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Manuscript Title: Users' Intention to Use Learning Analytics for Academic Advising in Malaysian Higher Education

Authors' Response to the Journal Editor and Reviewers

The authors are very grateful to the Journal Editor's efforts in essentially discussing the manuscript reviews with the reviewers and identifying further significant points for enhancements. The authors would also like to sincerely thank the reviewers for their valuable remarks and careful feedback which helped them to significantly enhance this work and its presentation. The productive and valuable remarks enabled us to update various parts of the manuscript as shown by the responses to each comment below. Further updated parts are shown in red color in the revised manuscript.

Authors' Response to Reviewer #1:

Reviewer's comments

1. Introduction is not justified enough and the research gap is not clearly identified. The authors need to depend on more recent references, especially those related to Learning Analytics.

Authors' response

We would like to thank the reviewer for the time and effort spent reading our manuscript and suggesting valuable comments to improve its quality. We have revised the Introduction section and incorporated the following lines to address your comment. Updated parts have been highlighted in red:

Applications of LADs in Educational Settings

“Learning Analytics Dashboards” (LADs) have evolved alongside the progression of educational technology and the increasing availability of educational data. Although the origins of learning analytics can be traced back to the early 2000s, advancements in data analytics, visualization techniques, and digital learning platforms have significantly influenced the development and utilization of LADs in higher education [20].

Learning analytics employ data science methodologies to analyze data and present the data analysis results using various textual and visual approaches [21]. Within the realm of LA, dashboards have garnered considerable attention as tools that can furnish users with pertinent insights, prompt user reflection, and potentially guide interventions aimed at optimizing learning and enhancing the quality of student experience [22]. Schwendimann et al. define LADs as “a single display that aggregates different indicators about learner(s),

learning process(es), and/or learning context(s) into one or multiple visualizations” [23] (p. 8).

These dashboards aggregate and synthesize diverse educational data, offering in-sights into student performance, engagement, behavior, and learning patterns [24]. LADs are designed to assist educators, administrators, and students in making informed decisions, optimizing teaching and learning strategies, and improving overall educational outcomes [25].

LADs provide a real-time view of individual and group academic performance [26]. Consequently, educators can monitor student progress, identify areas for improvement, and tailor instructional strategies accordingly. LADs analyze student data to craft personalized learning pathways based on individual weaknesses, strengths, and learning styles [27]. This facilitates a customized learning experience, enhancing student engagement and comprehension [28].

LADs can detect early signs of academic struggles or disengagement, enabling timely intervention and support for at-risk students [29]. This proactive approach can boost student retention rates [29]. Educators can utilize LADs to evaluate the effectiveness of courses and curricula [22]. Insights from the dashboards can guide adjustments to course content, assessments, and instructional strategies for better learning outcomes.

LADs can employ predictive models to forecast student success, aiding institutions in identifying students who may require additional support [30]. They evaluate student engagement and motivation levels using data on participation, interactions, and feedback [31]. This information empowers educators to implement strategies that enhance engagement and motivation [32]. Institutions can optimize resource allocation, including faculty time and support services, based on LAD insights [33]. This data-driven approach facilitates efficient planning and allocation of educational resources [23].

In summary, LDAs play a crucial role in modern higher education by leveraging the potential of data and analytics to improve teaching, enhance learning experiences, and drive student success [34]. They offer a multifaceted view of educational data, enabling stakeholders to make data-informed decisions and nurture a more effective and efficient educational ecosystem [32]. Integrating learning analytics into academic advising not only enhances the advising process but also contributes to student success and retention [29]. By harnessing the power of data analytics, academic advisors can provide timely, personalized guidance, ultimately supporting self-regulated learning [28].

Reviewer’s comments

2. Literature Review: The review of theoretical and practical gaps is very weak. The literature does not support research variables well. I would encourage authors to perform a good literature review to highlight the main contributions. Moreover, the researchers did not explain well the literature gap. Please simply explain what the literature gap you cover in this article. Please also add some recent articles regarding your variables.

Authors’ response

We have revised the Literature Review section and enhanced the section with additional references. We have also revised the Introduction and Literature Review section to highlight the main contributions.

3. Research Model: the study used UTAUT, but it did not clearly justify that (Why and How). Moreover, the study used two constructs from D&M IS success model (i.e., information quality (IQ), and system quality (SQ)), and personal innovativeness (PI) construct, but it did not indicate or justify that. To provide such a model, authors must clearly identify the justification for such integration, how they apply these variables together in one model, what are the theories covered it?

Authors' response

We have segmented the Theoretical Background section into two subsections. In the first section, we elucidated the research framework, while in the second section, we offered the rationale and context for the proposed hypotheses.

4. Hypotheses Development: The development of research hypotheses is weak somehow. Recent studies (2021-2023) are very limited, while Recent studies (from 2023) are absent. This section needs heavily to be supported by related recent studies. Notably, the hypotheses developed are too generic. They cannot explain how these relationships are supported in the case of Learning Analytics within Higher Education.

Authors' response

We have revised the Hypotheses Development section and provided more support from the literature.

5. Methodology: Authors have indicated academic staff (lecturers or tutors) and students as the respondents across the study survey (two deferent perspectives), Please explain and justify within the methodology section. Additionally, the data was collected from questionnaires and researchers does not explain "Common Method Bias". Kindly add this section.

Authors' response

We conducted a Harmon one-factor test and documented the results.

6. Discussion Section: Lack Discussion of the results (should be before implications subsections), kindly consider that the results discussion without comparing that with prior research is not acceptable. Explain clearly what the result of the research is and how it differs from previous research.

Authors' response

We have revised the Discussion section, accordingly.

7. Contributions: Kindly create new section (Research Contributions) and explain under it Managerial and theoretical contributions as a subsection.

Authors' response

We have revised the discussion section and separated managerial and theoretical contributions.

8. Research limitations and future recommendations are weak and need to be fundamentally reconsidered. The limitations and the suggestions of future research in the area need to be more addressed in new section (create new section related to it). The presentation of limitations and future work could be detailed and expanded.

Authors' response

We have revised the Concluding Remarks section to address this comment.

Authors' Response to Reviewer #2:

Reviewer's comments

9. Abstract: While your abstract adequately covers most essential elements, I recommend making the following additions: a) Briefly present the research design and sampling method. b) Specify the percentage of female and male participants. c) Provide a concise overview of the implementation procedures.

Authors' response

We would like to thank the reviewer for the time and effort spent reading our manuscript and suggesting valuable comments to improve its quality. We have incorporated the following lines to address your comment. Updated parts have been highlighted in red:

Abstract

Learning analytics (LA) is a rapidly growing educational technology with the potential to enhance teaching methods and boost student learning and achievement. Despite its potential, the adoption of LA remains limited within the education ecosystem, and users who do employ LA often struggle to engage with it effectively. As a result, this study has developed and validated a model for users' intention to utilize LA dashboards. The model incorporates constructs from the "Unified Theory of Acceptance and Use of Technology," supplemented by elements of personal innovativeness, service quality, and information quality. **The study utilized an exploratory research methodology and employed purposive sampling. Participants with prior experience in LA technologies were selected to take part in the study. Data were collected from 209 academic staff and university students in Malaysia (59.33% male) from four top Malaysian universities using various social networking platforms.** The research employed "Partial Least Squares Structural Equation Modeling" to examine the relationships among the constructs in the model. The findings revealed that information quality, social influence, performance expectancy, and system

quality all positively impacted the intention to use LA. Additionally, personal innovativeness exhibited both direct and indirect positive effects on the intention to use LA, mediated by performance expectancy. This study has the potential to offer valuable insights to educational institutions, policymakers, and service providers, assisting in the enhancement of LA adoption and usage. **This study's contributions extend beyond the present research and have the potential to positively impact the field of educational technology, paving the way for improved educational practices and outcomes through the thoughtful integration of LA tools. The incorporation of sustainability principles in the development and deployment of LA tools can significantly heighten their effectiveness, drive user adoption, and ultimately nurture sustainable educational practices and outcomes.**

10. Introduction: The introduction section requires substantial improvement in the following aspects: a) Restructure the paragraphs to enhance coherence and engagement. Paragraphs 1 and 2 primarily offer descriptive content, while paragraph 3 lacks direct articulation of the research problem. To address this, consider reorganizing these paragraphs to emphasize the development of the research area, existing research gaps, and unexplored areas. Explain how your study intends to address these gaps and underscore the urgency of your research. Employ comparative analysis of previous studies, highlighting the significance of your work. Avoid relying solely on descriptive content, and instead, compare and contradict the findings of previous studies to construct a strong foundation for your study. b) Summarize the hypotheses briefly to establish connections between the introduction and literature review (maybe towards the end of the introduction). c) Include a concise discussion on the intentions of users regarding the utilization of learning analytics dashboards for academic advising. Begin by delineating various applications of learning analytics dashboards in higher education before delving into their specific relevance to academic advising.

Authors' response

We have incorporated the following lines to address your comment. Updated parts have been highlighted in red:

Introduction

...

The early promise of LA to enhance learning and its settings has not been fully realized. There is currently little evidence demonstrating how LA services affect outcomes of student learning, processes of instruction and learning, as well as institutional decision-making [6]. Although numerous methods and tools for LA have been presented, there is little empirical evidence of the factors impacting this new technology's potential adoption [5]. To handle the difficulties of LA adoption, previous researchers have developed numerous instruments and frameworks to guide the implementation of LA tools in Australia, Europe, and North America [2]. Although those studies have enabled academics to pinpoint crucial factors that generally impact the LA services' acceptance, there are still several complicated silos, competing leadership agendas, and institution-specific problems [7]. There have been few efforts to develop theoretical models and test the variables

determining intention to utilize LA technologies. Considering these research gaps, this research aimed to develop a predictive model to assess users' intention to use LA tools in higher education institutions. UTAUT was selected as a theoretical foundation and extended with "service quality" (SQ), "personal innovativeness" (PI), and "information quality" (IQ) constructs that were recommended to be prominent in technology acceptance in educational settings. The study postulated that integrating these additional variables, alongside the UTAUT construct, would positively impact the intention to use LA among academic staff and university students from four leading Malaysian universities.

11. Literature Review: The literature review section necessitates significant revisions. The title focuses on the use of learning analytics dashboards for academic advising, yet this topic is scarcely addressed. To rectify this, consider the following: a) Create two distinct sub-sections. The first should provide an encompassing overview of learning analytics dashboards, encompassing their historical context, definition, and various applications within higher education. The second sub-section should delve into the specific application of learning analytics dashboards for academic advising, drawing insights from prior studies in this domain. Then, provide the details. This would include writing new reviews in line with those sub-sections.

Authors' response

We have created two subsections under the Literature Review section, the first subsection encompasses definitions and various applications within higher education. The second subsection delves into the specific application of learning analytics dashboards for academic advising.

12. Method Section: The method section necessitates significant restructuring: a) Establish a new sub-section titled 'Research Design' and comprehensively explain the chosen research design. b) Introduce a sub-section named 'Research Context and Participant' to elaborate on the research context, participants, and the applied sampling method. c) Create a sub-section labeled 'Research Instruments' to provide a detailed account of the research instruments employed. d) Designate a sub-section named 'Data Collection and Analysis' to elucidate the respective processes.

Authors' response

We have created new subsections under the Method section to address this comment.

Authors' Response to Reviewer #3:

Reviewer's comment

Overall, this article is well written, with academic soundness. It is an interesting contribution to the adoption of Learning Analytics in Education. Perhaps making the case

of LA in Sustainable Education a little clearer might make the article fit better. A line in the abstract and the introduction and conclusions might be sufficient. The term 'sustainability' is not mentioned even once

Authors' response

We would like to thank the reviewer for the time and effort spent reading our manuscript and suggesting positive comments. We have incorporated the following lines to address your comment. Updated parts have been highlighted in red:

Theoretical Contributions

...

Moreover, this research lays the foundation for future studies, serving as a starting point for developing a comprehensive theory for the use of LA tools. The identified significant variables and their interactions can be further explored and refined in subsequent research, advancing our understanding of the complex dynamics predicting the adoption and effective utilization of LA in educational environments.

The contributions discussed in the study have notable implications for sustainability within educational technology. A central strategy highlighted is the integration of automation in the design of "Learning Analytics" (LA) tools. By automating analytical procedures and minimizing human intervention, this approach can potentially optimize resource utilization and operational efficiency, thereby reducing the environmental impact. Additionally, prioritizing user-friendliness, reliability, and responsiveness in LA tool design aligns with sustainable principles, ensuring long-term viability and scalability. Adapting LA tools to specific contexts, particularly in developing nations, is vital for their continued relevance and utilization, embodying a commitment to educational sustainability. Furthermore, a strong focus on data accuracy and quality within LA tools supports well-informed and sustainable decision-making in educational institutions. In summary, integrating sustainability principles in developing and implementing LA tools can significantly enhance their effectiveness, drive user adoption, and ultimately foster sustainable educational practices and outcomes.

...

Authors' Response to Reviewer #4:

Reviewer's comment

1. First and foremost, the content of the abstract needs to be logically organized. At this time, it does not allow the average reader to understand how the purpose of the study fits the methodology adopted by the authors. I would advise the authors to organize the abstract

by considering the following conceptual categories: purpose of the study, rationale, method, results, and implications and/or applications of the results of the study. I would also encourage the authors to consider that the abstract is written to capture the attention of a broad audience of readers. Thus, clarity and simplicity are a must.

Authors' response

We would like to thank the reviewer for the time and effort spent reading our manuscript and suggesting valuable comments to improve its quality. We have incorporated the following lines to address your comment. Updated parts have been highlighted in red:

Abstract

Learning analytics (LA) is a rapidly growing educational technology with the potential to enhance teaching methods and boost student learning and achievement. Despite its potential, the adoption of LA remains limited within the education ecosystem, and users who do employ LA often struggle to engage with it effectively. As a result, this study has developed and validated a model for users' intention to utilize LA dashboards. The model incorporates constructs from the "Unified Theory of Acceptance and Use of Technology," supplemented by elements of personal innovativeness, service quality, and information quality. The study utilized an exploratory research methodology and employed purposive sampling. Participants with prior experience in LA technologies were selected to take part in the study. Data were collected from 209 academic staff and university students in Malaysia (59.33% male) from four top Malaysian universities using various social networking platforms. The research employed "Partial Least Squares Structural Equation Modeling" to examine the relationships among the constructs in the model. The findings revealed that information quality, social influence, performance expectancy, and system quality all positively impacted the intention to use LA. Additionally, personal innovativeness exhibited both direct and indirect positive effects on the intention to use LA, mediated by performance expectancy. This study has the potential to offer valuable insights to educational institutions, policymakers, and service providers, assisting in the enhancement of LA adoption and usage. This study's contributions extend beyond the present research and have the potential to positively impact the field of educational technology, paving the way for improved educational practices and outcomes through the thoughtful integration of LA tools. The incorporation of sustainability principles in the development and deployment of LA tools can significantly heighten their effectiveness, drive user adoption, and ultimately nurture sustainable educational practices and outcomes.

2. Second, the literature review needs to broadly offer a rationale for the study so that the motivation behind the study is self-evident. Namely, what have other researchers found that answers the research question? What have other researchers failed to address or consider?

Authors' response

Thank you for bringing this to our attention. We have created two subsections under the Literature Review section, the first subsection encompasses definitions and various

applications within higher education. The second subsection delves into the specific application of learning analytics dashboards for academic advising.

3. Third, as currently stated, the hypotheses are not easy to follow. The rationale of each hypothesis is also not very transparent. I would encourage the authors to review the empirical evidence supporting each hypothesis and present it concisely.

Authors' response

We have segregated the Conceptual Framework and Hypotheses Development sections accordingly. Furthermore, we reinforced each hypothesis by presenting additional research.

4. Fourth, in the method section, the following statement is questionable: "Thus, the sample size of 209 has exceeded the recommended 261 minimum sample size and is highly adequate to validate the developed model". The sample size may be adequate if it is considered as a whole. If demographic characteristics are considered, such as technical skills, or gender, predictions may be made for individual differences within the overall sample. Then, the samples may be less than ideal. Alternatively, what is the authors' rationale for ignoring demographic characteristics as potentially related to users' intentions?

Authors' response

Thank you for pointing this out. We revised the manuscript accordingly.

5. Fifth, in the method section, the response rate needs to be reported.

Authors' response

We have included the response rate and revised the Method section accordingly.

6. Sixth, a copy of the survey may need to be provided.

Authors' response

We have provided the survey items in the Appendix.

7. Seventh, the presentation of the results needs to be streamlined so that the reader can easily find whether each hypothesis is supported. The discussion section also needs to be clarified.

Authors' response

We would like to thank the reviewer for the time and effort spent reading our manuscript and suggesting valuable comments to improve its quality. We have revised the Discussion section accordingly.