Publishing Agreement

for Contributions in Edited Works

This Publishing Agreement (this "**Agreement**") has been approved by and entered into between:

Maria Pavlopoulou (Magnisias 4-6, Metamorfosi Attikis, 14451, Greece) and Stefanos Alifierakis (Mitsopoulou 25, Gyzi, 11474, Greece)

(the "**Author**")

whereas, in the event that the Author is more than one person, **Stefanos Alifierakis** serves as corresponding author
(the "**Corresponding Author**")

on the one part and

Springer Nature Singapore Pte Ltd.
152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

(the "**Publisher**")

on the other part;

together hereinafter referred to as the "**Parties**".

The Publisher intends to publish the Author's contribution in a collected work provisionally titled:

Proceedings of the Learning Innovations Summit 2024

Unveiling the Future of Learning and Artificial Intelligence

(the "**Work**")
edited by: **Charalambos Vrasidas, Eleni Mangina, Lucy Avraamidou, Xanthia Aristidou.**
(the "**Editor**")

The Publisher intends to publish the Work under the imprint Springer.

The Work may be published in the book series .

1. Contracting Authors

When the Author is more than one person then, unless otherwise indicated in this Agreement or agreed in writing by the Publisher:
(a) the expression "**Author**" as used in this Agreement will apply collectively for all such persons (each a "**co-author**");
(b) the Corresponding Author hereby warrants and represents that all co-authors of the contribution have expressly agreed that the Corresponding Author has full right, power and authority to sign this Agreement on their behalf, that the Corresponding Author is entitled to act on their behalf, and that

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they shall be bound by the Corresponding Author, with respect to all matters, responsibilities, notices and communications related to this Agreement; the Corresponding Author shall obtain authorisations and make them available to the Publisher on request; and
(c) each co-author is jointly and severally responsible for the Author's obligations under this Agreement which apply to each co-author individually and to the co-authors collectively and the Publisher shall not be bound by any separate agreement or legal relationship as between the co-authors.

2. Subject of the Agreement

2.1 The Author will prepare a contribution provisionally titled:
GenAI-Powered Digital Game-Based Learning and GlossapIAI: Revolutionizing Language Education
The expression **"Contribution"** as used in this Agreement means the contribution as identified above, and includes without limitation all related material delivered to the Publisher by or on behalf of the Author whatever its media and form (including text, graphical elements, tables, videos and/or links) in all versions and editions in whole or in part.

2.2 The Contribution may contain links (e.g. frames or in-line links) to media enhancements (e.g. additional documents, tables, diagrams, charts, graphics, illustrations, animations, pictures, videos and/or software) or to social or functional enhancements, complementing the Contribution, which are provided on the Author's own website or on a third party website or repository (e.g. maintained by an institution) subject always to the Author providing to the Editor, at the latest at the delivery date of the manuscript for the Contribution, an accurate description of each media enhancement and its respective website or repository, including its/their owner, nature and the URL. The Publisher is entitled to reject the inclusion of, or suspend, or delete links to all or any individual media enhancements.

2.3 In the event that an index is deemed necessary, the Author shall assist the Editor in its preparation (e.g. by suggesting index terms), if requested by the Editor.

3. Rights Granted

3.1 The Author hereby grants to the Publisher the perpetual, sole and exclusive, worldwide, transferable, sub-licensable and unlimited right to publish, produce, copy, distribute, communicate, display publicly, sell, rent and/or otherwise make available the Contribution in any language, in any versions or editions in any and all forms and/or media of expression (including without limitation in connection with any and all end-user devices), whether now known or developed in the future, in each case with the right to grant further time-limited or permanent rights. The above rights are granted in relation to the Contribution as a whole or any part and with or in relation to any other works.
Without limitation, the above grant includes: (a) the right to edit, alter, adapt, adjust and prepare derivative works; (b) all advertising and marketing rights including without limitation in relation to social media; (c) rights for any training, educational and/or instructional purposes; and (d) the right to add and/or remove links or combinations with other media/works.
The Author hereby grants to the Publisher the right to create, use and/or license and/or sub-license content data or metadata of any kind in relation to the Contribution or parts thereof (including abstracts and summaries) without restriction.
The Publisher also has the right to commission completion of the Contribution in accordance with the Clause "**Author's Responsibilities – Delivery and Acceptance of the Manuscript**" and of an updated version of the Contribution for new editions of the Work in accordance with the Clause "**New Editions**".

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3.2 The copyright in the Contribution shall be vested in the name of the **Author**. The Author has asserted their right(s) to be identified as the originator of the Contribution in all editions and versions, published in all forms and media. The Author agrees that all editing, alterations or amendments to the Contribution made by or on behalf of the Publisher or its licensees for the purpose of fulfilling this Agreement or as otherwise allowed by the above rights shall not require the approval of the Author and will not infringe the Author's "moral rights" (or any equivalent rights). This includes changes made in the course of dealing with retractions or other legal issues.

3.3 The Author grants to the Publisher the right to create and provide accessible formats of the Contribution for persons with enablement requirements (e.g. blind or dyslexic people), either directly or via third parties, in compliance with applicable laws and standards. The Author is encouraged to provide alt-text for images at the time of manuscript submission. If not provided by the Author, the Publisher reserves the right to create the alt-text, which can be reviewed by the Author at the proofreading stage. Both Parties acknowledge the complexities involved in creating accessible formats, including alt-text, and will work in good faith to resolve errors and inaccuracies that may be introduced through the process.

4. Self-Archiving and Reuse

4.1 The Publisher permits the Author to archive the Preprint and/or the Accepted Manuscript and to re-use the Version of Record in accordance with the Publisher's guidelines for archiving of the Contribution, which are set out and defined in the Appendix "**Author's Use of Manuscript Versions**". These guidelines may be updated by the Publisher at any time in its sole discretion. The Publisher shall notify the Author in the event of material changes by email or other written means.

4.2 The Author agrees and acknowledges that the Author must obtain the specific prior written permission of the Publisher (to be granted, withheld or conditioned at the Publisher's sole discretion) for any other use of any version of the Contribution in whole or in part.

5. The Publisher's Responsibilities

5.1 Subject always to the other provisions of this Clause below, the Publisher will undertake the production, publication and distribution of the Contribution and the Work in print and/or electronic form at its own expense and risk within a reasonable time after acceptance of the Work unless the Publisher is prevented from or delayed in doing so due to any circumstances beyond its reasonable control. The Publisher shall have the entire control of such production, publication and distribution determined in its sole discretion in relation to any and all editions and versions of the Contribution and the Work, including in respect of all the following matters:
(a) distribution channels, including determination of markets;
(b) determination of the range and functions of electronic formats and/or the number of print copies produced;
(c) publication and distribution of the Contribution, the Work, or parts thereof as individual content elements, in accordance with market demand or other factors;
(d) determination of layout and style as well as the standards for production;
(e) setting or altering the list price, and allowing for deviations from the list price (if permitted under applicable jurisdiction);
(f) promotion and marketing as the Publisher considers most appropriate.

5.2 All rights, title and interest, including all intellectual property or related rights in the typography, design and/or look-and-feel of the Contribution shall remain the exclusive property of and are reserved to the

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Publisher. All illustrations and any other material or tangible or intangible property prepared at the expense of the Publisher including any marketing materials remain, as between the Parties, the exclusive property of the Publisher. The provisions of this subclause shall continue to apply notwithstanding any termination of, and/or any reversion of rights in the Contribution to the Author, under this Agreement.

5.3 Without prejudice to the Publisher's termination and other rights hereunder including under the Clause **"The Author's Responsibilities"**, it is agreed and acknowledged by the Parties that nothing in this Agreement shall constitute an undertaking on the part of the Publisher to publish the Contribution unless and until: (i) any and all issues in relation to the Work (including all necessary revisions, consents and permissions) raised by the Publisher have been resolved to the Publisher's satisfaction, and (ii) the Publisher has given written notice of acceptance in writing of the final manuscript of the entire Work to the Editor. If following (i) and (ii) above the Publisher has not published the Contribution in any form within a reasonable period and the Author has given written notice to the Publisher requiring it to publish within a further reasonable period and the Publisher has failed to publish in any form, then the Author may terminate this Agreement by one month's written notice to the Publisher and all rights granted by the Author to the Publisher under this Agreement shall revert to the Author (subject to the provisions regarding any third party rights under any subsisting licence or sub-licence in accordance with the Clause **"Termination"**).
The Author may also give such written notice requiring publication on the same terms as above if the Publisher has published the Contribution but subsequently ceases publishing the Contribution in all forms so that it is no longer available.
This shall be the Author's sole right and remedy in relation to such non-publication and is subject always to the Author's continuing obligations hereunder including the Clause **"Warranty"**.

6. The Author's Responsibilities

6.1 *Delivery and Acceptance of the Manuscript*

6.1.1 The Author shall deliver the Contribution to the Editor (or, if requested by the Publisher, to the Publisher) on or before Delivery Date (the **"Delivery Date"**) electronically in the Publisher's standard requested format or in such other form as may be agreed in writing with the Publisher. The Author shall retain a duplicate copy of the Contribution. The Contribution shall be in a form acceptable to the Publisher (acting reasonably) and in line with the instructions contained in the Publisher's guidelines as provided to the Author by the Publisher. The Author shall provide at the same time, or earlier if the Publisher reasonably requests, any editorial, publicity or other information (and in such form or format) reasonably required by the Publisher. The Publisher may exercise such additional quality control of the manuscript as it may decide at its sole discretion including through the use of plagiarism checking systems and/or peer review by internal or external reviewers of its choice. If the Publisher decides at its sole discretion that the final manuscript does not conform in quality, content, structure, level or form to the stated requirements of the Publisher, the Publisher shall be entitled to terminate this Agreement in accordance with the provisions of this Clause.

6.1.2 The Author must inform the Publisher at the latest on the Delivery Date if the sequence of the naming of any co-authors entering into this Agreement shall be changed. If there are any changes in the authorship (e.g. a co-author joining or leaving), then the Publisher must be notified by the Author in writing immediately and the Parties will amend this Agreement accordingly. The Publisher shall have no obligation to consider publication under this Agreement in the absence of such agreed amendment.

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6.1.3 If the Author fails to deliver the Contribution in accordance with the provisions of this Clause above by the Delivery Date (or within any extension period given by the Publisher at its sole discretion) or if the Author (or any co-author) dies or becomes incapacitated or otherwise incapable of performing the Author's obligations under this Agreement, the Publisher shall be entitled to either:
(a) elect to continue to perform this Agreement in accordance with its terms and the Publisher may commission an appropriate and competent person (who, in the case of co-authors having entered into this Agreement, may be a co-author) to complete the Contribution; or
(b) terminate this Agreement with immediate effect by written notice to the Author or the Author's successors, in which case all rights granted by the Author to the Publisher under this Agreement shall revert to the Author/Author's successors (subject to the provisions of the Clause "**Termination**").

6.1.4 The Author agrees, at the request of the Publisher, to execute all documents and do all things reasonably required by the Publisher in order to confer to the Publisher all rights intended to be granted under this Agreement.

6.1.5 The Author warrants that the Contribution is original except for any excerpts from other works including pre-published illustrations, tables, animations, text quotations, photographs, diagrams, graphs or maps, and whether reproduced from print or electronic or other sources ("**Third Party Material**") and that any such Third Party Material is in the public domain (or otherwise unprotected by copyright/other rights) or has been included with written permission from or on behalf of the rightsholder (and if requested in a form prescribed or approved by the Publisher) at the Author's expense unless otherwise agreed in writing, or is otherwise used in accordance with applicable law. On request from the Publisher, the Author shall in writing indicate the precise sources of these excerpts and their location in the manuscript. The Author shall also retain the written permissions and make them available to the Publisher on request.

6.2 ***Approval for Publishing***

6.2.1 The Author shall proofread the page proofs for the Contribution provided by or on behalf of the Publisher, including checking the illustrations as well as any media, social or functional enhancements and give approval for publishing, if and when requested by the Publisher. The Author's approval for publishing is deemed to have been given if the Author does not respond within a reasonable period of time (as determined by the Publisher) after receiving the proofs nor contacts the Publisher within three days after receipt of the last of three reminders sent by the Publisher via email. The Publisher shall not be required to send a second set of corrected proofs unless specifically requested by the Author in writing but in any event no further amendments may be made or requested by the Author.
In the event of co-authors having entered into this Agreement the Publisher shall send the page proofs to the Corresponding Author only and all persons entering into this Agreement as Author agree that the Corresponding Author shall correct and approve the page proofs on their behalf.

6.2.2 If the Author makes changes other than correcting typographical errors, the Author shall bear all the Publisher's costs of such alterations to proofs including without limitation to alterations to pictorial illustrations. The Publisher shall have the right to charge and invoice these costs plus value added or similar taxes (if applicable) through its affiliated company Springer Nature Customer Service Center GmbH or Springer Nature Customer Service Center LLC, respectively, to the Author, payable within 14 days of receipt of the invoice.

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6.3 ***Cooperation***

Without prejudice to the warranties and representations given by the Author in this Agreement, the Author shall cooperate fully with the Editor and the Publisher in relation to any legal action that might arise from the publication or intended publication of the Contribution and the Author shall give the Publisher access at reasonable times to any relevant accounts, documents and records within the power or control of the Author.

7. Warranty

7.1 The Author warrants and represents that:
(a) the Author has full right, power and authority to enter into and perform its obligations under this Agreement; and
(b) the Author is the sole legal owner of (and/or has been fully authorised by any additional rights owner to grant) the rights licensed in the Clause "**Rights Granted**" and use of the Contribution shall in no way whatever infringe or violate any intellectual property or related rights (including any copyright, database right, moral right or trademark right) or any other right or interest of any third party subject only to the provisions in the Clause "**The Author's Responsibilities**" regarding Third Party Material (as defined above); and
(c) the Contribution shall not contain anything that may cause religious or racial hatred or encourage terrorism or unlawful acts or be defamatory (or contain malicious falsehoods), or be otherwise actionable, including, but not limited to, any action related to any injury resulting from the use of any practice or formula disclosed in the Contribution and all of the purported facts contained in the Contribution are according to the current body of research and understanding true and accurate; and
(d) there is no obligation of confidentiality owed in respect of any contents of the Contribution to any third party and the Contribution shall not contain anything which infringes or violates any trade secret, right of privacy or publicity or any other personal or human right or the processing or publication of which could breach applicable data protection law and that informed consent to publish has been obtained for all research or other featured participants; and
(e) the Contribution has not been previously licensed, published or exploited, nor has the Author committed to licensing any version of the Contribution under a licence inconsistent with the terms of this Agreement, and use of the Contribution shall not infringe or violate any contract, express or implied, to which the Author, or any co-author, who had entered into this Agreement,is a party and any academic institution, employer or other body in which work recorded in the Contribution was created or carried out has authorised and approved such work and its publication and all institutional, governmental, and/or other approvals which may be required in connection with the publication of the Contribution have been obtained and continue in effect.

7.2 The Author warrants and represents that the Author, and each co-author who has entered into this Agreement, shall at all times comply in full with:
(a) all applicable anti-bribery and corruption laws; and
(b) all applicable data protection and electronic privacy and marketing laws and regulations; and
(c) the Publisher's ethic rules as laid down in the Book Authors' Code of Conduct currently available online at https://www.springernature.com/gp/authors/book-authors-code-of-conduct, as may be updated by the Publisher from time to time (provided that in the event of material changes the Publisher shall notify the Author by email)
(the "**Applicable Laws**").
If the Author is in material breach of any of the Applicable Laws or otherwise in material breach of accepted ethical standards in research and scholarship, or becomes the subject of any comprehensive or selective sanctions issued in any applicable jurisdiction (e.g. being subject to the OFAC sanctions list)

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or if, in the opinion of the Publisher, at any time any act, allegation or conduct of or about the Author prejudices the production or successful exploitation of the Contribution and the Work or brings the name and/or reputation of the Publisher or the Work into disrepute, or is likely to do so, then the Publisher may terminate this Agreement in accordance with the Clause "Termination".

7.3 The Publisher reserves the right to amend and/or require the Author to amend the Contribution at any time to remove any actual or potential breach of the above warranties and representations or otherwise unlawful part(s) which the Publisher or its internal or external legal advisers identify at any time. Any such amendment or removal shall not affect the warranties and representations given by the Author in this Agreement.

8. Author's Discount Electronic Access

8.1 The Author, or each co-author, is entitled to purchase for their personal use the Work and other books published by the Publisher at a discount of 40% off the list price, for as long as there is a contractual arrangement between the Author and the Publisher and subject to any applicable book price law or regulation. The copies must be ordered from the affiliated entity of the Publisher (Springer Nature Customer Service Center GmbH or Springer Nature Customer Service Center LLC, respectively). Resale of such copies is not permitted.

8.2 The Publisher shall provide the electronic final published version of the Work to the Author, provided that the Author has included their e-mail address in the manuscript of the Contribution.

9. Consideration

9.1 The Parties agree that the Publisher's agreement to its contractual obligations in this Agreement in respect of its efforts in considering publishing and promoting the Contribution and the Work is good and valuable consideration for the rights granted and obligations undertaken by the Author under this Agreement, the receipt, validity and sufficiency of which is hereby acknowledged by the Author. The Parties expressly agree that no royalty, remuneration, licence fee, costs or other moneys whatsoever shall be payable to the Author.

9.2 The Publisher and the Author each have the right to authorise collective management organisations ("**CMOs**") of their choice to manage some of their rights. Reprographic and other collectively managed rights in the Contribution ("**Collective Rights**") have been or may be licensed on a non-exclusive basis by each of the Publisher and the Author to their respective CMOs to administer the Collective Rights under their reprographic and other collective licensing schemes ("**Collective Licences**"). Notwithstanding the other provisions of this Clause, the Publisher and the Author shall each receive and retain their share of revenue from use of the Contribution under Collective Licences from, and in accordance with, the distribution terms of their respective CMOs. To the fullest extent permitted by law, any such revenue is the sole property of the Publisher and the Author respectively and, if applicable, the registration and taxation of that revenue is the sole responsibility of the respective recipient party. The Publisher and the Author shall cooperate as necessary in the event of any change to the licensing arrangements set out in this Clause.

10. New Editions

10.1 The Publisher has the sole right to determine whether to publish any subsequent edition of the Work containing an updated version of the Contribution, but only after reasonable consultation with the Author. Once notified by the Publisher that an update of the Contribution is deemed necessary, the

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Author agrees to deliver an updated manuscript in accordance with the terms of the Clause "**The Author's Responsibilities**" and the other relevant provisions of this Agreement, together with the material for any new illustrations and any other supporting content including media enhancements, within a reasonable period of time (as determined by the Publisher) after such notification. Substantial changes in the nature or size of the Contribution require the written approval of the Publisher at its sole discretion. The terms of this Agreement shall apply to any new edition of the Work that is published under this "**New Editions**" Clause.

10.2 If the Author, for whatever reason, is unwilling, unable or fails (including as a result of death or incapacity) to submit an updated manuscript that meets the terms of this Agreement within the above stated period, then the Publisher is entitled to revise, update and publish the content of the existing edition or to designate one or more individuals (which, where co-authors have entered into this Agreement, may be one or more of the co-authors) to prepare this and any future editions provided that the new editions shall not contain anything that is a derogatory use of the Author's work that demonstrably damages the Author's academic reputation. In such case, the Author shall not participate in preparing any subsequent editions. The Author agrees that the Publisher shall be entitled but not obliged to continue to use the name of the Author on any new editions of the Work together with the names of the person or persons who contributed to the new editions. Should the Author or the Author's successors object to such continuing use then they must notify the Publisher in writing when first contacted by the Publisher in connection with any new edition.

11. Termination

11.1 In addition to the specific rights of termination set out in the Clause "**The Publisher's Responsibilities**" and the Clause "**The Author's Responsibilities**", either Party shall be entitled to terminate this Agreement forthwith by notice in writing to the other Party if the other Party commits a material breach of the terms of the Agreement which cannot be remedied or, if such breach can be remedied, fails to remedy such breach within 45 days of being given written notice to do so.

11.2 Termination of this Agreement, howsoever caused, shall not affect:
(a) any subsisting rights of any third party under any licence or sub-licence validly granted by the Publisher prior to termination and the Publisher shall be entitled to retain its share of any sum payable by any third party under any such licence or sub-licence;
(b) except where stated otherwise in this Agreement, any claim which either Party may have against the other for damages or otherwise in respect of any rights or liabilities arising prior to the date of termination;
(c) the Publisher's right to continue to sell any copies of the Work which are in its power, possession or control as at the date of expiry or termination of this Agreement for a period of six months on a non-exclusive basis.

12. General Provisions

12.1 This Agreement, and the documents referred to within it, constitute the entire agreement between the Parties with respect to the subject matter hereof and supersede any previous agreements, warranties, representations, undertakings or understandings. Each Party acknowledges that it is not relying on, and shall have no remedies in respect of, any undertakings, representations, warranties, promises or assurances that are not set forth in this Agreement. Nothing in this Agreement shall exclude any liability for or remedy in respect of fraud, including fraudulent misrepresentation. This Agreement may be modified or amended only by agreement of the Parties in writing. For the purposes of modifying or amending this Agreement, "in writing" requires either a written document signed by both the Parties or

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an electronic confirmation by both the Parties with DocuSign or a similar e-signature solution. Any notice of termination and/or reversion and, where applicable, any preceding notices (including any requesting remediable action under the Clause "**Termination**") must be provided in writing and delivered by post, courier or personal delivery addressed to the physical address of the relevant Party as set out at the beginning of this Agreement or any replacement address notified to the other Party for this purpose. All such notices shall become effective upon receipt by the other Party. Receipt is deemed to have taken place five working days after the respective notice was sent by post or left at the address by courier or personal delivery. If the Publisher is the terminating Party the notice need only be provided to the address of the Corresponding Author. If the Author is the terminating Party a copy of the notice must also be sent to the Publisher's Legal Department located at Heidelberger Platz 3, 14197 Berlin, Germany.

12.2 Nothing contained in this Agreement shall constitute or shall be construed as constituting a partnership, joint venture or contract of employment between the Publisher and the Author. No Party may assign this Agreement to third parties but the Publisher may assign this Agreement or the rights received hereunder to its affiliated companies. In this Agreement, any words following the terms "include", "including", "in particular", "for example", "e.g." or any similar expression shall be construed as illustrative and shall not limit the sense of the words preceding those terms.

12.3 If any difference shall arise between the Author and the Publisher concerning the meaning of this Agreement or the rights and liabilities of the Parties, the Parties shall engage in good faith discussions to attempt to seek a mutually satisfactory resolution of the dispute. This Agreement shall be governed by, and shall be construed in accordance with, the laws of Choose an item.. The courts of Choose an item. shall have the exclusive jurisdiction.

12.4 A person who is not a party to this Agreement (other than an affiliate of the Publisher) has no right to enforce any terms or conditions of this Agreement. The terms of this Agreement will supersede any other terms that the Author or any third party may assert are applicable to any version of the manuscript. This Agreement shall be binding upon and inure to the benefit of the successors and assigns of the Publisher. If one or more provisions of this Agreement are held to be unenforceable (in whole or in part) under applicable law, each such provision shall be deemed excluded from this Agreement and the balance of the Agreement shall remain valid and enforceable but shall be interpreted as if that provision were so excluded. If one or more provisions are so excluded under this Clause then the Parties shall negotiate in good faith to agree an enforceable replacement provision that, to the greatest extent possible under applicable law, achieves the Parties' original commercial intention.

The Corresponding Author signs this Agreement on behalf of any and all co-authors.

Signature of Corresponding Author:

Maria Parlopoulou

Stefanos Alifierakis

[Name of Author]

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Date:
11.03.2025

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Appendix "Author's Use of Manuscript Versions"

For purposes of this Agreement:

(a) references to the "**Contribution**" include all versions of the Contribution;

(b) the "**Preprint**" means the version of the Author's manuscript prior to acceptance for publication which has not undergone editorial and/or peer review on behalf of the Publisher (where applicable);

(c) the "**Accepted Manuscript**" ("**AM**") means the version of the Contribution after the contract is signed, publication is approved, and final editorial and peer review (where applicable) is complete. The AM is not the Version of Record and does not reflect post-acceptance and post-publication improvements on behalf of the Publisher, such as copyediting, typesetting, any amendments and corrections;

(d) the "Version of Record" ("**VOR**") means the final version of the manuscript as originally published in print and/or online by the Publisher, and may be subsequently amended following publication in a contractually compliant manner, by or on behalf of the Publisher. The VOR includes any editorial and Publisher improvements such as copyediting, typesetting, any amendments and corrections.

The Publisher acknowledges that the Author retains the following rights:

1. **Preprint:**

   The Author may archive and make available at any time the Preprint of the Contribution on either or both the Author's own personal, self-maintained website over which the Author has sole operational control (for personal and private reading purposes only) and/or on a legally compliant, non-commercial preprint server, such as but not limited to arXiv, bioRxiv and RePEc; provided always that once the VOR of the Contribution has been published by or on behalf of the Publisher, the Author shall immediately ensure that any Preprint made available above shall contain a link to the VOR and the following acknowledgement:

   "This is a preprint of the following chapter: [author of the chapter], [chapter title], published in [book title], edited by [editor of the book], [year of publication], [publisher (as it appears on the cover of the book)]. It is the version of the author's manuscript prior to acceptance for publication and has not undergone editorial and/or peer review on behalf of the Publisher (where applicable). The final authenticated version is available online at: http://dx.doi.org/[insert DOI]".

   No reuse rights apply. Under no circumstances may the Preprint be shared or distributed under a Creative Commons or other form of open access licence.

   Any linking, collection or aggregation of self-archived Contributions from the same Work is strictly prohibited.

2. **Accepted Manuscript:**

   The Author may archive the AM of the Contribution after the Embargo Period, on either or both the Author's own, personal, self-maintained website over which the Author has sole operational control and/or on the Author's employer's internal website or the Author's academic institution's or funder's repository.

   The "**Embargo Period**" is a period ending twelve (12) months from the first publication of the VOR of the Contribution by or on behalf of the Publisher.

   The Author must ensure that any part of the AM made available contains the following:

   "This is an Accepted Manuscript version of the following chapter: [author of the chapter], [chapter title], published in [book title], edited by [editor of the book], [year of publication], [publisher (as it appears on the cover of the book)]. This version of the manuscript has been accepted for publication, after final editorial and peer review (where applicable) is complete, but is not the Version of Record and does not reflect post-acceptance improvements (such as copyediting or typesetting), or any corrections. The final authenticated version is available online at: http://dx.doi.org/[insert DOI]. Use of this Accepted Manuscript version is subject to the publisher's Accepted Manuscript terms of use: https://www.springernature.com/gp/open-research/policies/accepted-manuscript-terms".

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Under no circumstances may an AM be shared or distributed under a Creative Commons or other form of open access licence.

Any linking, collection or aggregation of self-archived Contributions from the same Work is strictly prohibited.

3. **Version of Record:**

The Author may copy, distribute or otherwise reuse the VOR of the Contribution, without the requirement to seek specific prior written permission from the Publisher, subject to and in accordance with the following provisions:

a) any reuse of the VOR in a new book, book chapter, proceedings or journal article, whether published by the Publisher or by any third party, is limited to three figures (including tables) or a single text extract of less than 400 words; and

b) reuse of the VOR or any part of it is permitted in a thesis written by the same Author, and the Author is entitled to make a copy of the thesis containing content of the VOR available in a repository of the Author's awarding academic institution, or other repository required by the awarding institution; an acknowledgement should be included in the citation: "*Reproduced with permission from Springer Nature*"; and

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GenAI-Powered Digital Game-Based Learning and *GlossapIAI*: Revolutionizing Language Education

Abstract This research paper explores how GenAI can enrich Digital Game-Based Learning (DGBL) and enhance the learning experience for Language Education students of all educational levels (nursery, primary, and secondary). After approaching the interlacing terms around the use of play and technology in education, the academic and research gap of GenAI-assisted Digital Game-Based Language Learning (DGBLL) activities will be critically examined. GenAI could upgrade the field of DGBLL, since it can improve students' learning performance, and promote engaging, customized, and more enjoyable language learning experiences, while reforming the educators' role, methodology, and game design. However, such an important evolution requires mitigating significant potential challenges, which affect educators and learners and refer – among others – to ethical and functionality issues. Building on the theoretical exploration of GenAI's influence on DGBLL, this research presents a case study, the *GlossaplAI* platform, showcasing how an interactive digital library with GenAI-assisted DGBLL activities can promote language learning, while addressing key considerations. Inevitably, the discussion on the long-term implications of GenAI in Digital Game-Based Language Education is broad, so several strategies are proposed for ensuring the ethical integration of these technologies and maintaining language educators' and learners' critical engagement with them.

Keywords Digital Game-Based Language Learning, Generative Artificial Intelligence, Language Learning, *GlossaplAI*

1 Introduction

Re-imagining education is an important initiative that should be at the heart of our societies' endeavours. The COVID-19 pandemic and various other social challenges can potentially drive a shift in the design, goal-setting and orientation of our educational system, which has been proven incapable of addressing social changes (Zhao and Watterston, 2021). In light of this rare opportunity, as we

should all perceive it, play emerges as a possible solution to guide us through this new era of education. Recently, the rapid development of Generative Artificial Intelligence has started to revolutionize gaming and education, offering a valuable opportunity to explore their intersection in an important but often neglected field of education; language learning.

To establish a clear understanding and set the foundation of this study, it is important to define the key terms, starting with 'Generative AI' that denotes Artificial Intelligence tools, applications, or technologies that generate text, video, or audio content (Banh and Strobel, 2023). This content-creation capability is strongly connected to playful learning approaches, a learning 'philosophy' that underscores play's role in creating safe learning zones or 'magic circles' and encouraging curiosity, imagination, innovation and creativity (Whitton, 2018). Playful learning environments encourage learners to participate in game activities and interact with the educational content in a more enjoyable way, escaping, thus, from the boundaries of traditional education (Whitton and Moseley, 2012). Another important term is gamification, which refers to the implementation of game-design elements, like badges, points and leaderboards, into non-game contexts to boost learners' engagement, increase their motivation and ameliorate learning performance (Vrcelj et et al., 2023). On the contrary, in Game-Based learning, the core of the game, which constitutes the centre of the learning procedure, is infused with educational content. Hence, due to players' deep interaction with the material as they play, learning occurs naturally as an integral part of the gaming experience (Plass, Homer and Kinzer, 2015). On the other hand, digital games are defined as Game-based learning activities, which enhance participants' learning experience through their total immersion in video games (Figueroa-Flores, 2016). Although gamification and digital games present similarities and differences, both will be referred to in this paper as Digital Game-Based Learning (DGBL), which addresses all playful learning approaches leveraging digital technologies. A more specific term is Digital Game-Based Language Learning (DGBLL) that highlights those approaches' application to 'Language Learning', referring to the acquisition of language mechanisms and their proper integration in different language settings, that foster learners' ability to express themselves both in oral and written form at nursery, primary and secondary educational levels (Igiri et al., 2020).

With these terms defined, it is essential to examine relevant recent research, which acknowledges that the current important technological development of GenAI proves to be a major opportunity for the active application of digital playful learning concepts (Moon et al., 2024), which are believed to promote necessary 21st-century skills, such as critical thinking and problem-solving (Van Eck, 2015). More specifically, contrary to the popular discourse that language subjects are less suitable than STEM for the application of digital tools initiatives, past studies demonstrate that an immersive learning experience with the use of new technologies could help students in Language Subjects to engage with a practical scenario in the target language and, thus, enhance their vocabulary and spoken fluency (Guo and Gao, 2022). Since language proficiency is linked to the use of a range of learning strategies and methods according to previous research (Rahimi et at., 2008) and play is connected to experiential learning (Thomas and Seely

Brown, 2011), it is important that DGBL initiatives, enhanced and upgraded by GenAI, are applied to Language Subjects.

Despite the increased interest in GenAI, DGBL and language acquisition, their intersection remains underexplored. Existing research has only focused either on GenAI's impact on game-based learning (Moon et al., 2024) or the connection of playful approaches with language learning (Gee, 2003). The limited research work so far forms an academic gap which is further deepened by the official policies deficiency. In Greek nursery, primary and secondary education DGBLL's institutional introduction is still restricted. During the pandemic, the unprecedented circumstances of Emergency Remote Teaching (ERT) pushed educators and educational institutions to digital games that were considered useful supplementary learning tools (Krouska et al., 2021). Nevertheless, the noteworthy DGBL-relevant policies in the post-pandemic school years are still rare (like the 97171/Δ2/02-08-2022 policy) and insufficient in language education. In most cases, digital educational games are unofficially employed as a learning means in classrooms, but even more scarcely as assessment methods. In addition, many Greek educators are reluctant to leverage DGBLL and, especially, GenAI due to their lack of skills (digital illiteracy) or their belief that DGBLL could undermine the learning process (Kokolakis et. al., 2023), while they also forbid the use of GenAI in classrooms (Su and Yang, 2023).

This study attempts to address this double gap, by offering a theoretical research approach implementing a case study to highlight GenAI's role in Digital Game-Based Language Learning (DGBLL). The theoretical framework focuses on GenAI's potential pedagogical, learning and technological affordances in DGBLL, highlights the crucial challenges that might arise and suggests mitigation strategies. As the research topic is in a new knowledge-structuring phase, data for this study were collected through the critical examination of existing literature. To demonstrate the practical application of the theoretical insights, an online and functional platform, *GlossaplAI*, was created as a case study that showcases how GenAI-assisted activities can be developed for language education. No formal empirical testing was conducted on the platform. Instead, it provides proof of concept, showcasing the operationalization of theoretical principles in DGBLL environments. Thus, this part of the study falls under descriptive and exploratory case studies (Bryman et al., 2021) that offer insights without testing hypothetical scenarios through empirical trials. To achieve its objectives, this study is structured upon three research questions: (1) How could Generative AI enhance learning experiences, teaching practices, and game design in Digital Game-Based Language Learning?, (2) What are the key ethical, pedagogical, and technical challenges associated with integrating GenAI into DGBLL, and how can they be mitigated?, (3) How does the case study of the developed platform *GlossaplAI* demonstrate the potential integration of GenAI into DGBLL for language education, and how does it address potential challenges? By answering these questions, the study's findings will offer valuable insights to educators for the successful and ethical application of GenAI tools in DGBLL settings with the learners' active involvement. Moreover, this research could inform official policies on ethical and useful GenAI adoption by mitigating the challenges that it could bring to school settings.

To enable a comprehensive analysis, this paper presents a structured approach. After the statement of the research context, the terminology, the research gap, objectives and questions in the introduction, the theoretical findings on GenAI's benefits and challenges on DGBLL, along with the mitigation suggestions are critically examined. Afterwards, the case study of the *GlossaplAI* platform is analysed with a focus on its description and the application of most arguments previously stated in the theoretical framework. The long-term implications of GenAI's influence on DGBLL and policy recommendations are addressed in the discussion, while the conclusion outlines the key elements and suggests future research development.

2 Generative Artificial Intelligence's (GenAI) Impact on Digital Game-Based Language Learning (DGBLL)

2.1 Benefits

The constant development of DGBL approaches in light of the 21st-century technological evolution has attracted research interest in the last twenty years (Tay et al., 2022). As Generative Artificial Intelligence (GenAI) evolves, multiple potential benefits and challenges emerge for DGBLL's use and application. Starting from GenAI's positive impact on Digital Game-Based Language Learning, the arguments that will be presented, highlight the sides of DGBLL's ecosystem with the deepest influence. More precisely, after analyzing the enhancement of learners' experience and the upgrade of teaching and pedagogical strategies, GenAI's potential for DGBLL activities' development and design will be brought to the forefront.

2.1.1 Benefits for the Learning Experience

Leveraging GenAI technologies in DGBLL could benefit learners multimodally, keeping them motivated thanks to advanced GenAI-supported game mechanisms usage (Ragni et al., 2023; Moon et al., 2024). Learners' determination to DGBL activities derives from an intrinsic motive, which could form a constructive relationship between the learner and the language learning process (Habgood and Ainsworth, 2011). Thus, severe language learning challenges can be tackled, for instance, at times of important examinations. GenAI can be utilized to generate even more dynamic and engaging DGBLL content, by diversifying it and adapting it to each player's language proficiency and/or disabilities. Personalization and customization are equally significant potential benefits of GenAI's usage in Digi-

tal Game-Based Language Learning (French et al., 2023; Munir et al. 2022). Learners could receive tailored language content, like vocabulary scaffolding exercises, since GenAI enables the automatic creation of a variety of alternative game versions. This interactive experience is considered profoundly entertaining for learners, as it might nurture their desire for exploration, which is valuable for enjoying the often-so-called conventional language subjects and for delving into the educational content at the core of the DGBLL activity. The latter can be complemented with virtual tutors providing learners clarifications on grammatical structures, GenAI conversation practice and feedback adjusted to them and their skills, which is an important feature of serious games (Wouters et al. 2013). These GenAI virtual assistants may explain the game's functions and the language learning goals to be achieved, enabling learners to progress on their language learning path. Thus, students' trust and understanding of their interaction with GenAI is reinforced (Pothukuchi et al., 2023).

Following this, versatile and adaptable GenAI-facilitated DGBLL approaches will offer learners a sense of freedom and control over the game and their language learning track (Ragni et al., 2023). Contrary to inflexible language learning approaches, they can affect the game's outcome and leave their mark on it, by co-designing it and/or co-creating it (Gee, 2003), when engaging with GenAI in open-ended language training dialogues. Hence, students stay in their optimal learning zone, while interacting with a GenAI-facilitated DGBLL activity, and improve their learning outcomes (Connolly et al., 2012; Habgood and Ainsworth, 2011; Sung et al., 2018). Such immersive and interactive learning approaches can generally boost students' performances in vocabulary, grammar and syntax acquisition, considerably more than traditional practices. They are also valuable for students' self-assessment, enabling them to test their understanding of the concepts they have been taught (Gee, 2003) at different stages of their language-learning journey.

2.1.2 Benefits for Teaching and Pedagogical Strategies

The argumentation in favour of GenAI's implementation into DGBLL approaches also focuses on the improvement of pedagogical practices and the facilitation of language educators' work. The feedback provided by GenAI mechanisms benefits not only the learners, but also the educators, who better understand their students' involvement with DGBLL activities through accurate player data analysis, such as performance, difficult-to-detect linguistic mistakes, time needed, preferences and progress (Munir et al., 2022). With these data teachers and researchers can discern patterns in learners' behaviour and tactics (e.g. common grammatical misconceptions), detect struggling language learners and accordingly evaluate the effectiveness of their teaching methods (Su and Yang, 2023). Thus, learning theories and frameworks on language acquisition can be refined through the collection of large-classroom data and specific DGBLL elements' impact can be leveraged to inform pedagogical methods and boost students' learning outcomes (Su and Yang, 2023; Wu et al., 2012). For all the aforementioned reasons, GenAI-supported

DGBLL is a powerful tool in the teachers' hands to actively upgrade their means for teaching and assessment, i.e. through automating repetitive tasks. Hence, predefined learning goals will be better achieved (Motlagh et al., 2023) and focus will be placed on the deep understanding of linguistic phenomena. By embracing these approaches, educators can upgrade their pedagogical skill set and practically train themselves in the use of new technologies in the classroom (Ragni et al., 2023).

2.1.3 Benefits for Game Development and Design

Beyond its other beneficial aspects, GenAI-assisted DGBL approaches to language learning and assessment benefit game experience, in terms of its development and design. By opening the field of digital game creation to non-coders, language educators could become directly involved in the design and application of DGBLL activities. This more inclusive approach will enable teachers to personally upgrade their games through tailored linguistic tasks, since manual and laborious intervention will be diminished due to the automatic functional code snippets generated from natural language orders (Wang et al., 2023). Therefore, the efficiency of the DGBLL activity will be enhanced and improved through the real-time feedback from players' interaction with it (Pothukuchi et al., 2023), who will be supported in their language acquisition process. Moreover, through advanced mechanisms, a GenAI-assisted DGBL activity can predict and prevent the potential players' dropout, which could be a possible risk, especially for students with disability issues (Munir et al., 2022). Playtesting, mistake diagnosis and correction, such as the removal of bugs (Loizeau, 2024), cheat and hacking detection and game difficulty adjustment are significant affordances that GenAI offers to DGBL. Furthermore, Generative AI can enrich the grid narrative (French et al., 2023) and develop non-player characters (NPCs) with different realistic personalities, enabling conversational skills practice in a contextualized safe learning environment.

One of the key-features that distincts new GenAI-assisted DGBL activities from previous innovative approaches is their replayability thanks to its refined algorithms (French et al., 2023); thus, it enables learners to constantly upgrade their linguistic competencies. Overall, the high quality of Digital Game-Based Learning experiences could be achieved in less time and with reduced effort by language educators who are not always highly trained in the use of advanced technologies. Further, GenAI's capabilities enable DGBLL approaches to reach a global audience. The localisation of foreign games becomes an easy process, as Artificial Intelligence facilitates the translation of all in-game assets to different languages (Loizeau, 2024) and their adaptation to different linguistic and cultural contexts, which could be proven valuable for educators teaching more than one language subjects (e.g. modern and ancient Greek).

2.2 Considerations and Challenges

Nevertheless, in light of Generative AI's potential positive contribution to DGBLL approaches, there is a risk of neglecting the possible practical challenges that stem from such a radical technological development. The most serious challenges include legal and ethical issues, technical and operational limitations, pedagogical complexities and student-associated challenges. Their careful and critical examination is crucial, so that they are not overshadowed by the overhype about GenAI and DGBLL approaches.

2.2.1 Ethical and Legal Challenges

As Generative AI is actively integrated into Digital Game-Based Learning, a set of important ethical and legal considerations are brought to the forefront. Educators and learners/players might place undue trust in the accuracy and efficiency of GenAI (Ferrara, 2024). This will potentially reduce the educational quality and the linguistic accuracy of the DGBLL activity due to GenAI-provoked mistakes and errors caused by its poor and unequal training with different languages (Choudhury, 2023). Spreading biases, stereotypes (e.g. regarding language use, dialectic prestige), and misinformation that may become part of the game content is another crucial danger that will harmfully influence students, not only cognitively but also morally, since GenAI's output is based on random data selection that is not always critically evaluated for every language activity.

The ethical use of GenAI-assisted DGBLL also relies heavily upon player data security and respect for their privacy. Several risks are associated with the collection, storage and use of student data for language learning purposes, as sensitive learners' information might be shared (e.g. age, language proficiency, and/or needs). No one can ensure that data will be safely and appropriately used, and their recipient cannot always be defined (Moon et al., 2024). Sometimes students' interaction with GenAI through these DGBLL activities can function as a double-edged sword for learning; learners, often lacking the intrinsic motivation to acquire knowledge, might deviate from the posed educational goals of the DGBLL activity and use GenAI to cheat or hack it and bypass challenging language learning or assessment tasks. Lastly, legal issues associated with GDPR and the copyright of AI-generated content (Zhai et al., 2024) may arise, for example when a text of the DGBLL activity is created through a renowned literature work's editing by GenAI applications.

2.2.2 Technical and Operational Challenges

The function and the technical development of GenAI-assisted DGBLL may also present several complications. The development and maintenance of such inno-

vative technologically supported pedagogical approaches require high costs, which could be a serious problem for educational institutions with budget and resources constraints (Kaimara et al., 2021). However, even if adequate funding is offered, the active leverage of GenAI-facilitated DGBL activities in the classroom is often hindered by the lack of advanced skills that characterize the majority of language educators, whose subjects of expertise are not linked to technology. Consequently, they are unable to understand both AI technologies and the possible ways to integrate them into their teaching methods (Motlagh et al., 2023). Thus, language educators who often take on the role of game designers and/or developers fail to equally cater for the game's consistency and personalization of learners' experience. The balance between offering customizable and, thus, engaging learning tasks to each learner and maintaining the cohesion of the game's narrative and progress, to meet curriculum standards is indeed difficult, since failing in one of the two will render the DGBLL activity unsuccessful (Moon et al., 2024).

2.2.3 Pedagogical Challenges

Educators who lead GenAI-assisted DGBLL's introduction into schools should be prepared to tackle some equally important issues that could threaten their role and pedagogical strategies. The innovative DGBLL approaches result in a heavy workload for poorly trained and often AI-illiterate teachers who are already overwhelmed with a lot of language lesson planning and assessment work. The necessary devotion for the creation of GenAI-supported DGBLL activities derives from their need to equally balance the game's instructional and entertainment value as part of the official curriculum; namely, to keep the activity not only fun and engaging but also educational at the same time (Ke et al., 2016). Sometimes the gap between theory and praxis leads educators to deviation from their initial learning goals (Kapp, 2017). Thus, the game itself might become dominant upon the educational objectives it was meant to serve and the focus shifts from long-term educational outcomes to short-term engagement and fulfillment with GenAI-assisted DGBLL activities (Thomas and Uminsky, 2022). The latter are often presented to the students by their teachers without providing the necessary support or the context in which they belong. Hence, learners may struggle to understand the value of their interaction with them, position the knowledge acquired within broader linguistic and cultural frameworks and find their place in their language learning path (Moon et al. 2024).

2.2.4 Learner-Specific Challenges

Finally, but equally importantly, GenAI's leverage in Digital Game-Based Language Learning should focus on its potential negative impact on students. GenAI, when introduced into DGBLL, may substitute the learner and have a more dominant role than them in solving the questions and completing the activity's task. This may lead to learners' overreliance on GenAI (Zhai et al., 2024) and its text

translations, grammar corrections, and textual refinements, that can limit learners' active involvement with linguistic structures and reduce their ability to assimilate them. Consequently, learners might turn to passive consumers of the GenAI-assisted DGBLL activity that may hinder the development of productive language skills, like writing and speaking. As Zhou and Zhang (2024) support, players and users of GenAI systems often end up being addicted to them and embracing AI-spread misinformation, since their critical thinking and problem-solving skills are undermined. Consequently, autonomous judgment and independent thinking, both crucial in language learning, may be lost due to the excessive and imprudent leverage of GenAI output and frustration might be caused regarding the game mechanisms or the linguistic phenomenon involved in the activity.

2.3 Mitigation strategies for challenges in AI-driven DGBLL

Responding to these challenges requires the application of targeted mitigation strategies in DGBLL approaches, like robust regulatory frameworks and GenAI transparency mechanisms. Policymakers need to clarify in these frameworks how, when, and for how long GenAI can be used for Digital Game-Based Learning in School Language Education. Simultaneously, data protection policies for student data need to be introduced following GDPR (Zhai et al., 2024) and educators should be informed on these to ethically handle GenAI's affordances for DGBLL. GenAI literacy programs and workshops are essential for the holistic training of educators in GenAI-assisted DGBLL, so that they can later guide students in their usage. The educator's role is also crucial for critically examining GenAI's output in DGBLL activities, recognizing its misinformation and hallucinations, and ensuring that it only benefits the language learning acquisition process. To ensure this, teachers need to prioritise the educational objectives they want to achieve (Moon et al., 2024) and clarify them at the beginning of the language learning process. Thus, the choice of designing or applying a GenAI-powered DGBLL activity should always support and serve the objectives of language education. Overdependence on GenAI could then be avoided with the aid of students' and educators' collaboration in the co-creation of these activities and reflection upon the process. Of course, as the field of Generative Artificial Intelligence further develops, new features like GenAI difficulty-adjusting, anti-cheating and explainability mechanisms (generating translations or suggestions) will surely improve and upgrade DGBLL initiatives. However, their ethical and critical leverage in favor of Language Learning remains crucial and rests in the hands of educators and policymakers.

3 *GlossaplAI*: A GenAI-supported DGBL Platform for Language Learning

After the examination of the theoretical landscape regarding GenAI in Digital Game-Based Language Learning, focusing on its potential benefits, considerations and mitigation strategies, this section proposes a practical application. Nowadays, as language learning is more important than ever - for effective oral and written communication and the holistic academic development of all learners - more educational reform initiatives should aim at its upgrade. In light of today's technological advancement, various Digital Game-Based Learning approaches have been adopted worldwide (Li et al., 2024; Rasti-Behbahania and Shahbazib, 2022), many of which focused on vocabulary and grammar acquisition. Currently, GenAI, if cautiously and responsibly introduced into school education, is set to 'level up the game' of Digital Game-Based Language Learning, due to its various affordances, as examined above. The existing academic and policy gap related to that research field is addressed through *GlossplAI*, constituting an online open educational resource (OER) with GenAI-assisted DGBL activities. While this platform was not empirically tested for this study (Bryman et al., 2021), it provides proof of concept regarding its affordances, design rationale and strategies for guaranteeing substantial learner engagement and ethical leverage of GenAI in DGBLL.

3.1 GlossaplAI's Pedagogical and Technological Design

The *GlossaplAI* platform is currently hosted in WordPress, a platform that does not require exquisite programming skills, enables embedding HTML code, is easily accessible from any mobile device, and is user-friendly with convenient plug-ins for increased functionality and multi-modality. This OER is meant to contain Digital Game-Based Learning activities powered by GenAI tools that can be submitted either by the educators who created them, by students who participated in them (for learning or assessment purposes), or by third parties who have the license to share them. The contributor should provide a short description of the GenAI-assisted DGBL activity, so that all users can leverage it with this useful information, including an overview, a description of the DGBL activity, its educational value, technical and accessibility information, visuals, and media. Upon submission through a Google Form, a transparent evaluation process will start for all activities, conducted by *GlossaplAI*'s creators, Stefanos Alifierakis and Maria Pavlopoulou. Activities need to conform to the main principles of *GlossaplAI*'s Framework, as listed below. Feedback may be provided to the contributors for their activities' further improvement and better alignment with the Framework, alignment with the Framework, requiring that the activities are:

- GenAI-assisted → Leveraging Generative Artificial Intelligence tools (e.g. chatbots, visuals, audio or video AI-generators, text-to-speech tools etc.) either for the design, the development or their update.
- Ludic → Containing playful, funny and interactive tasks, that encourage exploration and creativity and renders the learning process enjoyable for learners (Jahrmann, 2020).
- Objective-oriented → Meeting specific learning goals and serving a predefined instructional purpose.
- Scalable → Offering a broad range of language learning materials that can be adjusted to different language proficiency levels, including multiple levels of difficulties with scaffolding available.
- Student-centered → Prioritizing learners' role, who actively explore knowledge through playing, by bringing their own ideas and past experiences, while the teacher's involvement is narrowed down to facilitating the activity's efficient execution and providing feedback to students at the end of it
- Accessible → Employing affordable or free-to-access tools and/or materials, thus being user-friendly and accessible across various devices (e.g. computer, tablet, smartphones).
- Practical → Focusing on real-world scenarios and practical learning skills, that are useful for everyday situations and different communicative contexts.
- Linguistically accurate → Guaranteeing valid language usage and offering rich language learning content.
- Adaptable → Allowing for adjustments and modifications, so that it can flexibly be employed by all users.
- Inclusive → Equally catering for all learners and their diverse learning backgrounds, language proficiency or learning needs.

The submissions will be listed in two categories; activities for learning and assessment. The DGBLL activities will be embedded into the WordPress site or a sample content will be shared, if they are hosted in an external platform. The users' feedback and the activities' ranking will enable of the activities that could reach a wider audience thanks to the multiple alternatives that they could get.

3.1.1 Model *GlossaplAI* GenAI-assisted DGBL Activities

The first model GenAI-facilitated DGBL activity is designed for students who study Greek as a foreign language at an A2 level[1]. The activity aims to develop learners' oral expression and vocabulary, grammar and syntactic skills, focusing on orally describing and comparing figures with the use of vocabulary related to colours, body parts and physical characteristics. The activity is called "ΤΑΙΡΙΑΖΟΥΜΕ; Περίγραψε, σύγκρινε, μάντεψε!" - "DO WE FIT?: Describe,

[1] Vocabulary related to colors, body parts, clothes belong to the A1 vocabulary level. However, only the periphrastic comparative will be used in the play, since the one-word comparative belongs to the B2 grammar level (https://www.greek- language.gr/certification/sites/greeklanguage.gr.certification/files/grammar.pdf).

compare, guess!" and it is accessible through the *GlossaplAI* platform. The second model GenAI-assisted DGBL activity aims at students' evaluation of vocabulary acquisition. This activity is designed for ancient Greek classes, while the vocabulary examined includes forensic terms that 2nd and 3rd-year High School Humanities students need to assimilate as part of their final exams preparation (Panellinies). The activity is accessible through the *GlossaplAI* platform.

3.2 Addressing GlossaplAI with the Theoretical Framework on GenAI's Influence in DGBLL

The platform demonstrates the main benefits of GenAI in DGBLL by offering customized and interactive digital playful learning experiences. *GlossaplAI* enables educators to adjust activities to different language proficiency levels and needs and fosters autonomous students' and teachers' engagement with them. The reusable and easily accessible nature of the platform's GenAI-assisted DGBLL activities enables their alignment with pedagogical objectives of different language subjects rather than their passive consumption. *GlossaplAI* also reduces the workload of language educators, offering them a range of complete activities. Moreover, as their GenAI-created prompts, visuals, narratives and scaffolded exercises provide contextualized practice in language learning, *GlossaplAI*'s content generates substantial and goal-oriented linguistic experiences. Interacting with them offers educators valuable insights into learners' common language errors and could help inform their teaching methodology. Simultaneously, the platform fosters learners' agency, since language students can independently interact with the activities and comment on them, using them as supplementary tools of autonomous language practice.

However, *GlossaplAI*, as a newly developed platform, has not incorporated yet built-in explainable GenAI features, which blocks the users' engagement with GenAI's feedback. The lack of personalized AI-generated justifications or recommendations on the use of the DGBLL activities might confuse the users on their proper leverage, causing an imbalance between their entertainment and instructional value. This frustration might lead to overdependence on the platform rather than critical interaction with it and linguistic experimentation. Furthermore, manual intervention is required from teachers to adjust the difficulty level of the DGBLL activities, while the lack of automation safeguards against bias renders obscure not only the content fairness and the cultural appropriateness but also its ethical usage. Lastly, several technical problems, like the functionality of some activities, are yet to be tackled on this platform.

To address *GlossaplAI*'s vulnerabilities and foster critical thinking and student engagement, future work on the platform should include advanced technological development embedding GenAI-assisted interactive scaffolding mechanisms for the platform's operation and for flexible activities' modification. The latter should always align with *GlossaplAI*'s Framework which needs to be fre-

quently updated. Metacognitive awareness and deep linguistic learners' competence would be strengthened through structured reflection tasks, online forum discussions and GenAI feedback through chatbots. The early familiarization of educators with the platform guarantees its smooth integration and active students' guidance. Accordingly, with editable AI-generated tasks, learners could revise, expand, modify and co-create the activities, so that the platform fosters student agency, linguistic creativity and contextual language use.

4 Discussion

GenAI's integration in Digital Game-Based Language Learning (DGBLL) can radically change language education, educators' roles, and student learning performances. However, some important considerations arise that require action for long-term sustainability. Educators' autonomy and educational equity may be threatened by GenAI's introduction into DGBLL. Broader systemic issues also should be handled, including overreliance on GenAI and GenAI literacy. Institutional support is crucial for equally integrating GenAI-assisted DGBLL without disparities caused by digital divide (Kaimara et al., 2021). Future research should delve into equitable usage of GenAI in digital game-based language learning, so that it supports - not threatens - educators' and students' holistic development. Ethical risks should also be prevented by safeguarding data privacy, transparently ensuring GenAI ethics, and collaboration among educators, policymakers and GenAI specialists. Transparency in data storage, process and usage through strict data protection policies is another necessary step, as minors are also involved in these GenAI-supported DGBLL activities. Last but not least, teachers' training is crucial for handling, modifying and reporting unethical or biased GenAI content. By investing in educators' GenAI literacy, institutions will ensure that GenAI is ethically leveraged and that GenAI-assisted DGBLL approaches enhance language learning.

5 Conclusion

This paper addresses a significant gap in scientific research focusing on GenAI's role in the advancement of Language Subjects through embracing Digital Game-Based Language Learning Activities. The lack of Greek policy papers highlights the need to promote such educational initiatives in light of the increased schools' digitalization. GenAI's transformative potential can upgrade learners' experience by revitalizing the pedagogical methodology and the quality of the game itself. However, the challenges that accompany this change call for further research in that field through meticulous and critical reflection, in order to facilitate the fruit-

ful introduction of GenAI-assisted DGBL into Language Learning. *GlossaplAI* initiative, a case study serving the aforementioned goal, constitutes an aspiring OER that aims to technologically transform Language Subjects with the acknowledged learning value of play.

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