathways for the responsible implementation of Gen AI under limited financial and technological resources. The 'Personas' provided evaluations on a Likert scale, assessing risks, required actions, and resources necessary for Gen AI integration, which were then analyzed through descriptive statistics and visualized for interpretation. The findings highlight the most significant challenges as legal and ethical issues, technological dependence, and student development, echoing concerns noted in existing literature. To mitigate these risks, the study suggests a series of sequential strategies including promoting balanced technology use, investing in mental health initiatives, developing skills for educators, supporting AI literacy, creating culturally responsive AI content, and developing inclusive technology policies. Moreover, creating AI tools to enhance teaching and investing in equitable technological infrastructure are identified as resource-intensive actions, with a special emphasis on the prioritization of human resource investment as a starting point for HEIs with financial constraints. It is crucial to note the limitations of this work, given that the expert 'Personas' are bound by the training data and capabilities of the Large Language Model used. Therefore, the careful evaluation of the advice provided to ensure alignment with each institution's mission and philosophy is mandatory. Despite these limitations, the study offers valuable insights and a call-to-action for HEIs to lead the charge in integrating Gen AI across society.**

Keywords—Educational Equity, AI Ethics, Academic Integrity, Workforce Disruption, Technological Literacy, Educational Innovation, Higher Education

I. Introduction

Since the release of ChatGPT in November 2022, Generative Artificial Intelligence (Gen AI) has changed the way we live [1], as it has changed the way we teach and the way we learn [2].

Higher education institutions (HEIs) must carefully analyze the consequences of implementing Gen AI and design proper policies and actions promptly [2], [3]. HEIs can implement Gen AI in the administrative process, knowledge creation (research and development) and in the teaching-learning-assessment process. In any case, there are potential gains, losses, benefits, and risks, even ethical issues.

Through a qualitative-quantitative methodology in collaboration with ChatGPT 4.0, this work aims to answer the following question:

'What strategies should HEIs in developing countries adopt to implement Gen AI in the teaching-learning-assessment process, thereby minimizing potential risks and adhering to limited budgets?'

II. Theoretical Framework

Within the teaching-learning-assessment process, several beneficial applications of Gen AI in HEI have been explored and reported in the literature: Personalized and adaptive learning; automated assessment and feedback; language learning and translation; Human-AI collaboration; higher accessibility at lower cost; enhanced creativity and efficiency; and didactic material and content design [4],[5], [6].

Educators have sought for several of these benefits for a long time; however, at this point some drawbacks have also been identified, hindering Gen AI implementation inside the classroom. Among them are: lack of teacher-student and student-student interaction [7]; limited understanding and contextual awareness; bias in training data, shaping culture and ignoring diversity [7]; hindering of learning and skill development; Ethical and academic concerns, including integrity issues [6]; privacy and security of the data [7]; widening of the digital divide, perpetrating global inequality [4], [8]; AI sustainability due to high-energy consumption [9]; future implications of AI in higher education; and impact on employment [5].

These potential risks might be drastically augmented within developing countries [10], where HEIs have limited resources to perform their job of delivering education and leading changes in the society [11]. For those reasons a careful analysis on how to implement Gen AI in tertiary education is urgent and mandatory.

III. Methodology

In this study, a mixed-methods (qualitative data from ChatGPT 'Personas' and quantitative) approach was employed to analyze the integration of Gen AI in HEIs, specifically under limitations of Developing Countries.

Fig. 1 represents the methodology used in this research. Using ChatGPT 4.0, we developed detailed 'Personas' representing experts in higher education and AI fields from international global entities, i.e., UNESCO, World Bank, OpenAI, Dicastery for Promoting Integral Human Development (Vatican City State), and OECD. These 'Personas' underwent training and validation to provide reliability of the data. Human-Gen AI determined the risks and actions towards their solutions.

The 'Personas' assessed potential risks, required actions, and resources needed for Gen AI implementation, using a Likert scale ranging from 0 (none) to +4 (Completely). These assessments were verified thrice, and their consistency

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Fig. 1. Mix-methodology performed through human-ChatGPT 4.0 collaboration. We developed five 'Personas' representing experts in higher education and AI fields from international global entities, i.e. UNESCO, World Bank, OpenAI, Dicastery for Promoting Integral Human Development, and OECD.

remained within a ±1 difference. The responses were analyzed through descriptive statistics (median, normalization, co-occurrence) using an Excel worksheet. Finally, they were qualitatively visualized to interpret and discuss the most efficient pathways for the integration of Gen AI in the teaching-learning-evaluation process in developing-countries' HEIs.

Academic publications have already reported the adoption of ChatGPT at different stages of research including idea generation, summarizing literature, and manuscript preparation [12]. However, to the author's knowledge, current work represents the first attempt using the prompt 'Personas', to gather a qualitative perspective. In this sense, the concluding recommendations must be taken with caution and under a critical perspective. Before being implemented, HEI decision-makers ensure that they align with the institution's mission and philosophy.

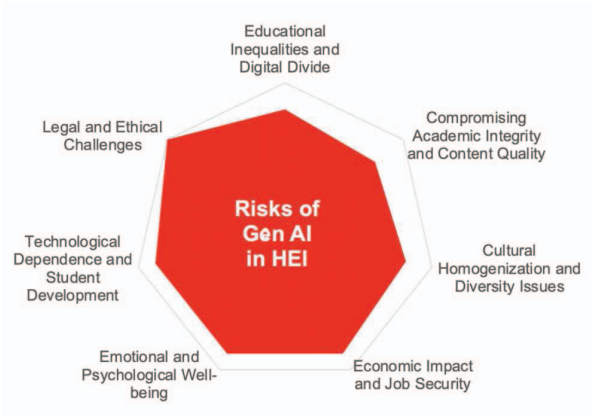

Fig. 1. The risks of implementing the use of Generative AI (Gen AI) in teaching-learning-assessment process according to higher education and AI-field experts 'Personas' from international global entities, i.e. UNESCO, World Bank, OpenAI, Dicastery for Promoting Integral Human Development, and OECD.

IV. Results and Discussion

The riskiest challenge in the implementation of Gen AI in the teaching-learning-assessment is related to Legal and Ethical Issues, followed by Technological Dependence and Student Development, in agreement with published literature [3]. Figure 2 shows the risks and their relative potential danger as evaluated by the HE-AI-expert 'Personas'.

HEIs may adopt two primary actions to mitigate most of the risks associated with implementation of Gen AI: supporting AI literacy and ethical education and promoting balanced technology use. Fig. 3 represents the graph of actions (green nodes) that within higher education institutions (HEIs) can implement and their impact (edges) on the potential risks (red nodes) associated to the implementation of Generative AI (Gen AI) in the teaching-learning-assessment process, as evaluated from five expert 'Personas'.

Creating AI tools that augment teaching and investing in infrastructure for equitable technological access are the actions that demand most of resources from HEIs, while investing in mental health initiatives demand the least of resources. Fig. 4 shows a heat map of the qualitative HEI resources required to implement Gen AI according to the evaluation from five 'Personas'. The actions are listed in increasing order of the product of financial and technological resources required, which would impact the budget of the HEIs.

Considering the limited financial and technological resources of HEIs in developing countries, to maximize the effectiveness in mitigating risks, they need to start investing in their human resources, then in the full incorporation

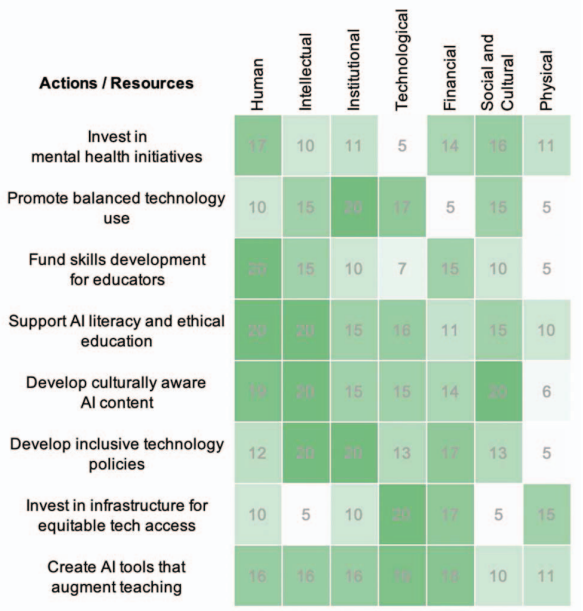

Fig. 3. Resources required to implement Generative AI (Gen AI) in the teaching-learning-assessment process within higher education as qualitatively evaluated from five 'Personas', representing experts from UNESCO, World Bank, Open AI, Dicastery for Promoting Integral Human Development, and OECD in a Likert scale from 0 (no resource is required) to +20 (a significant amount of resources is required). The most intense green tone indicates the greatest number of resources required.

of Gen AI into the teaching-learning-evaluation process to finally ensure the technology infrastructure for equitable access. Fig. 5 depicts HEI actions according to the resources they required and the risks they avoid when implementing Generative AI (Gen AI) in the teaching-learning-assessing process as evaluated from five HEI-and-AI-expert 'Personas'. The bubble size is directly proportional to the qualitative riskiness they overcome and inversely proportional to the qualitative required resources.

V. Conclusions

Beyond a call-to-action for Higher education Institutions (HEIs) to lead the incorporation of Generative AI (Gen AI) in every sector of society, this research suggests them feasible strategies and routes towards this evolutive change.

The analysis recommends that HEIs, particularly in developing countries, adopt the following sequential strategies to responsibly incorporate Gen AI into the teaching-learning-assessment process, even with financial constraints:

1) *Promote balanced technology use*
2) *Invest in mental health initiatives*
3) *Fund skills development for educators*
4) *Support AI literacy and ethical education*
5) *Develop culturally aware AI content*
6) *Develop inclusive technology policies*
7) *Create AI tools that augment teaching*
8) *Invest in infrastructure for equitable tech access*

It is fundamental to bear in mind that this qualitative-quantitative analysis was performed emulating experts in HEI and AI. They were created by ChatGPT 4.0 'Personas', therefore are limited to the training data and capabilities of this Large Language Model. Consequently, the advice should be scrutinized to make sure they fulfill their purpose while adhering to the mission and philosophy of the respective institutions.

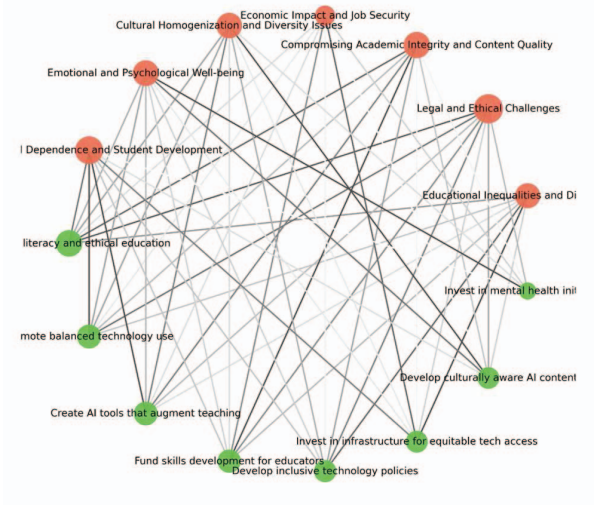

Fig. 4. Actions (green nodes) that within higher education institutions (HEIs) can implement and their impact (edges) on the potential risks (red nodes) associated to the implementation of Generative AI (Gen AI) in the teaching-learning-assessment process, as evaluated from five expert 'Personas' from UNESCO, World Bank, OpenAI, Dicastery for Promoting Integral Human Development, and OECD.

Beyond its limitations and the future work needed to validate these perspectives, current Generative AI-aided work provided valuable advice for HEI to complete their utmost mission of being a driving force towards improvement and social benefit in the era of Artificial Intelligence.

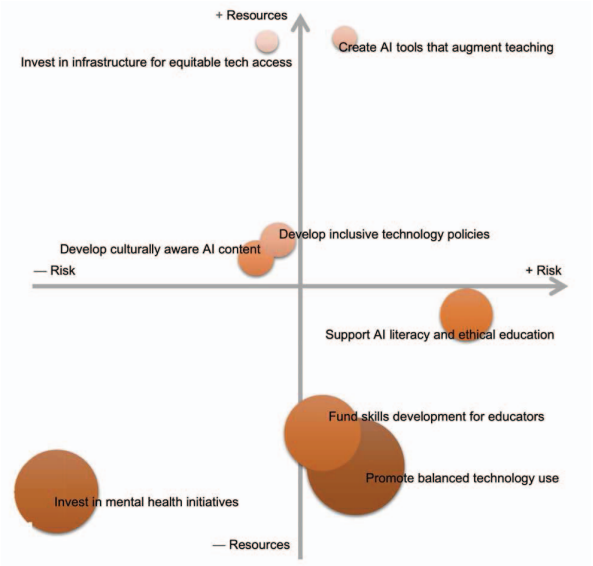

Fig. 5. Higher-education-institution (HEI) acctions, the resources they required and the risks they avoid when implementing Generative AI (Gen AI) in the teaching-learning-assessing process as evaluated from five HEI-and-AI-expert 'Personas'. The bubble size is directly proportional to the riskiness they overcome and inversly proportional to the required resources.

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