Cultural Implications in the Acceptability of Game-Based Learning

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Abstract

While game-based learning (GBL) environments have been shown to facilitate learning, in culturally diverse populations (e.g., university classrooms), GBL may only appeal to a subset of the population. We investigated how culture may relate to acceptability of GBL in undergraduate students. We performed online, survey-based research with 489 undergraduate students (66.9% female) at a Canadian university to assess how their (1) level of Canadian identity (cultural integration) and (2) other cultural associations (e.g., East Asian, South Asian, Middle Eastern, European, North American) related to students' views on GBL, while adjusting for prior gaming exposure and gender. We found that perceptions of Canadian identity were strongly and positively related to views on GBL, which can be explained by Canadians' affinity to playful learning opportunities and familiarity with video-gaming. Students who identified as East Asian had the most positive views compared to all other cultural groups, irrespective of their integration in Canadian culture. Surprisingly, previous gaming exposure was negatively associated with the acceptability of GBL, though this relationship became more positive as students' identification with Canadian culture increased. Males had overall more positive views on GBL than females. Our findings give insight into cultural considerations for the design and evaluation of GBL for international populations. Our results are limited by the small sample sizes of certain cultural sub-groups, treating ordinal variables as ratio in our regressions, and through defining and assessing culture based on geographical regions. Future research should assess culture more broadly and survey populations internationally and especially from underrepresented cultural groups.

Keywords: cultural and social implications, games, media in education, teaching/learning strategies

Cultural Implications in the Acceptability of Game-Based Learning

Culture can loosely be understood as the goals, principles, views, characteristics, and inferences that are shared by members of a society (House et al., 2004; Spencer-Oatey, 2008), or a shared pattern of thinking that influences one's world view (Hofstede et al., 1991). Games have long been used to express culture, functioning as sociological agents in cultural development (Rieber, 1996; Tleubayev et al., 2017), while their acceptability and perceived value or harm to a society vary depending on the cultural context (Colwell & Kato, 2005; LaPensée, 2017; Parmar et al., 2008). These aspects are important considerations in the burgeoning research and development of game-based learning (GBL) applications. GBL is an appealing concept as it attracts student attention and promotes the completion of otherwise repetitive tasks (Gauthier et al., 2015; Mohammed & Mohan, 2010; Prensky, 2003), and has been shown to result in greater cognitive gains in comparison to traditional forms of learning interventions (Clark et al., 2016; Sitzmann, 2011; Vogel et al., 2006; Wouters et al., 2013). However, since research has shown that culture influences learning styles and preferences (National Academies of Sciences, Engineering, 2018; Reinecke & Bernstein, 2011; Swierczek & Bechter, 2010; Ziguras, 2001), it is important to investigate the relationship between culture and the efficacy and acceptability of games in education, which is underrepresented in the literature (Lukosch et al., 2017; Siala et al., 2019; Tsai et al., 2010). This is especially true in multicultural societies such as Canada (Brosseau & Dewing, 2018; Esses & Gardner, 1996), where the design of GBL that is more aligned with the preferences of one cultural group may stifle its effectiveness in other groups within the larger population (Meershoek et al., 2014). However, there is little research investigating the association between culture and preferences for GBL, and few studies report the cultural or ethnic demographics of their populations (Clark et al., 2016; Tsai et al., 2010). This research

investigates the impact of national cultural integration and other cultural associations, while adjusting for gender and perceptions of/exposure to video gaming, on university students' views and acceptance of GBL.

1. Background

To understand the socio-cultural influences behind learning with a game, the behaviour of the individuals that make up the culture needs to be evaluated. We use the Igbaria model of technology acceptance to explore possible reasons for GBL adoption. The Igbaria model incorporates perceived ease of use, perceived usefulness, self-efficacy, experience, and technology anxiety as factors influencing behavioural intention (Igbaria & Iivari, 1995). The model is highly influenced by social cognitive theory (SCT), which states that outcome expectation as well as one's technological self-efficacy are predictors of behaviour (Bandura, 1977). Outcome expectation can be seen as analogous to perceived usefulness used in the Igbaria model. Both factors surmise that individuals will likely perform an action when the outcome is expected to improve performance (Igbaria & Iivari, 1995). Self-efficacy is the belief that an individual can perform a particular action. Individuals that doubt their capabilities will be more easily discouraged by a failure, while those that are assured of their efficacy will be more likely to persevere until successful at the given task (Bandura, 1977). Likewise, perceived ease of use is the degree to which a person believes a particular action would be free of effort and thus goes hand in hand with self-efficacy (Igbaria & Iivari, 1995). Both constructs will be highly influenced by a person's familiarity with a technology.

Environmental and personal factors such as social norms and personal experience influence one's expectation and thus should also be considered. Subjective norms are

described as one's perception that specific behaviours are viewed as acceptable by those who are closest and important to them (Ajzen, 1991; Davis, 1989). It is theorized that subjective norms most greatly influence technology adoption when the individual lacks experience with a new technology, thereby judging its value based on subjective norms rather than its design or intended effect (Bourgonjon et al., 2011). As such, while there may be a variety of factors that might influence one's subjective norms surrounding GBL, these can broadly be summed up as factors associated with (1) cultural learning preferences and (2) societal views of gaming.

1.1. Cultural Learning Preferences

Culture plays an important role in learning (National Academies of Sciences, Engineering, 2018; Reinecke et al., 2011; Swierczek & Bechter, 2010; Ziguras, 2001). Members of the same cultural group tend to share similarities in the perception and processing of information (National Academies of Sciences, Engineering, 2018; Nisbett, 2003). There is evidence to suggest that fully localized user interfaces lead to increased work efficiency and user satisfaction (Ford & Gelderblom, 2003; Reinecke & Bernstein, 2011). Previous research has also identified two main contrasting learning styles based on Hofstede's cultural models: high context and low context learning styles (Swierczek & Bechter, 2010). Hofstede's theory attempts to broadly classify cultures based on several characteristics into five cultural dimensions (Hofstede, 1984). High context learning cultures are characterized by being teacher-centric, having a reactive learning style (characterized by learners focusing on data or facts), and being collectivist (i.e., preferring group-oriented work). This style is commonly observed in East Asian students. Low context cultures are characterized by using teachers as facilitators for learning, having active learning styles, preferring creativity and expression of opinion in their work, and being individually

achievement oriented. This style is observed in South Asian and European students (Nevgi et al., 2008; Swierczek & Bechter, 2010). Similar research has used Hofstede's model in the context of graphical user interface design, which revealed that many Western students preferred non-linear navigation with data that was less structured, while Eastern students expected to receive instructions with data that was presented in an ordered fashion (Reinecke et al., 2011). These findings are pertinent for the design of GBL, in terms of how interfaces and information are structured.

1.2. Societal Views on Gaming

The cultural stigma associated with gamers can serve as a barrier preventing the adoption of GBL. In many cultures, gamers are still viewed as the stereotypes depicted in popular media, which often portray gamers as 'lazy' men with social deficiencies (Kowert et al., 2014). The stigma that video games lead to violence is widely believed by many influential members of society, such as politicians, and is further amplified by the media, which can disproportionally report on the potentially harmful effects of video games (Kowert et al., 2012; Markey et al., 2019). These factors result in a negative societal view on gaming in general, especially by older individuals, such as parents, who can influence how their children perceive the value of GBL (Bourgonjon et al., 2011), or by females, who may perceive gaming as being a distinctly "masculine" activity (Behm-Morawitz & Mastro, 2009; Ogletree & Drake, 2007; Paaßen et al., 2017). Furthermore, many students hold a false belief that games are irrelevant to learning, leading to low perceived usefulness of GBL (Ke, 2008; Rieber, 1996). These beliefs could potentially be amplified for immigrant families from Eastern regions because education is often viewed much more seriously, serving as a tool to overcome discrimination and achieve a higher social status (Goyette & Xie, 1999; Tebben, 2017). For example, South Asian immigrant parents often view their children as integral to

increasing family pride and view education as a tool to advance their social status (Bhattacharya & Schoppelrey, 2004; Saw et al., 2013). The work-related structures of society can also serve to create negative subjective norms on gaming which could potentially inhibit GBL adoption; games could be viewed as a waste of time in countries where children work at an early age or where there is a strong work culture, such as Kenya and Japan respectively (Messenger, 2004; Pilla & Kuriansky, 2018; Super & Harkness, 1986). Immigrants from these countries tend to emphasize their children learning academic skills as a parallel to working (Chao, 1996). As such, GBL may not be taken seriously by this group and could be viewed as a waste of time.

The cultural considerations behind the design of learning technology are even more important in multicultural countries, such as Canada. Video gaming and computer-based learning in general are embedded in current Canadian culture. For instance, the Canadian Council on Learning (2009) stated that "Canada's younger generation is primed to exploit the potential of learning technologies. Computers […] and other manifestations of the digital age are now common throughout children's developmental years". GBL is seen as a promising method to utilize inquiry-based learning, an important aspect of the Canadian education system (Romero & Barma, 2015). Gaming is also embedded in Canadian culture: Canada features the 3rd largest game industry, is the 8th biggest country in terms of game revenue, and approximately 61% of Canadians are gamers (Entertainment Software Association of Canada, 2020; NewZoo, 2017). However, immigrants and non-permanent residents, who may not hold the same learning preferences and social norms as multi-generation Canadians, make up 23.4% of the Canadian population (Statistics Canada, 2016), which compels us to consider culture when performing research in this population. For example, our recent research investigating the efficacy of a GBL environment and interactive (non-game) simulation on

undergraduate biology students' understanding of dynamic molecular environments—and which did not consider participants' cultural background at the time—found that the game was more effective and acceptable for native English-speakers, while the non-game was more effective and acceptable for *non*-native English-speakers (Gauthier, 2018). Since both instruments contained the same written language, we surmised that differences in learning and engagement may have been culturally aligned, rather than a result of language barriers. This finding provoked the current research to investigate the relationship between cultural associations and views on GBL, to support or refute these assumptions.

2. Aims and Research Questions

This paper seeks to investigate the relationship between culture and the acceptability of GBL in an international undergraduate population in Canada. It uses the concept of cultural "Canadianness" to assess the degree to which students feel integrated in typical Canadian (western) culture, regardless of their cultural origin. It also measures cultural association/origin based on geographical region. It asks the following questions:

1. Does the degree of identification with cultural "Canadianness" relate to undergraduate students' acceptability of/views on GBL?

2. (A) Are students' associations with other cultures an additional contributing factor to their views on GBL, and is this relationship moderated by degree of integration with Canadian culture? (B) Which cultural groups have the highest/lowest mean views on GBL, when adjusting for other factors?

For both these questions, we controlled for gaming exposure (i.e., gaming habits and views on gaming), gender, and their interaction to describe their impact.

We hypothesized that students' acceptability of GBL will increase with their perceived level of integration with Canadian culture (i.e., cultural Canadianness). Other cultural origin(s) are also believed to influence views on GBL, due to factors such as cultural learning preferences and societal views towards gaming/gamers. Furthermore, we believed that individuals who identify as gamers or have familiarity with gaming will be much more open to GBL because of their higher perceived use and greater self-efficacy for the medium and should be controlled for. We seek to use emerging research on GBL and cultural education trends to explore the cultural factors behind GBL adoption and provide a possible direction for future research.

3. Method

This paper will often refer to tables or sections within our Supplementary Materials (SM) document, which offers a more detailed report of our methods and results.

3.1. Participants

Participants were recruited from a convenience sample of undergraduate students enrolled in second- and third-year biology courses at a prominent Canadian university. Participants were recruited via a short two-minute presentation at the beginning of a typical biology lecture and were provided with general information and a link to the web-based study via a post on their course websites. Students that completed the survey were compensated for their time by receiving a 0.5% bonus mark in a participating course.

3.2. Material

The survey was conducted online by using a password-protected survey platform (SurveyMonkey). The survey, which can be found in Section SM 1, contained 48 items that

were ordered into three sections (determined a priori), including (i) demographics and cultural association/background, (ii) gaming habits and views on gaming, and finally (iii) views on GBL.

3.2.1. Demographics

The demographics section collected information on gender, whether the participant was born in Canada, year of birth and (if applicable) year moved to Canada (used to calculate proportion of life lived in Canada) as well as questions to gauge their cultural alignment, such as the 5-point Likert scale items "Do you consider yourself part of Canadian culture?" (#8), "Do you consider your parents part of Canadian culture?" (#10), and multi-choice categorical items, e.g., "Apart from being Canadian, many of us have a relationship to other communities in which our families once lived. Which, if any, of the following communities do you consider yourself a part of? (Please check all that apply.)" (#9), which listed communities/cultural groups by region and/or nationality (e.g., English Canadian, American, East Asian, South Asian, etc.).

3.2.2. Gaming Habits and Views on Gaming.

These items were meant to gauge an individual's familiarity and self-efficacy with gaming. Items related to gaming habits (#12-15, e.g., "How often do you play console or computer games", 7-point scale from never to everyday) and self-efficacy (#19, "I feel lost when directions are not directly accessible in video games") were produced in-house. Other items in this section (#21-24) were modified from the Pew Research Center questionnaire on gamer identification (e.g., "Video games help develop problem solving skills.") (Duggan, 2015). Additional items were inspired by the concept of subjective norms from the technology acceptance model (#20, 25; e.g., "I am ashamed of playing games.") (Venkatesh

& Davis, 2000). Finally, a handful of items from Bourgonjon et al. (2010) that form the "experience with games" section of their survey were included in this section (#26-30; e.g., "Compared to people my age, I play a lot of video games").

3.2.3. Views on GBL

Several additional items from the Bourgonjon et al. (2010) study on student perception of video games in the classroom were modified for use in the undergraduate context to gauge student's views on GBL (#31-48; e.g., "Video games offer opportunities to experiment with knowledge.", "Using video games as a supplementary material in a course would improve my performance"). Bourgonjon et al. (2010) previously validated these items through exploratory factor analysis to find the structure of the data, followed by confirmatory factor analysis (CFA) to test the structure stability (Bourgonjon et al., 2010). Their results showed good validity of the construct, with a Kaiser-Meyer-Olkin measure of .947 indicating optimal sampling adequacy, a significant Barlett's test of sphericity ($p \leq .001$), and a five-factor structure that explained 74% of shared variance. The CFA revealed a "reasonable" match between the constructs and the hypothesized model with significant loadings of all items with the latent factors (Bourgonjon et al., 2010). Reliability of constructs varied from good to exceptional (Mohajan, 2017). While these items represent four out of five distinct constructs in Bourgonjon et al. (2010), i.e., perceived usefulness, ease of use, learning opportunities, and preferences for GBL, here we combine constructs to summarize students' views on GBL.

3.2.4. Survey Preparation

The survey was prepared for online distribution using the SurveyMonkey platform. The questions were bundled into the three sections listed in 3.2 and displayed on three

consecutive “pages”, progressed by clicking a “next” button. Ordinal items were computed numerically with values from 1-7 or from 1-5 (see SM Section 1.2-1.3) to facilitate data reduction and inferential analyses. Categorical questions were also saved numerically for the same reasons.

3.3. Protocol

Students logged into a secure study website with their student IDs and passwords. The website contained a SurveyMonkey link along with the password to the survey. The survey remained open for 27 days. Any incomplete surveys were discarded. Surveys which took under three minutes to complete were discarded because this was estimated to be the minimum amount of time to complete the survey at a maximum speed, where less time would indicate random clicking. The first completed attempt was kept for individuals that attempted the survey multiple times.

3.4. Data Reduction

Using SPSS v.23, our survey data were reduced through a Categorical Principal Component Analysis (CATPCA), following the method by Linting & van der Kooij (2012), which is a dimensional reduction technique that reduces a large number of variables (items) into a smaller number of dimensions with as little data loss as possible (Linting et al., 2007). CATPCA does not assume a linear relationship among the data and does not assume normalcy, allowing for optimal scaling to be specified when conducting the data analysis (Linting et al., 2007). Out of all 48 items, 36 were used in data reduction. The aim of the data reduction was to achieve two dimensions corresponding to variables needed for our inferential analyses (refer to SM Section 1 for items): (i) gaming experience and views of gaming as control variables (15 items: #12-15), and (ii) acceptability of GBL (18 items: #31-

48). Items were run with an ordinal analysis level when optimal scaling was performed (all but one item [#6] was ordinal in type). Optimal scaling is a process that quantifies categorical labels while accounting for as much of the variance as possible (Linting et al., 2007). There was some expectation that there would be overlap between gaming exposure and views on GBL items.

An exploratory data analysis technique such as CATPCA may require more than one analysis runs with a different number of items and dimensions to ensure meaningful data reduction (Linting & van der Kooij, 2012). Two runs were performed in total with two dimensions in the analysis: (1) views on GBL and (2) gaming habits and views on gaming (henceforth referred to as gaming exposure). The first model accounted for 49.21% variance of the data and had an Eigenvalue of 18.207. Dimension 1 (views on GBL) and Dimension 2 (gaming exposure) featured Cronbach's Alpha values of 0.955 and 0.778, respectively, indicating good internal consistency (Linting et al., 2007; Linting & van der Kooij, 2012). A second two-dimensional CATPCA run was conducted, but variables with centroid coordinates below 0.100 were omitted (refer to Table SM 2) as they did not contribute to the principal components (Linting et al., 2007; Linting & van der Kooij, 2012). After the removal of these variables, the percentage of variance accounted for increased to 57.39%, with an Eigenvalue of 17.791. Of this variance accounted for, 44.59% of the variance was due to the first dimension (views on GBL). This run featured Cronbach's Alpha values of .959 for the 1st dimension and .773 for the 2nd dimension, reflecting exceptional and satisfactory inter-rater reliability of the dimensions (Mohajan, 2017). Component loadings for both CATPCAs are given in SM Sections 2-3. The two dimensions were then used within inferential analyses to answer our research questions (approach described in Section 3.6).

Since we wanted to account for the potential extraneous effect of gaming exposure on views on GBL in our analysis, a rotation was not applied to enable us to observe the true relationship between these two dimensions; rotation would effectively cloud this relationship and make them difficult to interpret, as it would force-load items more highly on one dimension than another. As depicted in Figure SM 1, the CATPCA plot displays items that are highly correlated, which cluster together. Items such as “video games offer opportunities to experiment with knowledge” and “using video games as supplementary material in a course would improve my performance” cluster together on the first dimension (views on GBL). Items such as “I consider myself to be a gamer” and “I like playing video games” cluster on the second dimension (gaming exposure). Items with a negative stigma surrounding gaming such as “video games promote violent behaviour” are clustered negatively on both Dimensions 1 and 2. Items that cluster on the second dimension are also positively correlated with the first dimension, indicating that gaming exposure is related to views on GBL. Furthermore, the largest difference between clustered items for the first dimension lies with items that pertain to negative stigma which negatively cluster in the first dimension. Final component loadings are listed in Table SM 3.

3.5. Inferential Data Analyses

All analyses were performed in SPSS v.23, using $\alpha = 0.05$. Firstly, participant demographics were summarized with descriptive statistics and frequencies. Secondly, we used hierarchical linear regression models to test our hypotheses because we were looking for relationships between culture and views on GBL.

3.5.1. Analysis 1

To answer our first research question, we used the "views on GBL" dimension (the first CATPCA dimension) as the dependent variable. In the first step of the hierarchical analysis, we controlled for gaming exposure (the second CATPCA dimension; a continuous variable), gender (0=female; 1=male), and the interaction between gender and gaming exposure. Then, in a second step, we included our independent variable "cultural Canadianness" (survey item #8), as well as the interaction effects between cultural Canadianness and gender, and between cultural Canadianness and gaming exposure. Cultural Canadianness, which is a 5-point ordinal variable, was treated as a continuous variable for the purposes of hypothesis testing, which has been discussed as a valid approach, as long as assumptions of linear regression are not violated (Long & Freese, 2014; Pasta, 2009; Williams, 2020). As such, to ensure that the assumptions of linear regression were not violated, we (a) tested the normality of both standardized and unstandardized residuals resulting from the model using a Shapiro-Wilk test, and (b) tested the homoscedasticity of the data by plotting the regression standardized predicted value against the regression standardized residual. The results of assumption testing for Analysis 1 are presented in SM Section 6.

3.5.2. Analysis 2

To answer our second question, we selected a subset of participants who either associated only with being North American (including English/French Canadians, Americans, and Native Americans) or who associated with one additional cultural group other than North American (categorical survey item #9). Individuals who associated with two or more additional cultural groups were removed to simplify the analysis. "Views on GBL"

was again set as the dependent variable. The first step in the regression controlled for the effects of all variables included in Analysis 1 (Section 3.5.1). Then, to test the additional impact of cultural association, this categorical item variable was recoded as multiple "dummy" variables (e.g., South Asian = 0 or 1) and included as the main independent variables in the analysis in Step 2. The North American group was used as the reference variable. In a third step, the interaction between each cultural association dummy variable and cultural Canadianness (treated again as continuous) were inputted. We saved the adjusted predicted values for views on GBL outputted from this regression to do two things: (i) to perform post-hoc Spearman correlations between predicted views on GBL and cultural Canadianness, should interaction effects be observed in the regression; and (ii) to answer part (B) of the research question, by performing Bonferroni-adjusted pairwise comparisons, to test the mean differences in predicted views on GBL between groups of different cultural associations. Assumption tests for Analysis 2 are presented in SM Section 7.

4. Results

4.1. Participant composition

A total of 499 surveys were completed, with eight duplicate attempts from same participants and two who rushed through the survey in less than three mins. Resultantly, 489 participants were included in the analysis. Of these students, 156 students were male (31.9%), 327 were female (66.9%), and six participants (1.2%) did not disclose their gender. Participants were split between those who were born in Canada (50.7%) and those who moved to Canada (49.3%). Despite a large proportion of the participants were not born in Canada, levels of Canadian cultural identity were fairly high, with 67.3% agreeing or strongly agreeing to being culturally Canadian (Table SM 4-A). Contrastingly, participants rated their

parents' Canadian cultural identity somewhat lower, with only 31.7% falling in the agree/strongly agree categories (Table SM 4-B). The vast majority were native English-speakers, with only 2% of non-native speakers identifying as not being fluent in English (Table SM 4-C). Table SM 4-D demonstrates the cultural diversity of our student cohort; 28.6% of participants self-identified with two or more cultural groups (Table SM 4-E). The composition of cultural sub-groups within each level of cultural "Canadianness" is displayed in Figure 1. Most students reported playing console games never or very seldomly (52%), while some (20.5%) played a few times a week or more. Only 4.3% admitted to being ashamed of playing video games, while 18.6% believed gaming was a waste of time. 55.5% of students agreed or strongly agreed that they would be enthusiastic about using a video game in a course and 59.7% would vote in favour of using a video game in a course. Median Likert-scale responses on all survey items used in the CATPCA are presented in Table SM 5.

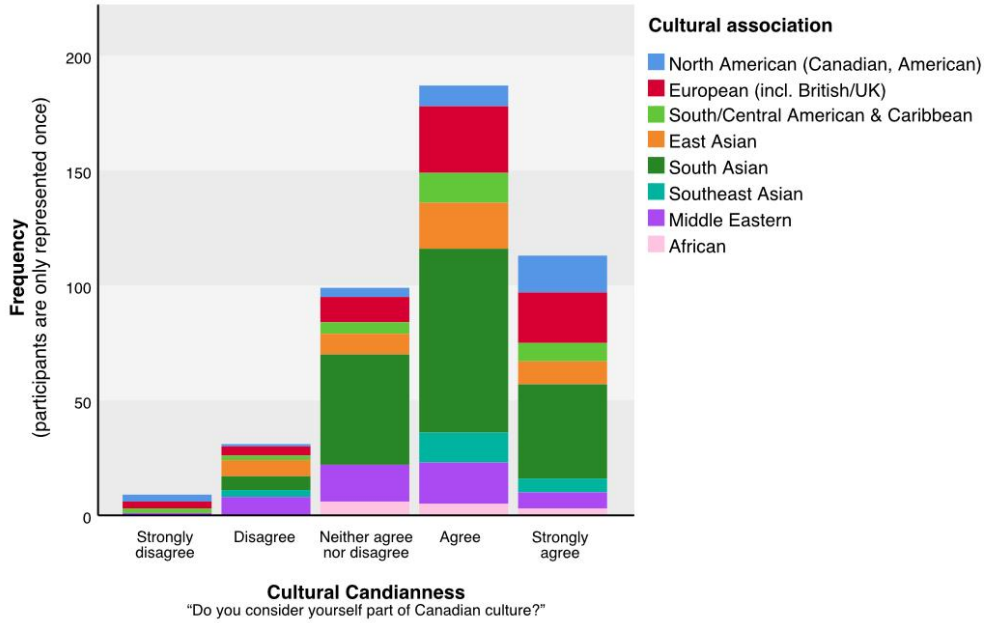

Figure 1. Cultural composition of participants within levels of Canadian identity. Each participant is only represented once in this graph: (1) individuals who identified as North American *and* another group are represented only as the other group, and (2) individuals who selected multiple cultural groups (not including the North American group) are not shown above.

4.2. Impact of Cultural "Canadianness" on Acceptability of GBL

Our first research question asked, "Does the degree of identification with cultural "Canadianness" relate to undergraduate students' acceptability of/views on GBL?". The dimension "views on GBL" had a minimum value of -2.97 and maximum value of 2.40, with an overall mean of 0.00 (SD=1.00); therefore, values above zero represent more positive views than average, while those below zero represent more negative views than average.

The detailed results from the hierarchical linear regression are presented in Table 1. The first step of the model, which controlled for gender, gaming exposure, and their interaction, was significant and explained about 7% of variance in the data, $\Delta F(3, 479) = 11.66$, $p < .001$. The second step, which tested the predictive impact of cultural Canadianness and its interaction with other variables, was also significant and explained an additional 4% of variance, $\Delta F(6, 476) = 6.88$, $p < .001$.

Table 1. Hierarchical regression results (Analysis 1) predicting views on game-based learning.

Variable	B	95% CI for B		SE B	β	R^2	ΔR^2
		LL	UL				
Step 1						0.07	0.07***
Constant	-0.22***	-0.33	-0.12	0.06			
Gender	0.58***	0.37	0.79	0.12	0.27***		
GameExp	-0.17**	-0.30	-0.05	0.06	-0.17**		
Gender*GameExp	0.11	-0.08	0.31	0.10	0.07		
Step 2						0.11	0.04***
Constant	-0.72***	-1.11	-0.33	0.20			
Gender	0.56***	0.36	0.77	0.11	0.26***		
GameExp	-0.63**	-1.08	-0.17	0.23	-0.63**		
Gender*GameExp	0.04	-0.66	0.73	0.35	0.02		
Cultural Canadianness	0.13**	0.03	0.23	0.05	0.13**		
Gender*Canadianness	0.03	-0.15	0.20	0.09	0.07		
GameExp*Canadianness	0.11*	0.00	0.23	0.06	0.45*		

Note. B = unstandardized coefficient; CI = confidence interval; LL = lower limit; UL = upper limit; SE = Standard Error; GameExp = Gaming Exposure.
*p < .05. **p < .01. ***p < .001.

The final model (Step 2) demonstrates a positive relationship between cultural Canadianness and views on GBL. Specifically, for every unit increase in Canadianness (e.g.,

from “neither agree nor disagree” to “agree”) views on GBL is predicted to increase by 0.13 units, $t(476) = 2.61$, $p = .009$, Figure 2. The contribution of gender to the model was also significant, with males being attributed with an increase of 0.56 units on views on GBL over females, $t(476) = 5.30$, $p < .001$, but that its interaction with level of cultural Canadianness is not significant (also visible in Figure 2).

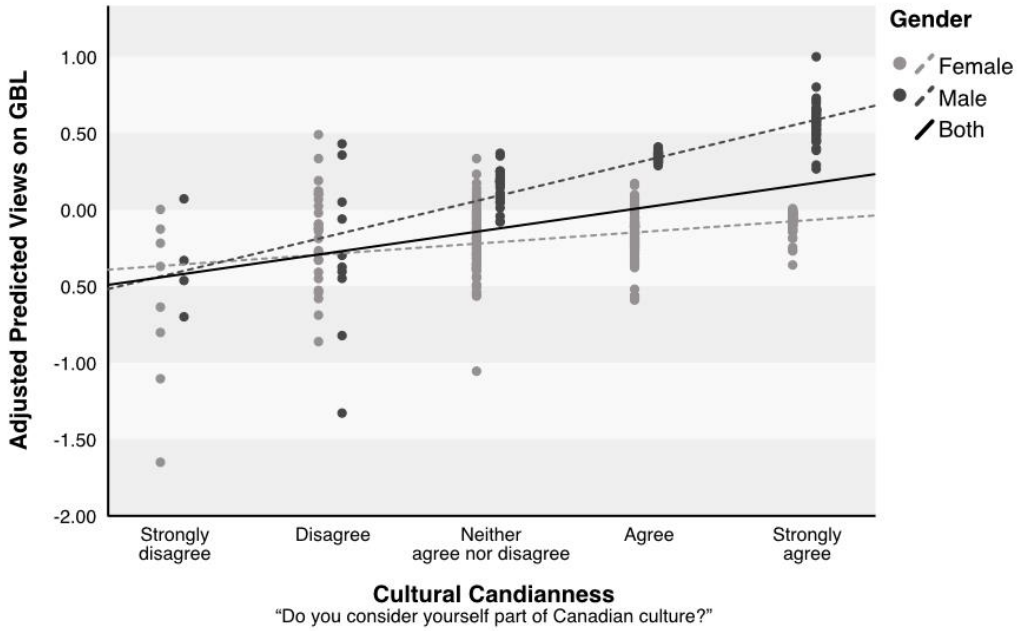

Figure 2. Adjusted predicted views on GBL (from regression Analysis 1) plotted against levels of cultural Canadianness, with gender indicated.

Furthermore, gaming exposure also made a significant contribution to the model, but not in the way we anticipated. Gaming exposure and views on gaming hold a negative relationship, with views decreasing by 0.63 units for every increasing unit of gaming exposure, $t(476) = -2.72$, $p = .007$. However, the interaction effect of gaming exposure and cultural Canadianness on views of GBL was also significant, and held a positive relationship with views on GBL, $t(476) = 1.98$, $p = .048$. This means that the negative relationship between views on GBL and gaming exposure becomes more positive as students’

identification with Canadian culture becomes stronger. This interaction is visualized in Figure 3.

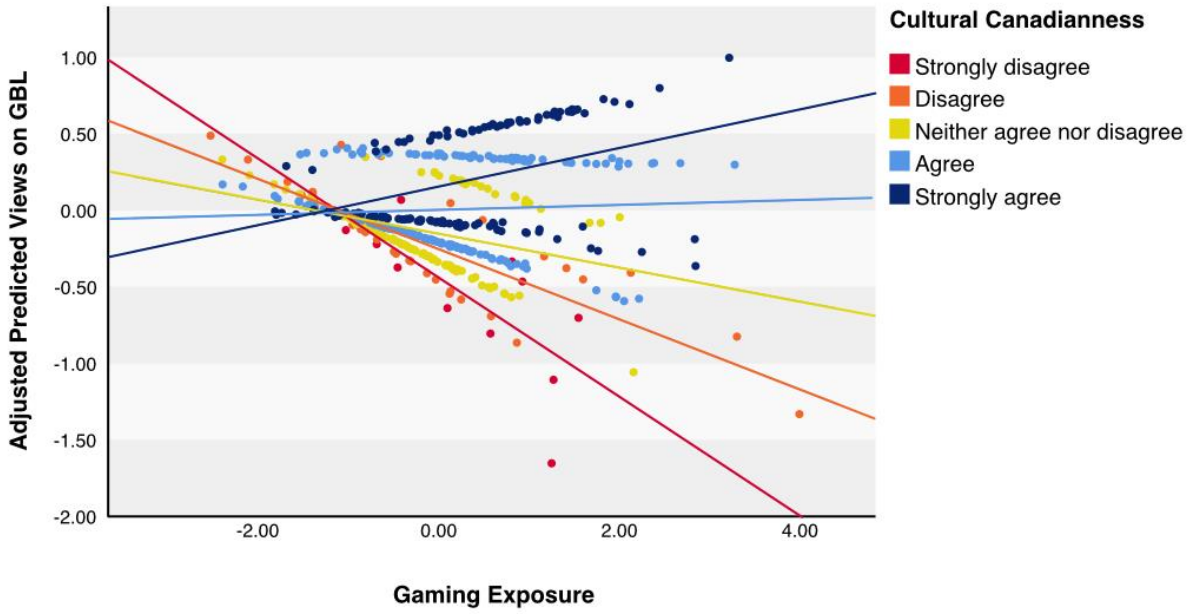

Figure 3. Adjusted predicted views on GBL (from regression Analysis 1) plotted against gaming exposure. Levels of cultural Canadianness are indicated to illustrate the significant interaction effect.

4.3. Impact of Cultural Group Association on Acceptability of GBL

Our second, two-part research question asked, "(A) Are students' associations with other cultures an additional contributing factor to their views on GBL, and is this relationship moderated by degree of integration with Canadian culture? (B) Which cultural groups have the highest/lowest mean views on GBL, when adjusting for other factors?"

Cultural association was measured based on self identification with a cultural group through a multiple-choice question (#9), wherein more than one answer could be chosen. Due to a low number of participants in certain cultural subgroups, the South/Central America & the Caribbean (5.5%), Southeast Asian (4.5%), and African (3.1%) groups were removed from this analysis. Furthermore, some groups were merged to create large enough groups for analysis: (i) the American (USA), English Canadian, French Canadian, and Aboriginal/First

Nations groups were merged to create a North American group, and (ii) the European, French (EU), and UK groups were similarly merged to create the European group. As such, five cultural groups, based on geographic origin, were included in the analysis: North American, European, South Asian, East Asian, and Middle Eastern. Finally, because participants could select multiple cultural affiliations on the survey, this needed to be accounted for prior to analysis. Since a measure of overall Canadian cultural identity was already implemented as an independent variable in Analysis 1, individuals who identified as North American *and* another group were assigned only as the other group for this analysis. For example, if a participant identified as English Canadian and East Asian, they were included in the East Asian group, since we already include a measure of their perceived "Canadianness". Furthermore, individuals who selected multiple cultural groups (not including the North American group) were excluded, since their cultural group could not be easily defined. To exemplify, if a participant identified as being English Canadian, East Asian, *and* European, they were excluded from this analysis, but if they identified as English Canadian, British (UK), and European, they were included in the merged European group. As such, a total of 360 participants were included in this analysis.

4.3.1. Part A

The regression is presented in Table 2. In this smaller sample, the variables previously tested in Analysis 1 accounts for approximately 10% of the variance in the data (Step 1), $\Delta F(6, 354) = 6.91$, $p < .001$. The additional predictive power of other cultural associations (Step 2) is significant and accounts for an additional 4% variance, $\Delta F(4, 350) = 4.13$, $p = .003$. Finally, the additional contribution of the interaction between cultural groups and cultural Canadianness covered another 3% of the variance, $\Delta F(4, 346) = 2.69$, $p = .031$.

Table 2**.** Hierarchical regression results (Analysis 2) predicting views on game-based learning.

Variable	B	95% CI for B		SE B	β	R^2	ΔR^2
		LL	UL				
Step 1						0.10	0.10***
Constant	-0.82***	-1.35	-0.30	0.27			
Gender	0.57***	0.33	0.81	0.12	0.27***		
GameExp	-0.57	-1.19	0.05	0.32	-0.57		
Gender*GameExp	0.16	-0.79	1.11	0.48	0.10		
Cultural Canadianness	0.14*	0.01	0.27	0.07	0.13*		
Gender*Canadianness	0.01	-0.23	0.24	0.12	0.01		
GameExp*Canadianness	0.11	-0.05	0.26	0.08	0.42		
Step 2						0.14	0.04**
Constant	-1.14***	-1.79	-0.49	0.33			
Gender	0.56***	0.32	0.80	0.12	0.27***		
GameExp	-0.83**	-1.46	-0.20	0.32	-0.84**		
Gender*GameExp	0.36	-0.59	1.30	0.48	0.23		
Cultural Canadianness	0.19**	0.06	0.32	0.07	0.17**		
Gender*Canadianness	-0.04	-0.27	0.20	0.12	-0.10		
GameExp*Canadianness	0.17*	0.01	0.32	0.08	0.66		
EuroBrit	-0.06	-0.46	0.35	0.20	-0.02		
EastAsian	0.63**	0.19	1.07	0.22	0.21**		
SouthAsian	0.07	-0.29	0.44	0.19	0.04		
MidEastern	0.18	-0.26	0.62	0.22	0.06		
Step 3						0.17	0.03*
Constant	-2.46**	-4.22	-0.69	0.90			
Gender	0.58***	0.35	0.82	0.12	0.28***		
GameExp	-0.86**	-1.50	-0.21	0.33	-0.86**		
Gender*GameExp	0.24	-0.70	1.18	0.48	0.15		
Cultural Canadianness	0.49*	0.09	0.89	0.20	0.44*		
Gender*Canadianness	0.00	-0.24	0.23	0.12	-0.01		
GameExp*Canadianness	0.16*	0.00	0.32	0.08	0.65*		
EuroBrit	0.42	-1.63	2.48	1.05	0.17		
EastAsian	3.03**	0.98	5.08	1.04	1.03**		
SouthAsian	1.27	-0.61	3.15	0.95	0.65		
MidEastern	2.18*	0.16	4.21	1.03	0.75*		
EuroBrit*Canadianness	-0.10	-0.57	0.38	0.24	-0.16		
EastAsian*Canadianness	-0.59*	-1.08	-0.11	0.25	-0.78*		
SouthAsian*Canadianness	-0.28	-0.71	0.16	0.22	-0.57		
MidEastern*Canadianness	-0.50*	-0.99	-0.01	0.25	-0.63*		

Note. B = unstandardized coefficient; CI = confidence interval; LL = lower limit; UL = upper limit; SE = Standard Error; GameExp = Gaming Exposure; EuroBrit = European/British; MidEast = Middle Eastern.
*p < .05. **p < .01. ***p < .001.

The final model (Step 3) demonstrates similar relationships to those observed in Analysis 1 between views on GBL and (i) cultural Canadianness (positive relationship), $t(346) = 2.41$, $p = .016$, (ii) gender (males > females), $t(346) = 4.84$, $p < .001$, (iii) gaming exposure (negative relationship), $t(346) = -2.61$, $p = .009$, and (iv) the interaction between gaming exposure and Canadianness (positive relationship), $t(346) = 2.01$, $p = .045$. The

model predicts that participants who associate with East Asian, $t(346) = 2.91$, $p = .004$, and Middle Eastern, $t(346) = 2.12$, $p = .035$, cultures are likely to have large increases in views on GBL relative to those who identify only as North American (the reference group), when considering other factors. Furthermore, while the relationship between cultural Canadianness and views on GBL is overall positive, as described above, the interaction between Canadianness and cultural group for East Asians and Middle Easterners has a negative relationship, $t(346) = -2.41$, $p = .017$ and $t(346) = -2.02$, $p = .044$ respectively, indicating that the degree of cultural Canadianness in these two subgroups has less positive impact than those who associate only as North American, thereby moderating the initial positive impact at the intercept observed in these two groups. Figure 4 demonstrates this interaction and is supported by post-hoc spearman correlations between Canadianness and predicted views on GBL in each cultural subgroup. Figure 4 depicts the strong positive slope, $r = 0.62$, $p < .001$, in the North American group juxtaposed against a weak negative slope for the Middle Eastern group, $r = -0.29$, $p = .045$, and a flat slope for the East Asian group, $r = 0.05$, $p = .752$. Both the European/British, $r = 0.66$, $p < .001$, and South Asian, $r = 0.53$, $p < .001$, groups have similarly strong positive slopes to the North American group.

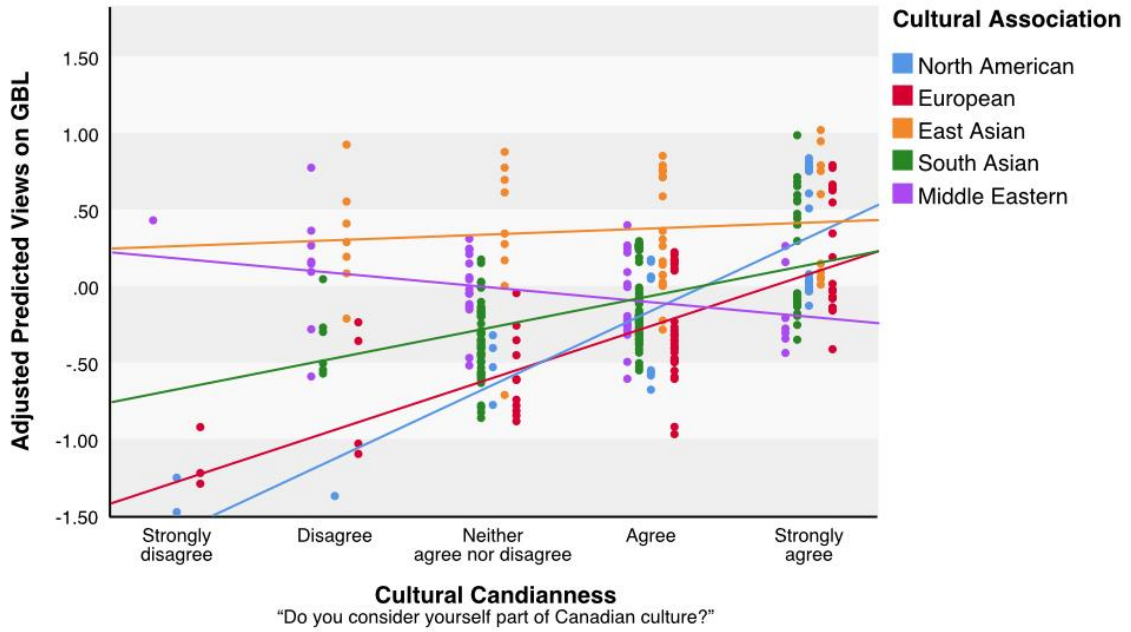

Figure 4. Adjusted predicted views on GBL (from Regression Analysis 2) plotted against levels of cultural Canadianness. Cultural association subgroups are indicated to illustrate the significant interaction effects.

4.3.2. Part B

Students who identified as East Asian had the highest mean unadjusted views on GBL (M = 0.361; SD = 0.72), followed by those who identified solely as North American (M = 0.002; SD = 1.09), then Middle Eastern (M = -0.014; SD = 1.06), South Asian (M = -0.107; SD = 0.89), and finally European (M = -0.160; SD = 1.21). We used Bonferroni-adjusted pairwise comparisons to assess whether these differences were significant *when adjusting for other factors* by testing the mean differences in predicted views on GBL, as outputted by the regression in Section 4.3.1. Adjusted means for all groups are presented in Table SM 8. The analyses indicated that individuals who identify as East Asian have significantly more positive views on GBL than all other cultural groups (Table 3), but that no other comparisons were significant (Table SM 9).

Table 3**.** Pairwise comparisons of predicted views on GBL, based on output from Model 2.

Cultural Group (I)	Cultural Group (J)	Mean difference (I-J)	SE	95% CI		Sig
				LL	UL	
EastAsian	NorthAm	.37***	0.09	.12	.62	.001***
	EuroBrit	.57***	0.07	.36	.77	< .001***
	SouthAsian	.47***	0.06	.29	.65	< .001***
	MidEast	.41***	0.08	.19	.63	< .001***

Note. SE = Standard Error; CI = confidence interval; LL = lower limit; UL = upper limit; NorthAm = North American; EuroBrit = European/British; MidEast = Middle Eastern.

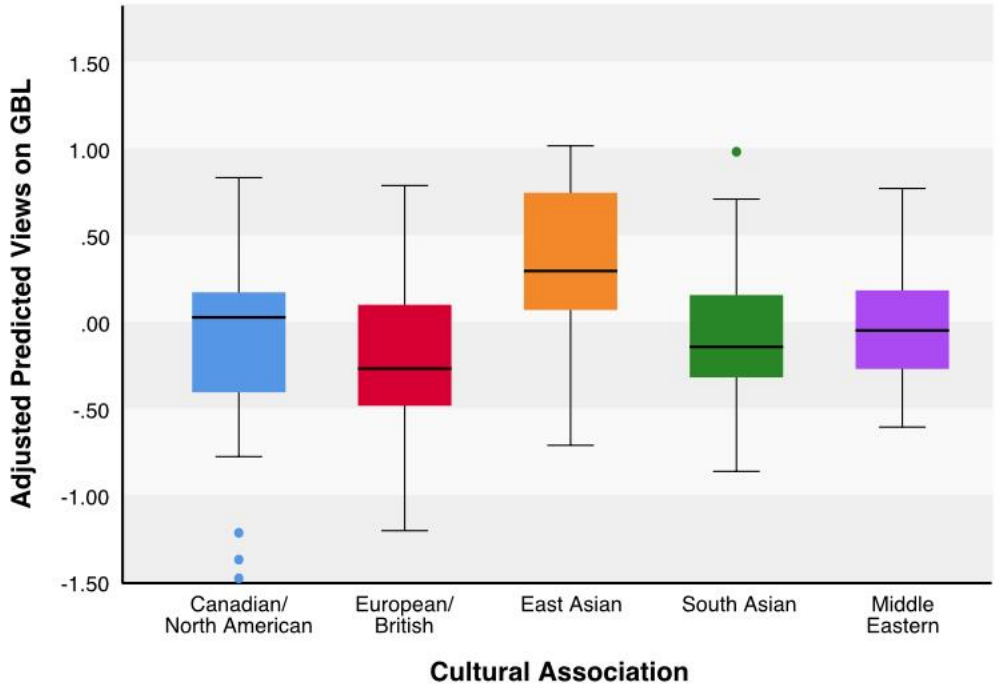

Figure 5. Box plot of adjusted predicted views on GBL (from Regression Analysis 2) by cultural association subgroups. The whiskers indicate the first and fourth data quartiles, coloured areas indicate the second and third quartiles, central lines indicate the medians, and dots represent outliers.

5. Discussion

5.1. Main findings

5.1.1. Canadian identity and acceptability toward game-based learning

Our results reveal a positive relationship between Canadian cultural identity and the acceptability of GBL. This is consistent with previous research which suggests that

"Western" cultures are familiarized with a low-context learning style and would, thus, be accepting of a non-linear, self-directed approach to learning, such as an educational game (Nevgi et al., 2008; Swierczek & Bechter, 2010). As gaming is deeply embedded in Canadian culture (Canadian Council on Learning, 2009; Entertainment Software Association of Canada, 2020; NewZoo, 2017; Romero & Barma, 2015), it is unsurprising that we observed a positive relationship between "Canadianness" and GBL acceptability; Canadians' familiarity and past experiences with gaming could lead to a greater perceived usefulness for the medium and greater self-efficacy for GBL, as evidenced by the interaction between cultural Canadianness and gaming exposure (discussed more below). An analysis of our demographic data reveals a more nuanced understanding of participants who identify themselves as "culturally Canadian". A majority of participants identified themselves as being culturally Canadian, despite many being born outside of Canada and many viewing their parents as *not* holding the same Canadian identity, which suggests a deep integration of younger generations into Canadian culture. Thus, individuals who associate themselves with Canadian culture are more likely to acknowledge the perceived learning opportunities and usefulness that comes from GBL, as well as have higher self-efficacy and lower anxiety surrounding the technology (Bandura, 1977; Igbaria & Iivari, 1995). This finding — that the degree of identification with a "Western" national culture (like Canada) positively correlates with acceptability of GBL — may be generalizable to other cultures with low-context learning styles and positive views on popular gaming, such as those found in the United States, United Kingdom, and other European nations.

Contrary to the Igberia model (Igbaria & Iivari, 1995) and the consensus seen in the literature surrounding models of this nature, gaming exposure held a negative relationship with views on GBL. An important aspect of the Igberia model is outcome

expectation/perceived usefulness, which is the theory that an action will likely be performed by an individual if the outcome is expected to improve one's performance. It was hypothesized that increased gaming exposure would dampen the influence of negative cultural stigmas on gaming thereby leading to higher perceived usefulness, meaning that individuals with high gaming exposure could better appreciated the potential opportunities and benefits of GBL as a medium. However, the negative relationship between gaming exposure and views on GBL demonstrates the opposite! Yet, our regression model also shows that the relationship between gaming exposure and views on GBL was influenced by the cultural lens through which it is experienced, indicated by the significant interaction effect between gaming exposure and cultural Canadianness. Specifically, with each degree increase in cultural Canadianness, gaming exposure held an increasingly positive relationship with views on GBL, reflecting the deep embedding of gaming into Canadian culture (Canadian Council on Learning, 2009; Entertainment Software Association of Canada, 2020; NewZoo, 2017; Romero & Barma, 2015).

Our analysis also revealed a significant contribution of gender on the model, as originally hypothesized. Males generally found GBL more acceptable than females, which reflects statistics that males are more likely to play video games and perform better within games than females (Hainey et al., 2011; Ogletree & Drake, 2007; Siala et al., 2019). The interaction between gender and cultural Canadianness was not significant, revealing that the propensity for male individuals to have better views on GBL is due to factors outside of Canadian cultural association and may be reflective of factors such as fear of stigmatization by women in overall gaming culture (Wolf & Perron, 2013).

5.1.2. Cultural association and views on GBL

Regardless of other cultural associations, the positive relationship between cultural Canadianness and acceptability of GBL holds for all cultures except the East Asian (who have high views regardless) and Middle Eastern (whose views are highest when they do not associate with Canadian culture) groups (Figure 4). However, some interesting relationships are observed between cultural association, Canadian cultural identity, and acceptability of GBL.

East Asian. East Asian participants were found to have significantly better views on GBL than all other cultural groups, and their perceptions were not related to their level of Canadian cultural identity. This finding might be unexpected if we appreciate only the literature on high/low-context learning cultures; with East Asians belonging to the high-context learning group (Swierczek & Bechter, 2010), we might expect them to have more negative views on GBL. However, these findings can possibly be explained by these individuals' exposure to, familiarity with, and higher self-efficacy with gaming. There is a growing gaming market in East Asia with 58% of the growth in the global games market coming from the Asia-Pacific region in 2016 (NewZoo, 2016). China is now the largest country in terms of game revenue with other East Asian countries such as Japan and Korea following by at 3rd and 6th respectively (NewZoo, 2017). Additionally, more online games are being created with Asian cultural taste in mind, which are partially reflective of the preferred game genres in each culture (Chen, 2014). In the west, male gamers prefer sports, action adventure, and simulation games, while female gamers preferred sports, puzzle, and platformer games; in countries like Taiwan, the most popular genres consist of roleplaying and fighting games (Chen, 2014). Massive multiplayer online roleplaying games (MMORPGs) have become popularized in the Asian gaming markets with Asian developers

creating hybrid MMORPGs that combine different game genres (Chen, 2014). Interestingly, many of the characteristics of MMORPGs, such as cooperative guild forming and raiding, are analogous to the teaching preferences outlined by high-context learning styles, such as collaborative group-based learning (Swierczek & Bechter, 2010); therefore, individuals who participate within a high-context educational system may, nonetheless, be amenable to GBL activities, due to their familiarity with cooperative games like MMORPGs. In support of this idea, Siala et al. (2019) found that females with high uncertainty avoidance (typical of high-context learning styles) were highly motivated by in-game rewards and incentives, thus possibly increasing their acceptability of GBL as observed in this study. In summary, East Asians likely have growing gaming exposure with cooperative games that reflect high-context learning styles, which may enable them to perceive the benefits of GBL and increase their self-efficacy towards game-based mediums.

Middle Eastern. Overall, the Middle Eastern students in our sample held similar views on GBL in comparison to other cultural groups with low-context learning styles (i.e., South Asian, European, and North American). Yet, they were also different from all cultural groups in that they exhibited decreasing views on GBL as Canadian cultural association increased. The negative relationship between Canadianness and views on GBL was weak but significant; Middle Eastern students in the strongly disagree to being culturally Canadian group exhibited higher mean predicted views on GBL in comparison to other levels of cultural Canadianness (Figure 4). This relationship is more difficult to explain, due to a paucity of research on GBL in this region, but it might partially be attributed to historical circumstances that lead to efforts to build nationalism by countries in this area (Baban, 2018). Furthermore, there is a young but burgeoning eSports (electronic sports) economy in the Middle East (Emirates NBD, 2018; McArthur, 2019). In 2018, The Arab eSports Federation

and the Global eSports Resources partnered together creating a new regulatory body for the Middle East (Martinelli, 2019). The goal of this partnership is to aid the development of video games and eSports within the Arab regions through regional championships and providing opportunities for players to participate in international tournaments (Smith, 2018). The growth of the gaming industry in the Middle East is growing at a rate of 26% each year, which is faster than the global average and one of the fastest growing online gaming populations in the world (Hammond, 2017). Furthermore, Middle Easterners tend to prefer a more active learning style, similar to Western students (Lemke-Westcott & Johnson, 2013); when looking at computer science and computer engineering freshmen and sophomores there was considerable similarity in learning style (Zualkernan et al., 2006). In summary, perhaps an active learning style—paired with a novel gaming modality—accounts for why GBL was highly acceptable to Middle Eastern students who did not identify as culturally Canadian. Despite the negative relationship between cultural Canadianness and views on GBL amongst Middle Eastern students, it should be noted that those who agreed to being culturally Canadian held similar views to students from other cultures who also identified as being Canadian (Figure 4). So, this negative relationship is perhaps not as contradictory to our hypotheses as it initially appears.

South Asian. The Indian gaming industry has grown nearly 60% over the past 3 years and is now valued at $930 million, with mobile gaming forming 85% of the industry (Navani, 2021). While more traditional forms of gaming, such as consoles, are deemed to be prohibitively expensive for most of the Indian population (Arora, 2018; Bhatia, 2020), the proliferation of cheap mobile phones in the country is allowing for a gaming community to evolve (Navani, 2021). The COVID-19 lockdown measures have increased gaming adoption in India, which now has grown to be the greatest downloader of mobile games at 7.3 billion

downloads in 2020 alone (Amin et al., 2020; Navani, 2021). Perhaps the reason for why South Asians' estimated views on GBL lowered with decreasing levels of cultural Canadianness is because of cultural learning preferences in South Asia. The importance of education is deeply ingrained into South Asian culture. It is often perceived as a means to improve the social class of the entire family and, thus, overcome the traditional social inequalities stipulated by traditional caste systems (Bhattacharya & Schoppelrey, 2004; Sen & Drèze, 1995). Immigrant parents from South Asia will often equate their child's academic success with elevating the honour and status of the family as a whole and thus take education seriously (Bhattacharya & Schoppelrey, 2004; Segal, 1991). Research has shown that one of the greatest factors in GBL adoption is the student's perception that the game would be easy and instructive (Iten & Petko, 2016). In a culture where strict traditional methods of teaching, such as the use of corporal punishment, are still common (Ghosh, 2016), a novel form of education, like GBL, could lead both teachers and students to doubt the instructive capabilities of the medium, leading to low perceived usefulness (Igbaria & Iivari, 1995). However, it is also worth noting that the relatively new gaming markets in regions like India and the Middle East may lead to younger individuals being more receptive to GBL than older individuals of the same culture as they are not as exposed to the same societal stigmas surrounding gaming.

European. Again, Europeans held statistically similar overall views on GBL as compared to other low-context learning cultures included in this study, as might be expected. However, the interaction between association with European culture and cultural Canadianness—wherein individuals who do not identify as Canadian have lower views on GBL—is less easily explained than, e.g., in the South Asian group. One might have expected to see relatively high acceptance of GBL across *all* levels of Canadian cultural identity

because European cultures generally practice low-context learning styles (Nevgi et al., 2008; Swierczek & Bechter, 2010) and exhibit similar levels of video game adoption as Canada (ISFE, 2020). However, acceptance rose sharply with each increasing degree of Canadian identity. Perhaps this is because some historically negative views/social stigmas around gaming may still be present in European culture. For example, when the Interactive Software Federation of Europe (ISFE) examined the top reason for individuals not playing video games back in 2010, it revealed a prominent belief amongst Europeans that the benefits of gaming were not sufficient and, thus, they did not make time for the activity (ISFE, 2010); promoting the benefits of video games continues to be a top priority for the ISFE a decade later (ISFE, 2020). This sentiment is echoed by the finding that 9% of Europeans held the stigma that games are only for children (ISFE, 2010). This stigma was so pervasive that game developers had trouble being taken seriously by government and investors (Prato et al., 2010). Alternatively, the positive relationship between cultural Canadianness and views on GBL in the European group could possibly be explained by the long-standing claim that the social and cultural properties of European institutions need to be considered as distinct from North American institutes when it comes to study (Liebenau & Smithson, 1991). Or, perhaps this shows the diversity of European cultures in and of themselves and the inappropriateness of bundling these cultures based purely on geography (McSweeney, 2002). Contrastingly, Lukosch and colleagues (2017) found that German and Dutch students performed similarly to each other in a GBL environment and that both outperformed American and other cultural groups. A deeper and more up-to-date investigation into different European cultures, their views and social stigmas on video games, as well as their acceptability of GBL, is warranted.

North American. Finally, the North American group (consisting of English/French/Native Canadians and Americans) consisted of individuals who did not

identify with any other cultural group outside of North America. As might be expected 32/40 of these individuals agreed or strongly agreed to identifying as culturally Canadian and had relatively high levels of acceptability of GBL. Our data for North Americans who "strongly disagreed" (n=2), "disagreed" (n=1) and "neither agreed nor disagreed" (n=7) is weak due to small sample sizes, yet their more negative views on GBL may be explained by the rejection of popular Canadian culture, which encompasses video gaming to some extent (Entertainment Software Association of Canada, 2020; Romero & Barma, 2015).

5.2. Implications, limitations, and future directions

A main finding of this research was that university students' level of identification with Canadian culture—i.e., a culture with low-context learning style and perceived high-value of play and games outside of school—was strongly related to their perceptions toward GBL. We also found that (a) there was a strong, positive interaction between gaming exposure and Canadianness and (b) low-context learning cultures held similar views to each other that were, overall, lower than views held by a high-context learning culture (East Asian). Therefore, we believe that the relationship between cultural Canadianness and acceptability of GBL is primarily due to the societal views on gaming as a legitimate and worthwhile activity (which may be higher in Canadian culture than, e.g., in South Asia and Europe), rather than the distinction between low- and high-context learning styles. It is an important finding for (i) groups designing learning interventions for, and (ii) researchers investigating GBL in, highly diverse, multicultural populations, such as higher education classrooms. Large proportions of these classrooms may be composed of international students who attach stigmas to video gaming and, thus, may be averse to GBL approaches. As such, the implications are two-fold. Firstly, designers of GBL should consider the cultural composition of their adult target audiences and include explanatory features that reveal the

beneficial nature of the GBL components to those who may hold biases against gaming. Secondly, researchers investigating GBL interventions (whether culturally sensitive or otherwise) in university populations (amongst others) should document the cultural identity of their participants, so that their possible confounding effects may be accounted for.

While the current research makes an important contribution to the literature on culture and GBL, it suffers from a few limitations. Firstly, we treated our "culturally Canadian" Likert-scale variable as continuous in our analyses when it is ordinal in nature. This approach has precedence (Long & Freese, 2014; Pasta, 2009; Williams, 2020), but it must be considered that the degree of separation between each level of Canadianness may not be equal in reality. This danger is somewhat mitigated by checking the normality and homoscedasticity of adjusted residuals in the regression models. Secondly, our sample sizes for some of the cultural subgroups were small. For instance, we had to exclude some cultural groups (e.g., Caribbean, African, Southeast Asian) from our second regression because their numbers were too sparsely distributed over all levels of Canadian cultural identity; additionally, to compensate for sample size, we merged some cultural groups together based on geography (e.g., Europe) when the nations that make up these regions (e.g., Italy vs. France vs. Germany) may display very different cultural features. As such, the results for the conglomerated region are difficult to generalize. Finally, it is difficult to define culture based on origin of heritage and/or nationality; Hofstede's work on nationality and culture has faced much criticism over the years (McSweeney, 2002), mainly that cultures can be highly diverse even within nations, and is a multidimensional construct that interplays with gender and socioeconomic factors. However, clustering culture by geographical region does offer a practical way to investigate these very complex and multifaceted trends in an international population (Hofstede, 2002) and has been applied in similar GBL research (Lukosch et al.,

2017; Siala et al., 2019). Nonetheless, our results should be viewed through a critical lens, with the understanding that all the intricacies of culture cannot be captured in a single survey, nor through clustering by nationality. Future research should attempt to assess cultural learning preferences explicitly, rather than rely solely on literature regarding regional high/low-context learning approaches. Further exploration on the socio-cultural factors that produce varying views on gaming is warranted. Furthermore, future participants should be sampled internationally, from institutions in multiple countries, to gain an in-depth understanding of how cultural groups that are underrepresented in the GBL literature (e.g., African, South American) perceive GBL.

6. Conclusion

Culture is an important aspect that shapes how one views the world and influences society (Hofstede et al., 1991). GBL applications offer improved learning opportunities with advantages that traditional learning formats do not have (Clark et al., 2016; Prensky, 2003; Sitzmann, 2011; Wouters et al., 2013). Thus, culturally aware GBL design can further aid in learning (Mohammed & Mohan, 2010). However, in culturally diverse populations (like typical international classrooms observed in higher education), GBL may only appeal to a subset of the population. This survey-based research investigated the relationship between undergraduate students' cultural associations, their subjective level of Canadian identity/integration, and their views and acceptability of GBL, while controlling for their gaming exposure and gender. We found that perceptions of Canadian identity were positively related to views on GBL, which can be explained by Canadians' general comfort with non-structured learning opportunities, familiarity with, and acceptance of video gaming. We also found distinct differences between individuals associating with other cultural groups, e.g., East Asians had highest views, irrespective of their integration in Canadian culture. Our

findings give insight into cultural considerations for the design and evaluation of GBL for international populations.

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