



## The Potential of Game-based Micro-learning Resources for Engaging Learners with Intercultural Competence Development

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### ABSTRACT

This article discusses the potential of the application of interactive micro-learning content that aims to develop intercultural competences in the workplace, focusing on the pedagogically-informed design of playful interactive learning resources for engaging learners with topics related to cultural risks. Eight topics were identified through our engagement with 154 personnel from multicultural organisations across five European countries, including cross-cultural awareness, stereotypes, and communication. A competence map was then developed, articulating the specific aspects of these topics, which informed online content development. Findings from the evaluation of the online educational materials across the five countries (n=223 participants) suggest the significance and relevance of the topics in the workplace and the value of using playful micro-resources for delivering topics that were deemed less attractive.

**Keywords:** cultural risks, micro-learning, interactive media, mini-games, game-based learning

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## 1 INTRODUCTION

In an increasingly globalised world, many organisations operate in multicultural environments. In Europe, as the number of people from diverse backgrounds continues to grow, the role of culturally responsive education is increasingly important. For example, countries such as the United Kingdom are more culturally diverse than ever, which creates significant implications for all managers and educators alike, requiring unprecedented breadth of knowledge about and understanding different individuals and their needs. Cultural diversity can pose challenges that include potential conflicts and misunderstandings among employees that result from the lack of competences associated with the mitigation and awareness of cultural risks and behaviours in multicultural organisations. The risks are further magnified during the pandemic when the means for collaboration were facilitated via synchronous and asynchronous technology-mediated communication.

There are various risks in the functioning of organisations (market, financial, legal, ecological, or political), cultural risk being one. Different cultures pose diverse work ethics and approaches, and they may not have a shared understanding of many workplaces and social aspects. That is why 'cultural risk is a journey with no end' (Walaszczyk, 2020), which means that it cannot be compared with the risk process in general. It is subjective and will need to be continuedly mitigated.

Awareness of risks should be promoted at both personal and organisational levels (Laycock, 2014). The main challenges associated with employees of multicultural organisations include the following aspects: the lack of openness, the inability to speak and understand a given country's national language, the lack of punctuality, different facial expressions, and gestures, and many others (e.g., Italy – Triandafyllidou, 2003; Ganz, 2016; Cyprus – Panagiotis, 2012, Mpezati, 2011; Poland – Sułkowski, 2017; Chmielewska-Muciek, 2017; other countries: Korzilius *et al.*, 2017; Fitzsimmons, 2013; Yeo *et al.*, 2017).

Although the importance of intercultural professional development is widely recognised, only a few organisations offer comprehensive training courses in multiculturalism in the workplace. Its importance and role are acknowledged, but hardly any complex intercultural assessment occurs. Much of the work on intercultural competences has concentrated on teaching and learning foreign languages as it seems to lend itself to the imperative intercultural competences more than to other areas. Many tools and tests that have been developed to assess intercultural competences mostly focus on the intercultural communication needs of international businesses employing multicultural employees or where employees are being seconded to other countries. The tools enable reliable and valid assessments to be conducted, where they are based on a different theoretical perspective or framework of intercultural learning. They include, among others, computer-based validity (e.g., Clemens *et al.*, 2015; Intercultural Competence Assessment – INCA project, 2004); testing by questioning (Competence Self-Assessment Questionnaire – Mason, 1995; The Intercultural Readiness Check); computer-based simulations; structured biographical interviews, analysing self-assurance and adaptation tendency; and related cross-connections (Measuring Intercultural Sensitivity in Different Cultural Contexts – Fritz *et al.*, 2000; Intercultural Development Inventory - Bennett, 1986). In addition to the formal assessments of intercultural competences, there are also simple tests (Tulman and Watts, 2008; Matsumoto and Hwang, 2013),

quizzes (Sercu, 2010; Chapman *et al.*, 2014, 2020), and group activities. The inclusion of cultural awareness in education has rarely been analysed further (Shepherd, 2019).

This article addresses the need for professional development towards addressing cultural elements by focusing on designing and developing online educational content that includes interactive micro-learning and mini-gaming resources. The aim is to offer a broad scope of cultural aspects that multicultural organisations need to consider. This article discusses how engagement with topics deemed uninteresting can be improved.

### **1.1. Micro-learning and mini gaming**

Engagement with bite-sized content has been proven to impact learning outcomes positively (Wang, 2017; Girgiu, 2017). Professional development initiatives often feature the brevity characteristics of micro-learning resources (Hug, 2005; Shail, 2019). The brevity aspect refers to engagement in condensed learning activities that usually take 1 to 10 minutes, designed for skill-based training, learning, and education (Shail, 2019). Micro-learning refers to an instructional unit that provides a short engagement in an activity intentionally designed to elicit a specific outcome from the participant (Kapp and Defilice, 2019). Micro-learning can also be part of a more extensive learning system, where the learning resources are not limited to one particular medium. Online educational initiatives implementing micro-learning resources include Udemy™, Khan Academy™, and Coursera™.

Equipping learners with materials in different formats engages learners more effectively in their development towards strengthening their knowledge base (Shail, 2019). Micro-learning contents are often created on demand and in a more passive form, where learners would simply consume content, such as short videos viewed in sequence or accessing content delivered in simple infographics (Arnab *et al.*, 2020). Interactive media such as mini-games (also called micro-games) have been increasingly delivered as micro-learning content. More dynamic interaction with digital content such as mini-games, could increase learners' self-efficacy, where they can develop and boost learners' confidence in their capabilities to study the content in a digital environment (Alqurashi, 2017).

Interactive games enable learners to participate actively instead of passively consuming content. More active interaction with such content can often increase learners' self-efficacy, which can develop and boost learners' confidence in their capabilities to study the content in a digital environment (Alqurashi, 2017). For instance, a supermarket chain in the UK (Tesco) adopts mini-games for compliance training. Ten mini-games are delivered with testing on a particular aspect integrated within each game. The games contain scenarios for learners to problem-solve in various situations, improving engagement in online learning. Another example is 'Broken Co-worker,' which engages learners through interactive scenarios that adopt comic and video styles.

Micro-learning is not just a quick and easy way to improve upon a boring learning programme, as it can take just as long to design, develop, and implement (Kapp and Defilice, 2019). To create effective micro-learning environments, design considerations related to content, pedagogy, and

technology are essential (Alqurashi, 2017). When mini-games are used to support micro-learning, the design should include balancing learning and play, ensuring engagement is enhanced.

## 2. MATERIALS AND METHODS

The overarching aim was to investigate the potential use of interactive mini-game resources on an online learning platform for supporting engagement with need to develop competences for mitigating cultural risks. The scope of the investigation was within the context of five countries across Europe – Cyprus, Italy, Latvia, Poland, and the United Kingdom. Table 1 lists the four-step methodology and the associated sample size.

**Table 1.** Research sample – overview.

	<b>Poland</b>	<b>Latvia</b>	<b>Italy</b>	<b>Cyprus</b>	<b>the UK</b>	<b>TOTAL</b>
<b>Phase 1 – Literature review and AHP to rank topic importance</b>						
AHP method (No of partner employees engaged in the ranking exercise)	6	4	4	3	5	22
<b>Phase 2 – Managers and employees' consultations</b>						
Number of respondents in total	30	30	33	34	27	154
<b>Phase 3 – Development of the course materials (peer-review)</b>						
Number of people from each partner organisation	6	4	4	3	5	22
<b>Phase 4 – Evaluation phases (March 2020 – January 2021)</b>						
Alpha testing (students)	6 (71)	5	5	6	6	99
Beta testing (students)	14 (69)	10	11	10	10	124
Total testing participants						223

The development and evaluation process consisted of the following phases in Table 2.

**Table 2.** Research phases.

Phase	Description
1	Phase 1 involved an in-depth literature review based on national and international sources. The authors analysed the keywords related to cultural diversity in the organisations and possible risks that may occur towards identifying the relevant topics. To assess the level of importance of the identified topics, the Analytic Hierarchy Process (AHP; Saaty, 1996) was used in the five partner organisations. The hierarchisation was performed by managers, diversity officers, and researchers of cultural and diversity aspects (n=22).
2	To confirm the risks synthesised in Phase 1, managers and employees from multicultural organisations in the five countries (n=154) were consulted. Key competences associated with the identified topics were identified.
3	A browser-based online training platform, consisting of 15 mini-games in various forms, was developed. The design aspects were mapped against the specific learning objectives based on Arnab et al. (2015) 's learning mechanics-game mechanics mapping (LM-GM) model. The resources were iteratively developed, tested, and refined by project members across the five countries (n=22), which included translation of contents.
4	The evaluation phase followed a two-phase testing process (Alpha and Beta testing) to gain feedback on the educational materials, online training platform, and the associated interactive resources. A questionnaire (5-point Likert scale) was used, which consisted of three main parts: the training relevance, impact on outcomes, the sufficiency of the training materials, and the efficiency of the process. Altogether 223 participants took part in the evaluation phase, which included a total of 140 university students in Poland (who+ carried out additional evaluation of the mini-games). During the alpha testing (March – April 2020), feedback was collected to assess the first version of the online educational platform and the associated resources. Beta testing (June 2020 – January 2021) involved the evaluation of the improved version of the resources.

### 2.1. Phases 1 and 2 – Topic and the Competence Map

National and international literature were reviewed and synthesised to identify relevant cultural challenges commonly associated with the countries mentioned above, leading to the articulation of eight topics, which were then established as the primary training module headings (see Table 3).

**Table 3.** Proposed training modules vs cultural challenges.

<b>Module (M)</b>	<b>Scope of the Module</b>	<b>Findings from the literature</b>
M1: Cross-cultural awareness	To introduce cross-cultural awareness to managers and employees on culture in general, cultural differences, individuals, and society.	<ul style="list-style-type: none"> <li>• Migration of people from different cultures (Czaińska, 2017).</li> <li>• Societies vs. behaviours (Kostrzyńska, 2018).</li> </ul>
M2: Understanding different cultures	To identify different cultures in the workplace and the role of tolerance among people from different cultures.	<ul style="list-style-type: none"> <li>• Culture or religion-related impediments to communication (Singh, 2014).</li> <li>• Different perception of body language and gestures.</li> <li>• Different attitude to conflict situations (Hanovs, 2016).</li> <li>• Different attitude to openness (Laizane et al., 2015).</li> </ul>
M3: Stereotypes	To introduce cultural stereotypes and their influence on people working in multicultural organisations. To understand cultural stereotypes and possible cultural biases, prejudices, and beliefs.	<ul style="list-style-type: none"> <li>• Deeply rooted stereotypes and prejudices (Adamczyk, 2017).</li> <li>• Cultural prejudice, bias, and discrimination in the workplace (Jones et al., 2016, Triana et al., 2015).</li> </ul>
M4: Communication	To introduce the main communication styles to managers and employees in the workplace, and the differences in verbal and non-verbal communication among people of different cultures.	<ul style="list-style-type: none"> <li>• Communication problems (Dębczyńska, 2017).</li> <li>• Communication breakdown due to language barriers (Hussain, 2018).</li> <li>• Different communication styles (Rožukalne et al., 2017).</li> </ul>
M5: Teamwork	To identify management styles of multicultural team, problem solving ways, emotional intelligence.	<ul style="list-style-type: none"> <li>• Different perception of time (Bussotti, 2017, Allievi, 2010; Rožukalne et al., 2017)</li> <li>• Different perception of organisational hierarchy</li> <li>• Different attitude to conflict situations (Hanovs, 2016).</li> <li>• Different attitude to fulfilment of tasks (Brands-Kehre, 2014).</li> </ul>
M6: Leadership and hierarchy	To identify culture and management factors related to leadership development in the	<ul style="list-style-type: none"> <li>• Traditional approach to work and low acceptance of methods used in high-context cultures (Richardson &amp; Smith, 2007;</li> </ul>

	organisation, and to use them to improve the quality of work.	Ahmed et al., 2009). • Individualism vs. collectivism in the workplace (Meng, 2010; Lee et al., 2019).
M7: Learning styles	To introduce learning styles, cultural influences on learning styles and how to differentiate between learning styles in the organisation.	• Different perception of time (Rožukalne et al., 2017; Yang, 2017; Kurtes et al., 2017).
M8: Qualities in the workplace	To implement important factors that can support effectiveness in the workplace; the role of attitudes, skills, values, and other factors responsible for the quality of work in the workplace.	• Lack of skilled workforce (e.g.: in the IT sector). • Lack of equal opportunities in the workplace (McLaughlin et al., 2004, Lane et al., 2015, Gaucher et al., 2011, Quillian et al., 2017). • Different attitude to fulfilment of tasks (Brands-Kehre, 2014).

The topics are further analysed for importance using the AHP method, where the hierarchisation of the modules was carried out by the employees of the partners' organisations. The summary of the hierarchisation research is included in Table 4.

**Table 4.** Research results based on the AHP method.

Module	M1	M2	M3	M4	M5	M6	M7	M8
Mean	0.244	0.211	0.092	0.120	0.138	0.045	0.083	0.066
Ranking	1	2	5	4	3	8	6	7

M1 and M2 were identified as the most important, corresponding to 'Cross-cultural awareness' and 'Understanding different cultures'. A high mean value corresponds to the most important and most interesting. The least preferred modules were M6 and M8, corresponding to 'Leadership and Hierarchy' and 'Qualities in the Working Place'. It may stem from the fact that 'Cross-cultural awareness' and 'Understanding different cultures' modules include various elements directly related to a better understanding of cultural diversity.

To confirm the theoretical research and the correctness of the partners' decisions on the hierarchisation, personnel from multicultural organisations, including managers and employees, were consulted to identify critical competences related to the identified topics and the respective modules. Altogether, there were 154 questionnaires collected in the project partner countries (see Table 5). The survey ran between October 2018 – February 2019.

**Table 5.** Overall participant demography across the phases.

Country	Cyprus	Italy	Latvia	Poland	The UK
<b>Number of survey respondents</b>	34	33	30	30	27
<b>Types [%]</b>					
Managers	41.18	9.09	20.0	33.3	55.6
Other employees	41.18	66.67	46.7	56.7	29.6
Others interested in the topic	17.65	27.27	33.3	10.0	14.8
<b>Interviewees' affiliations [%]</b>					
Currently in a multicultural organisation	73.53	81.82	60.0	86.7	92.6
Previously in multicultural organisation	20.59	6.06	23.3	10.0	7.4
Have never been in such an organisation	5.88	12.12	16.7	3.3	0.0

Each module consists of a list of competences, which the target groups assessed. According to the survey results, most cultural competences – out of the 34 included in the questionnaire – were evaluated as "very important" and "important" for coping with cultural risks in multicultural organisations. The five most essential competences are as follows:

- To understand why people from different cultures behave differently (mean 3.67).
- To identify the effective ways to solve problems in a multicultural organisation (mean 3.53).
- To understand the role of tolerance between people of different cultures (mean 3.52).
- To analyse differences in meanings of one word or sign in different languages (mean 3.46).
- To identify possible cultural biases, prejudices, and beliefs (mean 3.44).

The least important competence, out of the 34 included in the questionnaire, was 'to get familiar with interesting models of culture, i.e., Iceberg Model of Culture, Hofstede's Cultural Dimensions Theory, Milton Bennett's Cultural Sensitivity Model' (mean 2.53). The explanation could be that this is the most theoretical aspect, and the target groups were interested in a more practical aspect of the competences. The more practical a competence, the higher the final score was.

The competence map was developed based on the findings from Phase 1 and the survey performed in Phase 2. Table 6 shows an example of the mapping.

**Table 6.** Cultural competence map examples – Modules 1 and 2.

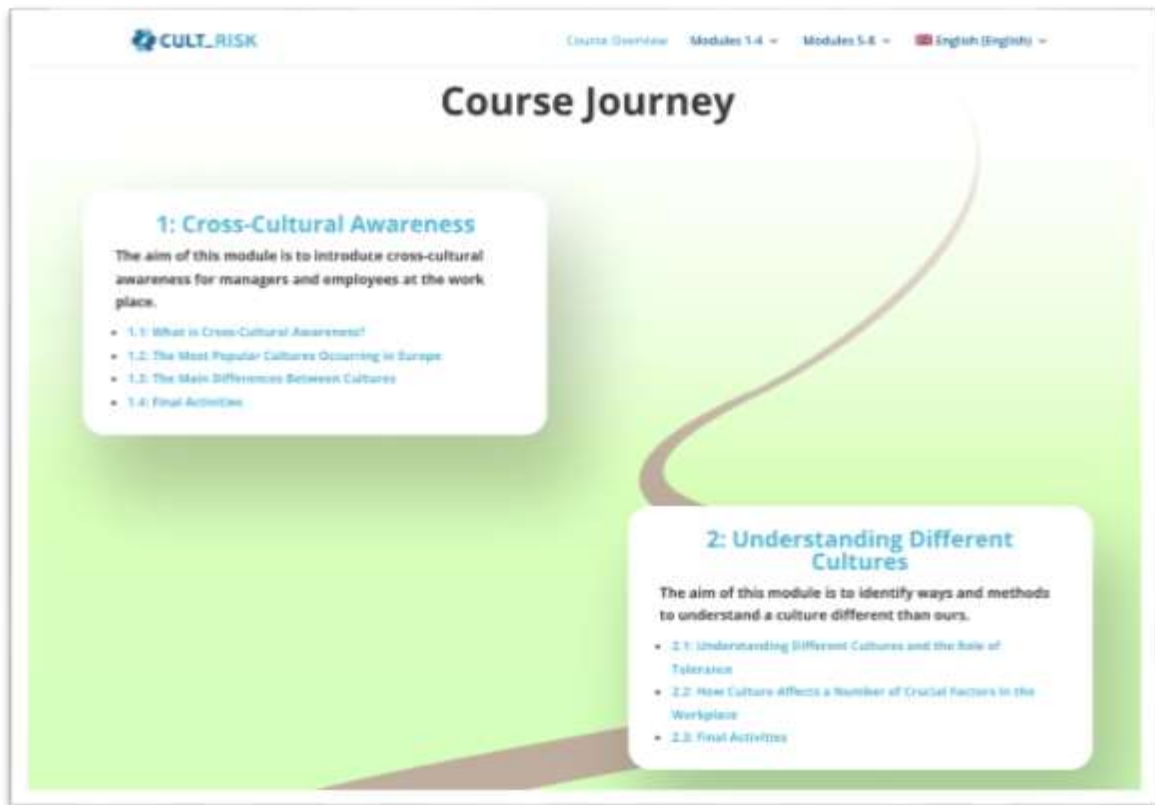
Module (M)	Units	Knowledge	Competences
<b>M1.</b> <b>Cross-cultural awareness</b>	U1.1. What is cross-cultural awareness?	to learn the concepts of 'culture', 'cultural awareness', 'culture sensitivity' and 'culture shock'	to outline the concepts of 'culture', 'cultural awareness', 'culture sensitivity' and 'culture shock'
	U1.2. The most popular cultures occurring in Europe	to identify cultural diversity in Europe	to illustrate the most popular cultures in Europe



	U1.3. The main differences between cultures	to identify cultural and personal diversity	to categorise between cultural differences of the society and differences of individuals
		to draw differences between cultures	to analyse the main differences between own and other cultures
<b>M2. Understanding different cultures</b>	U2.1. Understanding different cultures and the role of tolerance	to define the role of tolerance among people of different cultures	to outline the role of tolerance among people of different cultures
		to describe why people from different cultures can behave differently	to determine why people from different cultures can behave differently
	U2.2. How culture affects a number of crucial factors in the workplace?	to identify nuances in cultural norms and values	to analyse nuances in cultural norms and values
		to find the key cultural drivers and attitudes (i.e.: time, space, authority, risk, tasks, and relationships)	to analyse the key cultural drivers and attitudes (i.e., time, space, authority, risk, tasks, and relationships)

## 2.2. Phase 3 - Resource Development

Interactive and online learning content consisting of micro-learning resources was developed based on the module and competence map. The module-based approach was according to the European Credit System for Vocational Education and Training (ECVET (European Credit System for Vocational Education and Training)) principles corresponding to a set of learning outcomes in terms of knowledge and competences. All training resources and materials were developed as standalone elements following the same framework. The presentation of both content and activities is highly modular (see Figure 1).



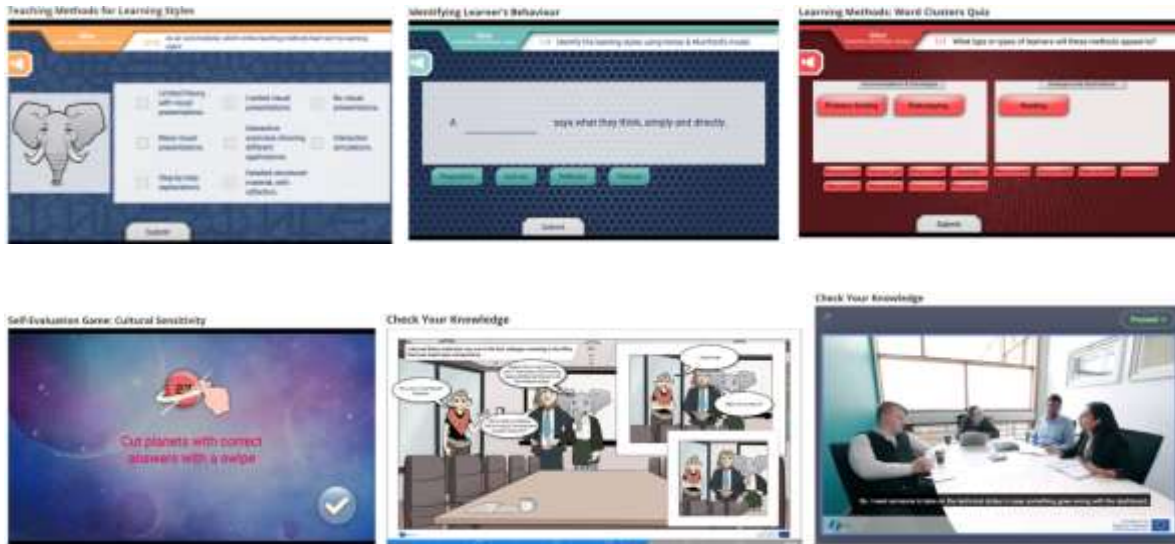
**Figure 1:** The online platform with modular resources (<https://culturalrisk-course.com/>).

Each module comes with an overview of the specific topic and the corresponding units of learning (knowledge and competences) to be covered. Each unit contains micro-learning materials, external reference materials, and self-reflection questions. The learning materials include visually attractive PowerPoint presentations and interactive media, such as mini-games that address specific learning objectives of the units, which allow specific topics to be represented engagingly.

The design of the mini-game activities considered game-based pedagogy and design approaches. The selection of the mini-game categories/types (see Figure 2) was informed by the four aesthetic representations (Hunicke et al., 2004), which include (1) Challenge – Game as an obstacle course, (2) Discovery – Game as uncharted territory, (3) Fantasy – Game as make belief, and (4) Expression – Game as self-discovery. There are five mini-game types:

- 'MCQ (Multiple Choice Question)' quizzes - challenges in the form of multiple-choice questions with time pressure;
- 'Drag-and-drop' quizzes – challenges with time pressure and the 'drag-and-drop' action acting as the obstacle course;
- 'Animated' target-and-swipe' games - challenges, where players need to swipe the planets with the correct answers under a time constraint;
- 'Comic book' games – fantasy with engaging scenarios featuring imaginary characters;

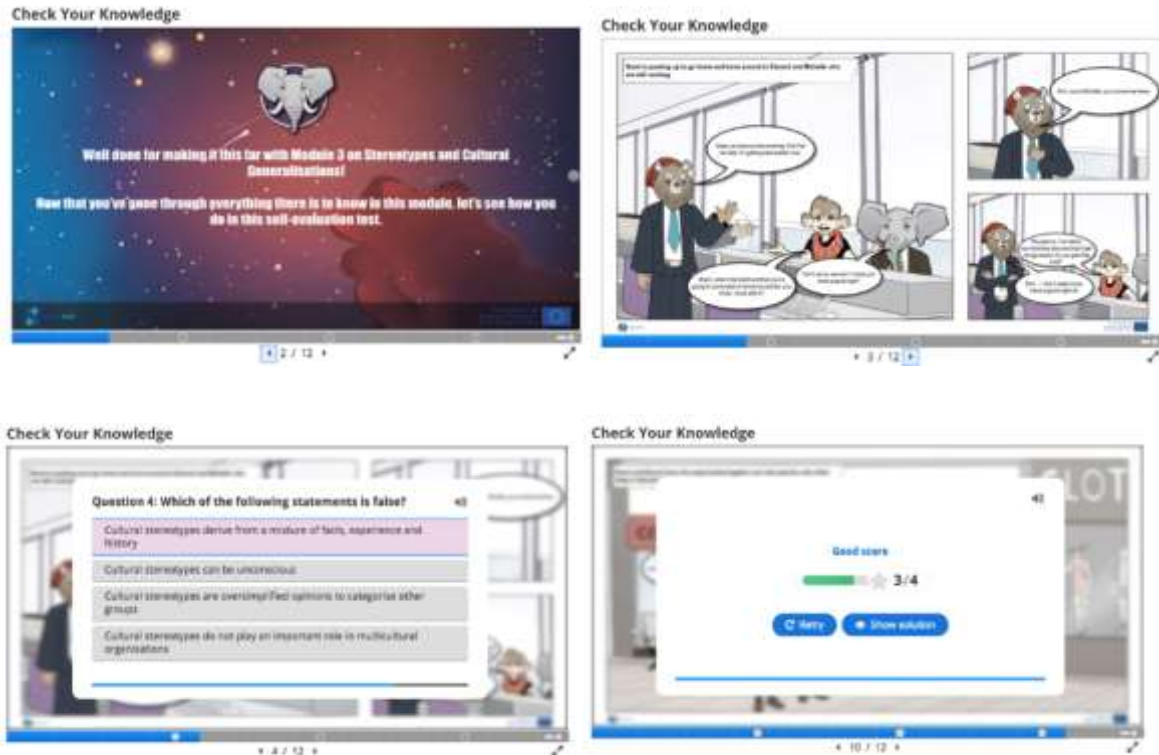
- 'Video scenario' games – fantasy and expression providing branching scenarios, where the player's responses determine the ensuing narrative as they traverse the game.



**Figure 2:** Mini-game categories (left to right, top down): 'MCQ' quiz, 'drag-and-drop' (fill in the blank), 'drag-and-drop' (word cluster), animated 'target-and-swipe', 'comic book', and 'video scenario'.

Project partners iteratively co-designed the learning materials, including peer-reviewing content-related elements and the visual side of the system in a co-creative participatory approach. The co-creation involved storyboarding the pathway for the resources to be encapsulated as a learning journey or context relevant to the identified learning needs. It also assessed the relevance of different types of learning resources (trans-media resources, such as videos, games, literature, stories, and the like) to be included in this learning journey via the tool. The Learning Mechanics informed the design of the mini-game resources - Game Mechanics Mapping (LM-GM) framework (Arnab et al. 2015) to design and develop a suite of games with simple mechanics.

To demonstrate the mapping exercise during the design process, Table 7 summarises the high-level LM-GM of the Comic Book game design (see Figure 3). The game serves as the 'check your knowledge' part of Unit 3 of Module 3 on cultural stereotypes and generalisations, which enables learners to reflect and assess their knowledge. The narrative within the comic includes examples of scenarios set in an office context, such as incidents involving stereotypical comments made towards a colleague that highlights risk and impact of cultural biases and prejudices. Learners play through the comic book scenarios and respond to questions concerning cultural stereotype and associated risks, impact of cultural stereotypes and cultural biases, and various kinds of of cultural stereotypes. Aligning with the fantasy aesthetics and to avoid any potential biases or stereotypes, the design adopts a cultural agnostic approach where animal characters were heavily used in the scenarios.



**Figure 4:** Screenshots of the Comic Book.

**Table 7.** Simple LMGM mapping of a Comic Book quiz game.

Learning Objective	Learning Mechanics	Game Mechanics	Implementation
To reflect and assess knowledge of cultural stereotypes and cultural generalisations	Hypothesis	Narrative	Comic-style scenarios with cultural-agnostic characters and dialogues to present the narrative, enabling learners to hypothesise and reflect on the incidents portrayed in the scenarios.
	Reflect	Endogenous fantasy	
	Q&A	Selecting	Related questions embedded in the scenarios, where learners must select the correct answer to proceed.
	Identify	Quiz	
	Feedback	Scores	The use of multimedia feedback to flag correct and incorrect answers, and to display summary scores.
	Reflection	Feedback	Provide a summary of correct answers to the questions, allowing players' reflection.

### 2.3. Testing and evaluation of the online training programme and resources (phase 4)

To verify whether the developed materials are relevant to the target groups, two testing phases were performed (as described in the previous Table 2).

#### 2.3.1. Overall platform and resources

Two hundred twenty-three participants comprised of employees of multicultural organisations, trainers, adult educators, and students tested the platform and completed the surveys to assess the various elements of the platform. During the alpha testing, the participants' feedback was used to assess the first developed version of the materials and online platform to improve the quality of the training methodology and material and modify and better adapt the course to the needs of the target groups. In the beta testing, the participants assessed the improved version of the materials and interactive online platform. The results of the testing phases are presented in Table 8.

**Table 8.** Testing phase results.

Sections included in the questionnaire	Frequency (number of times as '5- excellent' and '4- good')	
	Alpha testing [%]	Beta testing [%]
<b>Training relevance</b>		
How would you rate the overall quality of the online training programme and online platform?	73	94
How valuable was the training programme in helping you gain new knowledge and skills?	83	92
Will you utilise the knowledge and skills gained whilst undertaking the programme? Does the tested material meet your needs?	85	86
The Cult Risk methodology is appropriate to my educational needs.	89	90
The Cult Risk methodology enables me to engage managers and employees in the training process.	88	88
The Cult Risk training material facilitates the learning process.	85	92
<i>Mean:</i>	84	90
<b>Impact of outcomes</b>		
Do you think the competences acquired are useful in multicultural organisations?	91	93
Do you think the training material and online platform can easily be used by multicultural organisations to train managers and employees?	95	95
<i>Mean:</i>	93	94
<b>Sufficiency of the training materials and efficiency of the process</b>		

The quantity of information provided.	95	93
The quality of the content explained.	89	94
The language and layout of the materials.	88	91
How clear the material is, how easy it is to understand.	85	89
The adequacy of the provided educational material.	92	92
Navigation and usability of the courses training material.	89	92
Overall graphic design of the learning environment.	95	96
Quality of the multimedia resources.	96	96
Form and organisation of the training materials.	91	93
<i>Mean:</i>	91	93
<b><i>Grand mean:</i></b>	<b>89</b>	<b>92</b>

The platform and the materials were evaluated positively, with the grand mean of 89% in the alpha testing and 92% in the beta testing rated as excellent or good by both internal and external adult educators, trainers, representatives of multicultural organisations, and students. Findings from the alpha testing demonstrated value in informing the improvements in the beta version.

In the beta testing, the respondents stated that the relevance of the training and the overall quality of the course is good or excellent (90% mean). Most adult educators and coaches confirm they will use the proposed materials in their practice. The training materials were highly regarded (93% mean). Notably, 96% commended the quality of the multimedia resources highly, demonstrating the effective role of interactive materials such as mini-games.

However, each module features a slight variation since project partners from different countries have implemented them. The additional reference materials provided were found to be very useful and of a high standard, offering access to further knowledge. However, they are almost exclusively available only in English, impeding participants from enjoying them in their national languages.

Participants agreed that cultural risk is a timely topic as cultural-related competences are critical to help improve communication with those of different nationalities and others of the same nationality and culture. The course was deemed to provide them with new awareness, encouraging empathy, tolerance, and integration.

The modular approach was particularly helpful. Even though the training programme and materials were developed by trainers (i.e., project partners) from five countries, there is a coherent organisation of the training material. In particular, the material covers a wide range of topics that are useful for facilitating classroom discourse or used as micro-learning materials for engaging learners with interactive learning contents and activities.

### 2.3.2 Interactive mini-games

The core element of the testing was to evaluate the engaging elements of the mini-games. In addition to the target groups from the partners' countries, students from the School of Economics

in Radom (Poland) have also tested the mini-games as part of the 'Social aspects of the integration process in Europe' module. The testing was done online due to the restrictions during the COVID-19 pandemic. The participants were students from countries such as Turkey, Kazakhstan, Senegal, Spain, the Philippines, China, and Nigeria. Altogether 140 students (2 separate cohorts) tested the online training programme (71 in alpha and 69 in beta testing) with a particular evaluation focus on the games. The additional questions focused on how engaging the mini-games are, whether they support the learning objectives and topics, whether they can be used as a separate learning resource, and ultimately which are the top three mini-games the learners find engaging and educational.

Out of the 140 students, 116 students found the interactive media to be highly engaging, 108 students found the games to be connected to the learning objectives, and 107 students stated that the mini-games could be used separately as standalone learning resources. The appreciation of the learning aspects of the mini-games demonstrates the value of including pedagogical perspectives in the creation of micro-learning resources, such as mini-games.

The students were also asked to rank the games, which were then synthesised to identify the most favourable game types. The combined frequency is summarised in Table 9.

**Table 9.** The combined frequency of times mini-games is collectively ranked in the top 3.

Mini-game types	Frequency (number of times)		Relative Frequency [%]	
	Alpha testing	Beta testing	Alpha testing	Beta testing
Comic Book	43	56	20	27
Drag-and-drop Quiz	80	67	38	32
Animated target-and-swipe	66	55	31	27
MCQ Quiz	24	20	11	10
Video-based	0	9	0	4

The most significant difference between the alpha and beta testing is the perception of the comic-book game type with a 7% increase in preference from alpha to beta. It may stem from the fact that a comic book is part of each module, so the students were able to find the comic books in different topics they were interested in the most. Most notably the comic-book game from Module 3 '*Working with stereotypes*' (1<sup>st</sup> choice for 59 students) and Module 1 '*Cross-cultural awareness*' (1<sup>st</sup> choice for 37 students). The interest in this game type may be due to the informal style of the comic to deliver fictional scenarios using illustrated characters that enhance the quizzes. Using engaging narratives with the mix of humour in the content enables learners to put their learning into context, motivating better engagement. The comic-based games also employed an ethnicity/cultural agnostic approach to avoid any potential stereotypes/biases in the scenarios.

The video materials were deemed to be the least interesting, however there is the increase in 4% between the two testing phases. Dialogue-based scenarios were also adopted in the video scenario games. The video scenarios depended on the quality of script and acting, which may have been

deemed too serious and lengthy compared to the 'comic book' scenarios. The video scenarios are longer in nature due to scenarios being acted out by actors and also due to the branching nature of the game compared to the comic book that is more linear. The mechanics and aesthetics of the video-based games were less playful compared to simpler approach to content representation (e.g., quiz, word cluster) and yet more interactive in nature (e.g., drag-and-drop, target-and-swipe with visual and audio feedback), which were more favourable amongst the participants. These games require less level of comprehension compared to the scenario-based approaches.

When compared to the hierarchy (AHP) of the ranking of the topics associated to the modules (from module 1-8) in Table 4, Module 1 excelled in both the hierarchy and the mini-game preference compared to other topics. Modules 7 and 8 demonstrate that interactive contents, such as mini-games, could positively affect engagement with topics that were initially deemed less interesting in the earlier phase of the project based on the hierarchy. Mini-game activities in module 7 (ranked no. 6 in the hierarchy) have collectively been consistently ranked in the top 3 in both testing phases. Module 8, which was ranked seventh in the hierarchy, also scored highly in the ranking of the mini-games.

### **3. CONCLUSIONS**

There is a need to promote 'cultural fusion', which refers to 'the energy released by the fusion of several different cultures in one single organisation' (Simpson, 2011). Raising awareness of cultural diversity could facilitate such 'cultural fusion.' Cultural awareness is most often intangible in quantitative terms but very tangible in qualitative terms.

This article discusses the potential of the application of interactive micro-learning content that aims to support intercultural competences in the workplace. In our investigations, we echo and further emphasise the need for such competences for the employees of multicultural organisations to mitigate risks, increase understanding of the different cultural backgrounds, and in doing so increase work effectiveness and wellbeing.

This article has discussed and presented a pragmatic approach to designing and developing the educational resources for supporting the development of the competences. The engagement with the target groups in the two-phase topic identifications has been critical to ensuring that the immediate needs of the target groups are addressed in the design and development of the educational resources. The pedagogical considerations are essential for ensuring that the design of the interactive content is mapped against the mechanics of learning. The evaluation phase demonstrated positive feedback from the participants who are currently engaging in multicultural environments. Around 77 percent of the participants agreed that the mini-games are highly related to the learning objectives and are suitable for use as standalone learning resources, aligning with the micro-learning approach.

Topics deemed not interesting or less relevant in the original hierarchy of topics received a high ranking when it came to the mini-game resources, demonstrating that using game-based resources



can improve engagement. There need to be further investigations into the different types of games within a micro-learning context and the impact of time, content, and mechanics complexity.

The research has addressed the challenges associated with the multiculturalism of employees in multicultural enterprises (on a micro level). The research significantly contributes to expanding the development practice in this area, precisely the design approach for the corresponding educational resources. The potential impact of the educational programme designed and developed could be extended to consider more international dimensions as the outcomes can be further adapted by enterprises globally. Future work will also include correlating the engagement with the assessment of knowledge and competencies.

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