

GAME-BASED APPROACHES FOR RESEARCH SKILLS TRAINING AND RESEARCHER DEVELOPMENT: A SURVEY OF ATTITUDES AND ACCEPTANCE IN HIGHER EDUCATION

D. Abbott

The Glasgow School of Art (UNITED KINGDOM)

Abstract

Research skills training is both crucial and ubiquitous in Higher Education (HE), however there are a range of pedagogical challenges in effectively delivering research capabilities and learning outcomes. The move towards constructivism, including game-based learning (GBL) techniques, in research skills training has been shown to improve outcomes for students, yet GBL for research skills is under-researched compared to other application domains.

This paper analyses the results of a new survey of attitudes towards GBL specifically for improving research skills training in UK HE institutions. Responses came from 92 researcher developers, research leaders, librarians, and academic skills teachers. Results demonstrate a very strong appetite for games and gamified approaches in this topic area, with a large majority of respondents noting the potential for novel, interactive and experiential techniques for delivering high-level learning outcomes. Thematic analysis of qualitative responses identifies and analyses key themes such as: institutional and attitudinal barriers to the use of GBL; the need for balancing flexibility in learning approaches with a structured framework to scaffold learning; and for a choice of complementary methods to suit diverse learner cohorts. Other key findings are related to accessibility; platforms for engagement; cultural knowledge and perceptions; and the potential for cognitive overload. Results also identify those topics within researcher development that are thought to be most important for GBL approaches.

This paper gives a clear overview of the attitudes, opportunities, barriers, and concerns of HE staff when considering the use of GBL to complement existing research skills training provision in universities and contextualizes this with current opportunities for engagement with GBL for research skills.

Keywords: Game-based learning, serious games, researcher development, research skills, higher education, research.

1 INTRODUCTION

Research skills are crucial for students at all levels of Higher Education (HE), in particular postgraduates who rely on independent problem-solving and rigorous research design and methods. However, students often find research skills courses "dry" and "irrelevant," leading to disengagement [1]. To enhance relevance and motivation, which in turn leads to more capable and satisfied student researchers, those teaching research skills have increasingly begun to emphasize constructivism, using active and experiential methods [2], [3], [4], [5], [6]. These approaches have been shown to improve learning outcomes, engagement, and practical application of skills. However, the literature notes that further innovation and cultural shifts are needed [1].

Game-based learning (GBL) approaches can be effective for learning and skill development across a range of fields. However, HE has been slower to adopt GBL due to unique barriers such as the perception of games as frivolous and challenges in evaluating high-level cognitive outcomes, particularly at the postgraduate level [2]. Research skills training is an area of particular need in terms of both student satisfaction and equipping students with the skills they require to successfully transition to further study or work. Therefore, this paper focuses first on the existing context of GBL for enhancing teaching and learning of research skills in an HE context, and then on a detailed survey of the attitudes towards, and acceptance of, GBL in those delivering research skills training in UK institutions.

2 RESEARCH CONTEXT

My own previous work explores GBL for enhancing research skills training in depth, noting that learning outcomes in this topic can be cognitive, affective, and behavioral [7]. Furthermore research capabilities tend to sit towards the higher levels of Bloom's Revised Taxonomy [8] which can present challenges for

both learners and teachers [9]. Previous work (including my own) provides a convincing rationale for the use of GBL for high-level learning outcomes [2], [6], [7], [10], [11] as games and playful techniques reflect the active, experiential, creative, and student-centered pedagogies that are recommended in this domain. It has been noted that GBL offers opportunities for personalization of learning and can be particularly useful for the process of scholarship, as it reflects the variety of paths student researchers can take to achieve success, the uncertainty of outcomes, and possibility of failures which lead to subsequent successes [12], [13]. Furthermore, the novelty or enjoyment provided by (some) GBL techniques can revitalize learners' motivation and emotional affect, and, in conjunction with increased agency over learner journeys, can improve knowledge retention [14], [15]. The literature also clearly identifies a slower take-up of GBL in HE [16] and specifically in research skills training [2], [6]. Although a full contextual review of games for HE research is outside the scope of this paper, previous reviews show that, whilst there are a number of games which address a specific topic related to research (e.g. copyright, data management, Open Access), there are considerably fewer that aim to support general research processes [7], [17]. The complexity of research training provision (see Section 4.1) and tangled terminology within the domain makes identifying GBL complex as 'research' can mean anything from the design, implementation, and dissemination of a whole research project to a single information gathering task, e.g., a literature search.

2.1 Acceptance of game-based learning within Higher Education

In general, teachers in UK HE consider GBL to be a promising pedagogical approach that can improve engagement and outcomes, *provided that* it is well-designed and fits within the educational and practitioner context [18], [19], [20], [21], [22]. Studies cover both analogue and digital games, although are skewed towards digital GBL. Valencia *et al* [19] used the Technology Acceptance Model (cf. [23]) with a sample of over 100 HE teachers, demonstrating very high intention of use and perceived usefulness of serious games (80-90%), whilst also identifying significant barriers to use such as lack of both time and confidence (particularly with technology.) These results are reflected in Sandí-Delgado *et al* [20] where high acceptance is observed overall, with important factors related to the individual, perceived ease of use, and usefulness contributing to intention.

As noted in [20], there are no prior studies focusing on acceptance of serious games for the development of academic competencies, and that study focusses on technological competencies. [19] suggests that future work to assess acceptance within specific knowledge domains is needed. This paper builds on previous work by: focusing on a particular domain of knowledges and competencies (researcher development); including analogue game-based approaches; and contextualizing acceptance within the time/budgetary context of UK institutions. It therefore represents a valuable contribution to our understanding of attitudes towards GBL in HE.

3 METHODOLOGY

Research skills provision at UK HE institutions is extremely complicated and dispersed both across and within institutions, meaning that it is difficult to ascertain the appetite of game-based approaches in research training communities. Therefore, it was decided to perform a 'wide and shallow' survey of as many relevant communities as possible. Ethical clearance was granted by The Glasgow School of Art. Inclusion and exclusion criteria were:

- Respondents must be over 18 and fluent in English.
- Respondents must have a connection to academic development, learning development, researcher development, or research skills training in a UK institution at some level, for example, as their core role (e.g., a Researcher Developer, Head of Doctoral Training) or as an educator teaching research as part of a subject-based course.
- Respondents must provide informed consent.
- Respondents must NOT be game-based learning specialists in fields other than research skills training.

Participants were asked to confirm they met these criteria as part of informed consent.

The survey was developed in JISC Online Surveys platform. A link was shared to relevant JISCMail lists (the UK's national academic mailing list service [24]) targeting communities of research or academic skills developers (see Table 1.) The link was also shared on closed email lists of UK HE research skills developers through personal contacts. Data collection was undertaken in June – July 2024.

Table 1 - Mailing lists targeted

<i>List name</i>	<i>Subscribers (June2024)</i>
rdscholarship@jiscmail.ac.uk	194
ldhen@jiscmail.ac.uk	1628
research-staff-support@jiscmail.ac.uk	420
lis-researchsupport@jiscmail.ac.uk	749
gtadev@jiscmail.ac.uk	101
jisc-digi-research-community@jiscmail.ac.uk	478

It should be noted that there is likely to be substantial (unquantifiable) overlap in membership of these lists, so it is not possible to say how many people were invited to take part overall. Preliminary results were shared back with each of the above lists 1 – 2 weeks after the initial invitation. In order to keep the recruitment highly relevant to the inclusion criteria, the link was not shared on any other mailing lists. In particular, to avoid skewing the results, the link was *not* shared in game-based learning communities.

3.1 Data analysis

Quantitative results have been presented directly, with percentages showing the proportions from answers given (as almost all questions were optional.)

Qualitative results have been coded by keyword (descriptive codes tallied with manual adjustments to remove negative concepts of the same word and/or account for misspellings) and concept (author's analysis and classification), then thematically grouped. This process was data-driven in order to capture the full range and nuance of responses given.

Data was anonymous at point of data collection. Some respondents included data in free-text responses that could potentially make them identifiable which was redacted/anonymized by the researcher and not seen by anyone else.

4 RESULTS

There were 92 valid responses to the survey. The geographical spread of respondents was broadly representative across the UK's population.

4.1 Institutional contexts

In order to understand better the institutional contexts of research skills training, the survey asked about participants' institutional contexts and individual roles within that context.

There were 78 free text responses to the question: "*Research skills development can sit within a Research Office, Learning and Teaching, a specialised department, or at school/departmental level – where does most research training come from at your institution? Does it come from a different place depending if it's aimed at staff, PGRs, or students on taught programmes?*"

Descriptive keyword codes (with synonyms) for these responses were counted and are shown in Figure 1 and Figure 2. The responses clearly confirm the very complicated nature of research skills provision at UK HE institutions. There are a large number of (overlapping) places where research skills are taught with the most mentioned being local-level (i.e. from within academic departments or on specific courses), followed by central delivery through various research services (both above 60%), then the institutional library (37%), and discrete graduate schools (26%). Four more places are mentioned by 10 – 20% of responses: professional services; learning development; HR; and, interestingly, external sources such as university partners or research clusters. The terminology used by respondents was also diverse, with a range of terms being used for most categories of provider.

In terms of audiences, postgraduate researchers (PGRs) appear to be the priority, followed by early career researchers (ECRs.) Only 21% mentioned postgraduate-taught cohorts (PGT) and just 6% mentioned undergraduates (UG.)

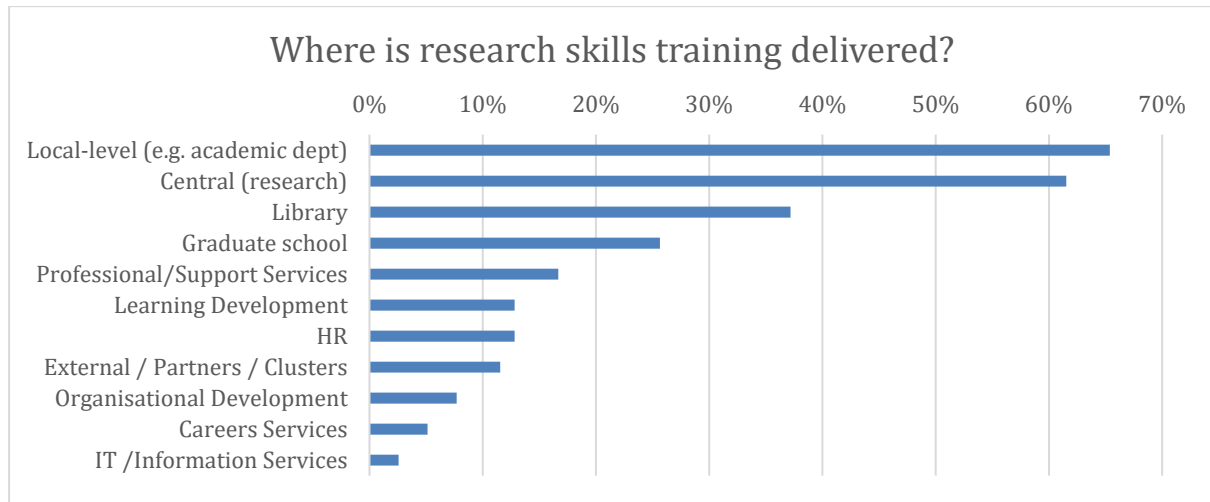


Figure 1 - places within UK HE institutions where research skills training is delivered (based on descriptive keyword codes)

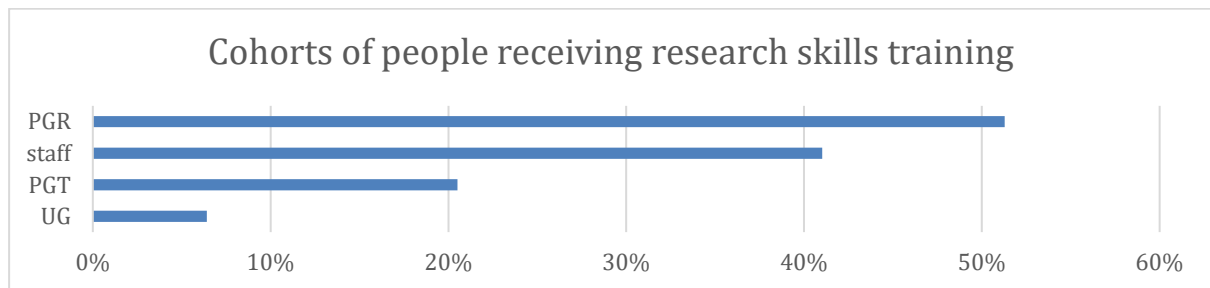


Figure 2 – mentioned audiences for research skills training (based on descriptive keyword codes)

A more robust analysis of the qualitative data was undertaken by manual coding and thematic analysis of concepts raised to ascertain key themes. This supports the conclusion that research training is dispersed across institutions and there is usually different training for different audiences (55%). 45% stated that research training comes from a mixture of centralized and local departments, whilst 38% said that all research training is centrally provided but from different departments (e.g. research offices, graduate schools, libraries.) Some mentioned that only PGRs get dedicated research skills training (8%) or that there is no training for taught students (4%). 12% said that taught students only get local training. 12% stated that some training is shared between PGRs and staff. Finally, 8% of responses noted that special research training for particular topics was provided.

4.2 Attitudes towards game-based approaches

The survey aimed to gain an overall impression of attitudes towards game-based approaches for research skills training within HE institutions.

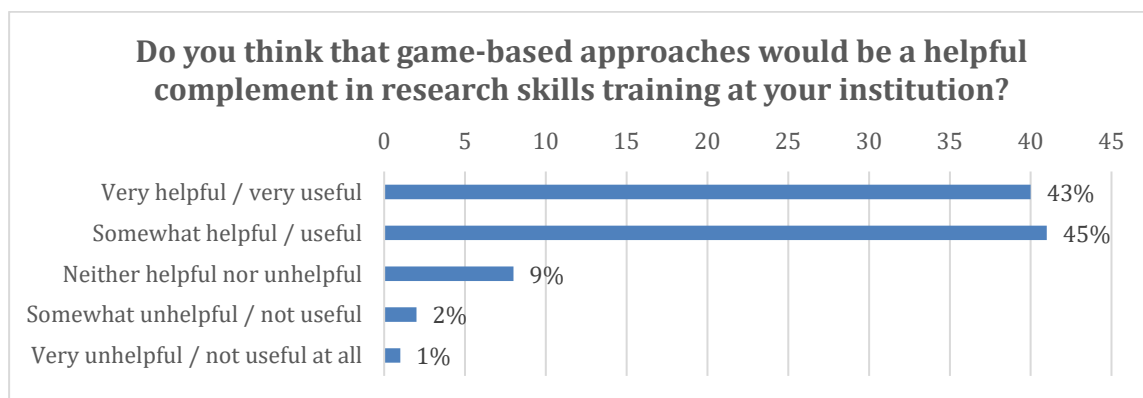


Figure 3 - overall attitude towards using game-based approaches as a complement to existing research skills training

Figure 3 (above) shows a high acceptance of game-based approaches as a complement to research skills training, with 88% of responses being positive towards their use.

There were 71 free text responses to the prompt: “If you would like to, please explain your answer. E.g. What are the opportunities or pitfalls you envisage for game-based approaches in research skills training?” The most commonly used keywords were Engaging (19 responses, 27%), Novel (15, 21%), Fun (14, 20%), and Interesting (11, 15%). It can be seen from Figure 4 that free text descriptive keywords focused mostly on the emotional affect of game-based approaches, with other significant categories being ‘Impact on learning’ and ‘Innovation.’

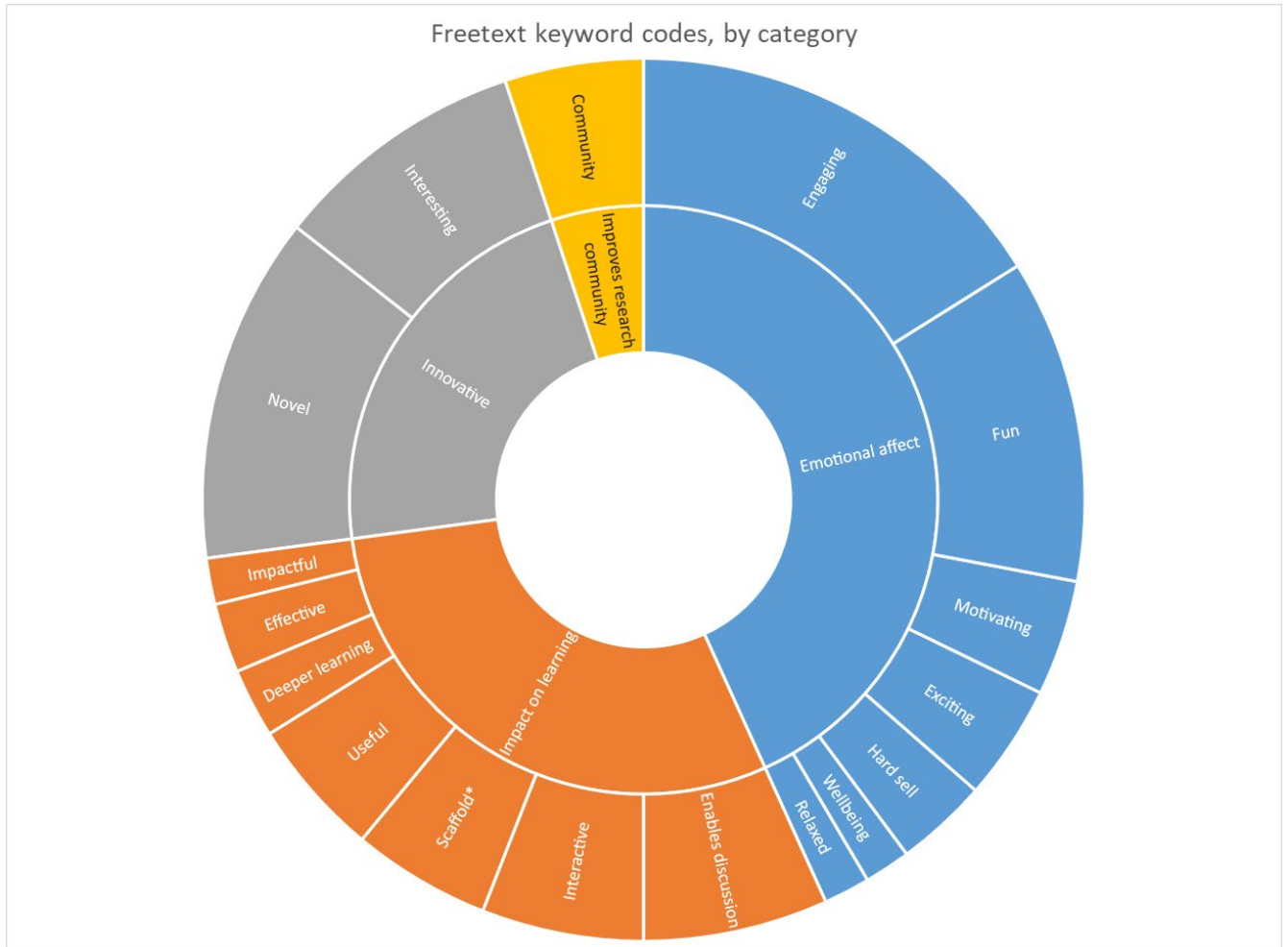


Figure 4 - sunburst diagram showing keywords and concept categories

A detailed thematic analysis of the qualitative data was undertaken by manual coding and categorization of concepts raised. This data is shown in Table 2 and Figure 5.

Table 2 - Hierarchical concept mapping of free text responses

Category	Overall theme	Sub theme	Sub theme	Count
Emotional affect	Positive	General positive comment		31
		Removes fear of failure		8
		Engagement beyond cognitive		4
		Positively affects wellbeing		3
		Enhances teambuilding /collaboration		7
	Negative	Hard sell	For staff/leadership	4

			For students	9
		Game 'failures' can demotivate		3
	Neutral	Not 'one-size fits all'		4
		Need to match tone with content		5
Impact on learning	Positive	Efficacy	Enhances relevance/relatedness	6
			Good for experiential learning	10
			Useful for "tricky" concepts	5
			Scaffolds learning	4
			Improves retention of ILOs	5
		More efficient		7
		Supports diverse learning styles		9
		Good feedback from students		6
	Negative	Less efficient		2
		Hard to fit into existing curriculum		4
		Increased cognitive load		4
		Efficacy risks	Distract learners	3
			Oversimplification	2
	Neutral	Needs skilled facilitation	Difficult to resource	9
			Needs debrief	2
			Success depends on game	6
		Integration	Recommend short games	7
			Communicating relevance is key	6
		Not 'one size fits all'		10
		Inclusion risks	Neurodiversity	2
			Cultural/social	4
Research community	Positive	Useful for dialogic/team learning		7
		Enhances collaboration		9
	Neutral	Staff confidence/training needed		2

As can be seen, the majority of concepts concerned the potential impact on learning, with positives highlighting expected efficacy benefits (e.g., experiential learning (14%), scaffolding, and retention) as well as benefits for alternative learning formats (13%) and previous experience of good feedback from students (8%). Interestingly in this context, five respondents specifically praised GBL for teaching "tricky"/complex concepts. Much smaller numbers of responses highlighted potential negative efficacy, e.g., the risk of distraction or oversimplification (3%), and increased cognitive load for learners (4%). In terms of efficiency of learning, 10% indicated GBL could be more efficient for delivery, conversely 3% suggested GBL could be less efficient. Respondents also noted a wide range of practical considerations, primarily the issue that games require skilled facilitation which can be difficult to resource, and that success is very dependent on the individual game. The concept that there is no "one size fits all" approach came across strongly in the responses (22%.) Integration of GBL was also an important consideration: shorter games (to be combined with existing workshops) were suggested (10%); communicating relevance of the activity to students is key (8%); and fitting games into an already crowded curriculum is difficult (6%.) Inclusion and accessibility were also mentioned as major considerations (10% proposing a positive impact and 6% proposing a negative impact.)

The second largest theme was that of emotional affect from games, with a majority of positive responses. 44% included a general positive comment such as “I like this idea” or “I find this works well with my students.” Major sub-themes are that games enhance teambuilding, collaboration, familiarization, and dialogic or team learning. 11% of responses also explicitly noted the ability of games to reduce the ‘fear of failure’ common in students. Other sub-themes were: positive effect on wellbeing; and usefulness of engagement beyond the cognitive (e.g., visual, tactile, or physical enhancements.) These findings overlap with the more detailed insight into the role games can play in supporting research communities, in particular, that games can enhance both disciplinary and interdisciplinary collaboration (13%) and collaborative learning. However, there is a relatively common opinion that game-based approaches are a “hard sell” for students (13%) as well as for staff and leadership (6%), and that staff need training and confidence to run games effectively. One respondent specifically noted that more peer-reviewed research would help to increase confidence in positive outcomes from GBL.

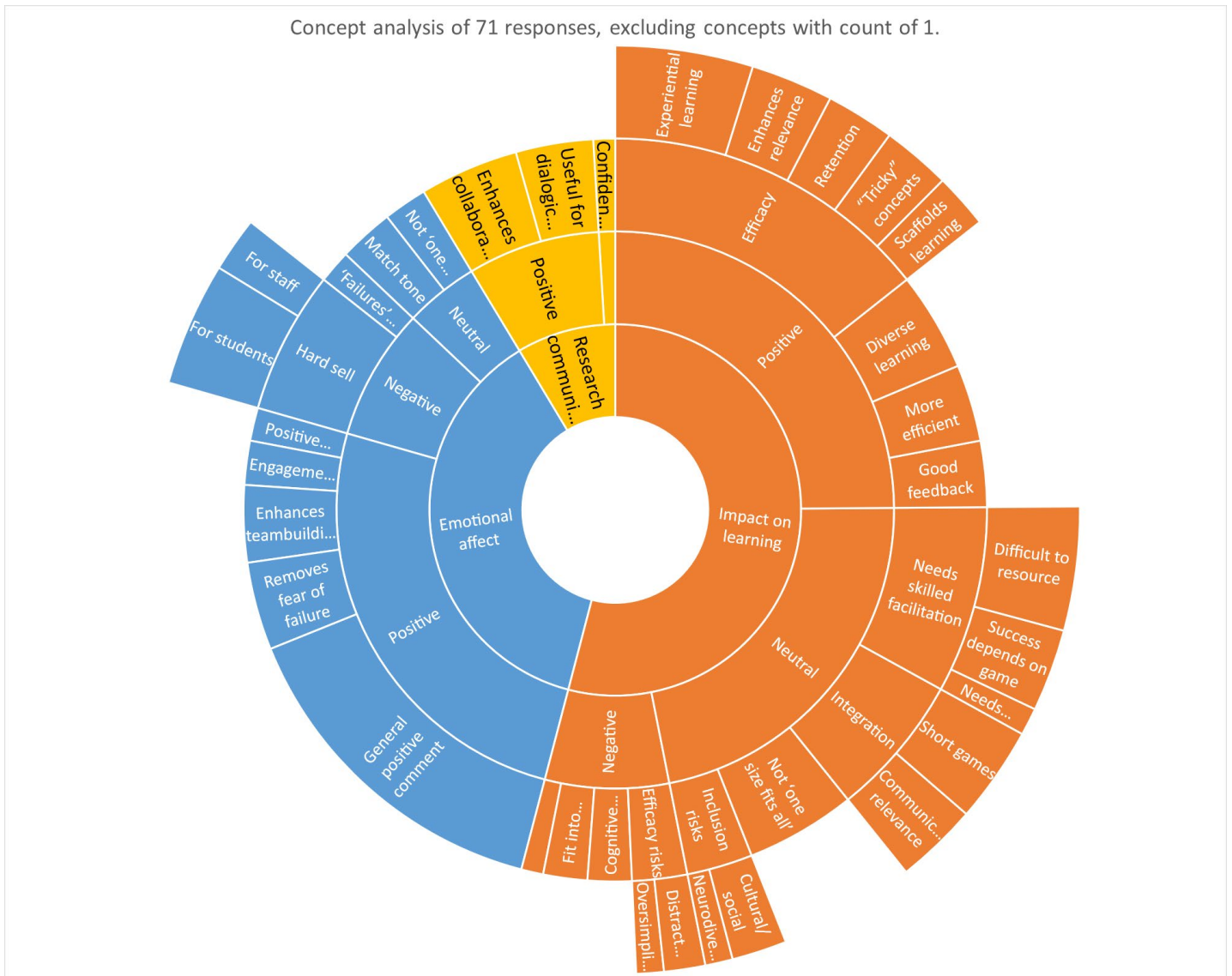


Figure 5 - sunburst diagram showing key themes in attitudes towards GBL for research skills

This analysis also revealed a small number of misconceptions about game-based approaches from participants: that games must be competitive (1 respondent); that games require high digital skills/need to be digital (2); and conversely that games need to be played in person (1).

4.3 Products and services needed to support GBL within research training

Supporting previous literature, there is evidence of a high level of criticality in the attitudes of research trainers with regards to game-based approaches. The results presented above identify a range of

accurate considerations about both the potential and the challenges of GBL to complement research training. The survey proposed a range of ways in which GBL might be delivered, and the support services that might be required for institutions to use this approach effectively. Participants were asked to rate their appetite for products and services related to game-based learning. As shown in Table 3, there is high appetite for games and services to complement research skills training, however the majority of respondents (82%) would be interested only if these are available without cost to their institution. Standalone games are clearly desired, if they are free, with only 13-17% of respondents saying their institutions might pay for these. Respondents indicated that their institutions would be more likely to pay for services than standalone games, with 29% saying they might pay for external game facilitation, 39% for external training to allow their staff to run games for themselves, and 26% for working with external GBL experts on bespoke game design. This final category, a service to partner with institutions to produce bespoke games, can be seen to be much less in demand, with 45% of responses being 'Not interested'.

Table 3 – “Which of the following game-based products or services might you/your institution be interested in?” (92 responses)

<i>Product or Service to support GBL</i>	<i>Not interested</i>	<i>Interested only if free</i>	<i>Interested and institution would pay</i>
Tabletop (physical, face-to-face) games about aspects of research skills	5%	82%	13%
Access to online digital games about aspects of research skills	6%	76%	17%
Game facilitation workshops (game-based training run entirely by an external facilitator)	19%	52%	29%
Game training workshops (external facilitator trains staff on how to run games for themselves)	8%	53%	39%
Paid service to help you develop your own bespoke games	45%	30%	26%

A clear finding is that resourcing (in terms of both time and money) is a major factor. Many respondents noted that tight budgets and spending freezes affects their capacity to both purchase the necessary resources, and devote the time to staff training that is required to effectively use GBL training, even if the service or product was highly desired.

4.4 Desired GBL topics within research training

The survey asked respondents to identify any areas of particular need that they felt would benefit from a game-based approach. Of 62 responses, the most desired topics were: ethics/academic integrity (27%); Artificial Intelligence (in the context of research skills) (24%); and literature search and review (18%). Other topics mentioned by around 10% of respondents were: induction; student journey; career development; and data protection/research data management. Some of these responses also mentioned particular cohorts; the most common were PGR and ECRs (16%). Mid-career researchers were mentioned twice, and only one respondent mentioned PGTs as an audience.

4.5 Survey limitations

The recruitment method (academic email lists) may have affected the sample by potentially skewing the type of practitioners who responded. The survey may also have suffered from self-selection bias. The survey was relatively short and, whilst it provides structured data for analysis, the results lack nuance. Future work could triangulate these results through interviews, focus groups, and testing prototype services with researcher development experts.

5 CONCLUSIONS

The main findings of this study are as follows.

As expected, research skills provision at UK HE institutions is shown to be extremely complicated and dispersed within (and sometimes across) institutions.

There is a high majority (88%) of positive attitudes towards GBL as a complement to research skills tuition and training. A range of benefits for learning were articulated, primarily focused on the positive emotional affect of GBL and its potential advantages for learning outcomes that are particularly relevant or challenging within the research domain. However, the overall strong acceptance needs to be interpreted in conjunction with the much smaller proportion of institutions who indicated that they can afford the time and/or cost to effectively implement GBL: 13% for analogue games; 17% for digital games; 29% for externally-provided GBL workshops; and 39% for staff training to implement GBL. Therefore, practical considerations impede take up of GBL for research skills. Furthermore, although considerably less than the positive attitudes, a range of conceptual barriers and/or weaknesses were also identified: that there is no “one size fits all” solution (22%); that the (all-important) curricular and contextual integration [21] can be a challenge, and that there are risks as well as advantages for social, cultural, and neurotype inclusion. One particular issue is that 13% of respondents (a minority but significant proportion) felt that GBL can be a “hard sell” for students. There is debate in the wider literature about student acceptance. Studies identify a wide range of different factors affecting student acceptance [25], [26], primarily the perception of whether GBL will enhance their performance and learning outcomes [25], along with effort expectancy and enjoyment [26]. As with HE staff, the literature supports there being a high level of criticality in GBL acceptance, and emphasizes the requirement for GBL to instill confidence in both teachers and learners.

Topics within research skills of particular interest for future GBL provision are ethics/academic integrity; Artificial Intelligence; and literature search and review, as well as topics related to more general student or staff development (e.g., learner/career journeys.)

Overall, the main findings of this study are 1) GBL has significant potential in this domain and 2) to confirm that it should be offered as a complement to (not a replacement for) non-GBL teaching methods.

ACKNOWLEDGEMENTS

The survey was funded by the Founders Fund for Creatives, and performed in partnership with Dr. Joanna Royle, Research Development Manager, University of Glasgow.

REFERENCES

- [1] M. Ryan, C. Saunders, E. Rainsford, and E. Thompson, ‘Improving Research Methods Teaching and Learning in Politics and International Relations: A “Reality Show” Approach’, *Politics*, vol. 34, no. 1, pp. 85–97, 2014, doi: 10.1111/1467-9256.12020.
- [2] D. Abbott, ‘Game-based learning for postgraduates: an empirical study of an educational game to teach research skills’, *High. Educ. Pedagog.*, vol. 4, no. 1, pp. 80–104, Jan. 2019, doi: 10.1080/23752696.2019.1629825.
- [3] T. W. McCarty, ‘Methods Can be Murder: A Metaphorical Framework for Teaching Research Design’, *J. Polit. Sci. Educ.*, vol. 17, no. 4, pp. 623–640, Oct. 2021, doi: 10.1080/15512169.2019.1664908.
- [4] H. J. Hamnett and A.-S. Korb, ‘The Coffee Project Revisited: Teaching Research Skills to Forensic Chemists’, *J. Chem. Educ.*, vol. 94, no. 4, pp. 445–450, Apr. 2017, doi: 10.1021/acs.jchemed.6b00600.
- [5] M. A. Saeed and H. S. Al Qunayeer, ‘Can we engage postgraduates in active research methodology learning? Challenges, strategies and evaluation of learning’, *Int. J. Res. Method Educ.*, vol. 44, no. 1, pp. 3–19, Jan. 2021, doi: 10.1080/1743727X.2020.1728526.
- [6] N. Kollars and A. M. Rosen, ‘Who’s Afraid of the Big Bad Methods? Methodological Games and Role Play’, *J. Polit. Sci. Educ.*, vol. 13, no. 3, pp. 333–345, Jul. 2017, doi: 10.1080/15512169.2017.1331137.
- [7] D. Abbott, ‘Choose Your Own Adventure! An empirical study on gamification of postgraduate learning on research project design’, *J. Play Adulthood*, vol. 6, no. 1, May 2024, doi: 10.5920/jpa.1475.
- [8] L. W. Anderson and D. R. Krathwohl, *A taxonomy for learning, teaching, and assessing: A revision of Bloom’s taxonomy of educational objectives*. Addison Wesley Longman, Inc., 2001.

- [9] M. Nind and A. Katramadou, 'Lessons for Teaching Social Science Research Methods in Higher Education: Synthesis of the Literature 2014-2020', *Br. J. Educ. Stud.*, vol. 71, no. 3, pp. 241–266, May 2023, doi: 10.1080/00071005.2022.2092066.
- [10] A. Walsh, *The librarians' book on teaching through games and play*. Innovative Libraries, 2018. Accessed: Nov. 20, 2023. [Online]. Available: <https://osf.io/6vby9>
- [11] D. Abbott, 'Beyond Vicarious Learning: Embedding Dialogic Learning into Educational Games', P. Fotaris, Ed., in *Proceedings of the 14th European Conference on Games Based Learning.*, Reading: Academic Conferences International Limited, 2020, pp. 1–10. Accessed: Sep. 07, 2024. [Online]. Available: <https://radar.gsa.ac.uk/7343/>
- [12] M. J. Brennan, 'Open Axis Video Game'. Accessed: Sep. 21, 2024. [Online]. Available: <https://guides.library.ucla.edu/openaccess/openaxis>
- [13] D. Abbott, 'Creative Thinking Quest', itch.io. Accessed: Sep. 21, 2024. [Online]. Available: <https://daisyabbottitchio.itch.io/creative-thinking-quest>
- [14] R. Costello, 'Gamification Design Principles and Mechanics to Improve Retention', in *Handbook of Research on Acquiring 21st Century Literacy Skills Through Game-Based Learning*, C.-A. Lane, Ed., Hershey, PA: IGI Global, 2022, pp. 788–809. doi: 10.4018/978-1-7998-7271-9.ch040.
- [15] L. Chittaro, 'Improving Knowledge Retention and Perceived Control Through Serious Games: A Study About Assisted Emergency Evacuation', *IEEE Trans. Vis. Comput. Graph.*, vol. 30, no. 8, pp. 5339–5349, 2024, doi: 10.1109/TVCG.2023.3292473.
- [16] N. Whitton and A. Moseley, Eds., *Using games to enhance learning and teaching: a beginner's guide*. New York: Routledge, 2012.
- [17] G. Bray and V. McCutcheon, 'Research Support Games List', figshare. Accessed: Sep. 23, 2024. [Online]. Available: <https://doi.org/10.6084/m9.figshare.16652701.v5>
- [18] B. Berg Marklund, *Unpacking digital game-based learning: the complexities of developing and using educational games*. Skövde: University of Skövde, 2015.
- [19] D. Cardona Valencia and F. A. Betancur Duque, 'Technology Acceptance Model (TAM): A Study of Teachers' Perception of the Use of Serious Games in the Higher Education', *IEEE Rev. Iberoam. Technol. Aprendiz.*, vol. 18, no. 1, pp. 123–129, Feb. 2023, doi: 10.1109/RITA.2023.3250586.
- [20] J. C. Sandí-Delgado, C. V. Sanz, and E. N. Lovos, 'Acceptance of Serious Games to Develop Digital Competencies in Higher Education Professors', *Electron. J. E-Learn.*, vol. 20, no. 3, Art. no. 3, Apr. 2022, doi: 10.34190/ejel.20.3.2181.
- [21] V. Maratou *et al.*, 'Game-Based Learning in Higher Education Using Analogue Games', *Int. J. Film Media Arts*, vol. 8, no. 1, pp. 63–83, Jun. 2023, doi: 10.24140/ijfma.v8.n1.04.
- [22] L. Cunningham and O. Murphy, 'A Qualitative Study of Practitioner Perspectives on the Design and Development of Effective Game-Based Learning Solutions', *EDULEARN19 Proc.*, pp. 9191–9199, 2019, doi: 10.21125/edulearn.2019.2276.
- [23] N. Marangunić and A. Granić, 'Technology acceptance model: a literature review from 1986 to 2013', *Univers. Access Inf. Soc.*, vol. 14, no. 1, pp. 81–95, Mar. 2015, doi: 10.1007/s10209-014-0348-1.
- [24] 'JISCMail'. Accessed: Aug. 27, 2024. [Online]. Available: <https://www.jiscmail.ac.uk/>
- [25] C.-H. Chung, C. Shen, and Y.-Z. Qiu, 'Students' Acceptance of Gamification in Higher Education', in *Research Anthology on Developments in Gamification and Game-Based Learning*, Hershey, PA: IGI Global, 2022, pp. 1878–1893. [Online]. Available: <https://doi.org/10.4018/978-1-6684-3710-0.ch090>
- [26] R. Ibrahim, S. Masrom, R. C. M. Yusoff, N. M. M. Zainuddin, and Z. I. Rizman, 'Student acceptance of educational games in higher education', *J. Fundam. Appl. Sci.*, vol. 9, no. 3S, p. 809, Jan. 2018, doi: 10.4314/jfas.v9i3s.62.