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# PLAYING FOR THE FUTURE

The Critical Role of Skills for Canada's  
Video Game Industry



dawson strategic

 ENTERTAINMENT  
SOFTWARE  
ASSOCIATION OF CANADA

## ABOUT THIS REPORT

This report was written by research and consulting firm Dawson Strategic for the Entertainment Software Association of Canada (ESAC). ESAC is the industry association for companies in Canada that develop, publish and distribute video games for consoles, handheld devices, personal computers and the Internet.

The data and information presented in this report is based primarily on industry reports, government publications, and in-depth roundtable discussions with representatives of Canada's leading video game companies and other video game sector stakeholders, which took place in January 2016.

The companies that participated in the industry roundtables represent a broad cross-section of the Canadian industry and included studios of various sizes as well as several public and independently owned developers,

publishers and console manufacturers. Several representatives from the non-profit and educational sectors with expertise or relevant ties to the video game industry also participated in the discussions. Stakeholders were asked questions pertaining to hiring requirements, core business challenges and solutions, and the Canadian business environment, among other topics. The insights from these discussions greatly shaped the main proposals outlined in this report.

The authors are indebted to the participants in these discussions for their invaluable insights and every effort has been taken to ensure that their voice is front and center in this report.

The team at Dawson Strategic would like to thank Brandon Silver for his exceptional contribution to this report.

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# A Word From the Entertainment Software Association of Canada

CANADA SITS AT THE HELM, WITH FEW COMPETING COUNTRIES, AS A LEADER OF THE FASTEST GROWING ENTERTAINMENT INDUSTRY GLOBALLY. THE GLOBAL VIDEO GAME INDUSTRY IS PROJECTING NEARLY US\$100 BILLION<sup>1</sup> IN REVENUES IN 2016, DEMONSTRATING THAT TECHNOLOGICAL INNOVATION COUPLED WITH CREATIVITY AND ART CAN THRIVE ACROSS ALL PLATFORMS AND BE APPRECIATED BY A VARIED AUDIENCE.<sup>2</sup>

Amid a sluggish national economy, Canada's video game industry is a bright light. The industry is recognized as a global powerhouse for game development and has played a significant role in shifting what was once a "niche industry" into a blockbuster industry and driver of innovation.<sup>3</sup> In 2015, the industry contributed more than \$3 billion to the Canadian economy and provided 20,400 full-time equivalent (FTE) jobs across the country, representing an increase of 31 percent and 24 percent respectively since 2013.<sup>4</sup> Looking ahead, the Canadian video game industry shows no signs of slowing down, with over 1,400 senior and intermediate level jobs vacancies expected over the next one to two years and exponential potential to attract global investment.<sup>5</sup>

Yet the sector is at a crossroads: while it is has experienced rapid growth that will

likely continue into the future, there are not enough highly skilled workers to keep up with demand. The sector is knowledge-intensive and positions are well compensated, but companies struggle to find and attract highly skilled workers to lead domestic teams and keep up with demands of the global market. While the industry is resourceful and innovative, with many video game companies boasting deep relationships with local post-secondary institutions and educators, keeping pace with demand and training talent simply isn't enough to stay competitive in the global innovation and digital economies.

Canada is not alone in this challenge. However, other global leaders like the United States and the United Kingdom have been proactively addressing their domestic challenges with talent supply, and unless Canada responds effectively to our domestic talent shortage, it risks falling behind and paralyzing, if not derailing, the success of the video game industry to date.

This report offers solutions with short and long-term benefits that seek to protect Canada's competitive advantage and industry achievements. The policy recommendations are grounded in a collaborative approach that proposes new policy measures and stronger partnerships to strengthen the entire talent pipeline.

1 All figures in this report are in Canadian dollars unless otherwise noted.

2 NewZoo Games Market Research, "Global Games Market Report: 2015," (November 2015a) projected US\$91.5B revenue for 2015.

3 André Marchand and Thorsten Hennig-Thurau, "Value Creation in the Video Game Industry: Industry Economics, Consumer Benefits, and Research Opportunities," *Journal of Interactive Marketing* 27, (19 July 2013), 141.

4 Entertainment Software Association of Canada (ESAC), "Essential facts about the Canadian video game industry," (2015a).

5 Chad Sapieha, "Foreign workers filling gaps in Canada's fast growing video game industry," *Financial Post*, (16 November 2015).

The future success of the video game industry hinges on Canada's ability to capitalize on global inspiration and leadership while cultivating a rich and robust domestic talent pool. Like other high-tech industries, the video game industry continues to require highly skilled intermediate and senior leaders to train and lead teams, primarily comprised of Canadians.

As the rapidly evolving digital economy grows, it is not enough to expect post-secondary institutions to keep pace and, in fact, the high-tech and innovation industries must carry out the dual roles of employer and educator. In this latter capacity key industry leaders will need to convey knowledge and provide formational experiences to their teams. The goal of this report is not to repeat positions addressed previously,<sup>6</sup> but rather to provide new solutions to reinforce the longer-term talent and innovation strategies.

To achieve this goal, and create a rich and robust domestic talent pool, we support the findings of Dawson Strategic and propose that the federal government:

- 1. CREATE A COMPREHENSIVE, NATIONAL COMPUTING AND DIGITAL SKILLS STRATEGY** for Canada that includes a coordinated effort to immediately address the digital skills gap in Canada. The strategy should be holistic, reflecting industry and educational needs in Canada, and developed by a multi-stakeholder task force comprising industry leaders, policy makers and educators who establish clear objectives and milestones to put Canadians' digital skills back on track with international competitors.

- 2. DEVELOP POLICIES AND PROGRAMS THAT SUPPORT INDUSTRY STAKEHOLDERS TO BE ACTIVE PARTICIPANTS IN DIGITAL SKILLS EDUCATION** and curricula development for Canadians in K-12, post-secondary and in the workforce.

- 3. ESTABLISH A STRONG WORKING PARTNERSHIP WITH THE PROVINCES** to ensure computing and digital skills are included in elementary and secondary school curricula across Canada. The federal government can provide the resources and support required to define national objectives in relation to computer science and digital skills in a manner that ensures inclusivity, diversity and ultimately creates more opportunities for all to participate more fully in Canada's digital economy - including teaching staff, local and provincial policy makers and students in levels K-12.

Finally, while this report focuses on a federal call to action, we will continue to call upon our colleagues in industry, education, and provincial and municipal governments to support our efforts as we move forward to strengthen our national economy.

We look forward to working with you to ensure Canada's position as a leading global force in innovation and the digital economy.

Jayson Hilchie

President and CEO, Entertainment Software Association of Canada

<sup>6</sup> Previous positions can be found in Entertainment Software Association of Canada and Information Technology Association of Canada, "The Importance of Global Workers in Canada's ICT and Digital Media Industries," *White Paper on Foreign Workers*, (January 2014).

## SECTION ONE

## The Video Game Industry

# A CANADIAN SUCCESS STORY



CANADA IS ONE OF THE BIGGEST PRODUCERS OF VIDEO GAMES IN THE WORLD. IN 2015, CANADA RANKED IN THE TOP TEN COUNTRIES IN THE WORLD FOR GAME REVENUE, AHEAD OF BRAZIL, THE RUSSIAN FEDERATION, AND TAIWAN.<sup>7</sup> CANADA HAS PRODUCED SOME OF THE MOST SUCCESSFUL GAME TITLES AND FRANCHISES INCLUDING THE *ASSASSINS CREED* SERIES, *FIFA WORLD CUP* SERIES, *NHL*, *MASS EFFECT*, AND *DRAGON AGE*.

Canada's video game industry crosses the country with 472 active studios that develop, publish, and distribute video games. The sector is mainly concentrated in the provinces of Quebec (29.4 percent), British Columbia (27.1 percent), and Ontario (22.9 percent).<sup>8</sup> Most of the industry is made up of standard-sized companies (5 to 99 employees), though nearly 90 percent of employment is concentrated in the 24 largest companies.<sup>9</sup>

In 2015 the industry contributed more than \$3 billion to the Canadian economy. Industry growth both globally and in Canada has been explosive and is expected to continue into the future. The Canadian industry saw a 38 percent increase in the number of active studios in the two-year span between 2012 and 2014 (from 328 to 472 active studios). Employment gains were similarly impressive, with 20,400 full-time equivalents (FTEs) employed in 2014, up 24 percent from 16,500 in 2012.<sup>10</sup>

The video game industry is export-oriented and provides employment that is future-oriented, sustainable, and resilient against downturns in traditional sectors such as manufacturing and commodities. The workforce is highly educated and the majority of workers have attained at least an undergraduate university degree.<sup>11</sup> Jobs with Canadian video game companies also appeal to new graduates because they are well compensated. The average national salary for the sector is \$71,300 (2015), though salary levels vary notably with the size of the company.<sup>12</sup>

Professionals working for video game companies comprise a unique mix of art and technology experts, and often the best workers have a diverse mix of skills beyond purely technical. Video games are developed in highly collaborative environments and the multi-functional skillsets (e.g. game design, sound design, computer engineering, data analysis, etc.) are easily transferable to other tech industries and can be used to help grow sub-sectors of Canada's knowledge economy. Graduates equipped with game development skills go on to become leaders in other fields that rely on technology, including education, government, and defence.<sup>13</sup>

The video game industry is known for its highly innovative and dynamic hardware, software, and production technologies. Video games have moved out of basements and are now widely consumed across all platforms - television screens, mobile devices, PCs, handheld consoles, cinema screens, and even wearables such as watches.<sup>14</sup> This once "niche industry" now attracts record-breaking audiences larger than some of the biggest sports events. In 2014, an estimated 27 million streaming viewers watched Riot Games' *League of Legends*

7 NewZoo Games Market Research, "Top 100 Countries by Games Revenue, 2015," (November 2015b).

8 Nordicity, "Canada's Video Game Industry in 2015," (August 2015).

9 ESAC, (2015a), 4-5.

10 Nordicity, "Canada's Video Game Industry in 2015," (August 2015).

11 Nordicity, "Canada's Video Game Industry in 2015," (August 2015), 39.

12 ESAC, (2015a).

13 Higher Education Video Game Alliance (HEVGA), "Priming the Pump 2015: Higher Education Video Game Alliance Survey of Program Graduates," (June 2015a), 3.

14 Marchand and Hennig-Thurau, (2013), 141-167.

World Championship.<sup>15</sup> These high-demand products resonate with Canadians across age, regional, and social groups. In fact, 19 million Canadians (over half the total population) identify themselves as “gamers.”<sup>16</sup>

Interestingly, video games are increasingly being used as educational tools across a variety of subjects. Whether in primary, secondary, or post-secondary education, video games can be effective educational tools that inspire students to learn in entirely new ways.<sup>17</sup> A Stanford University panel of experts on education and “gamification” touted the benefits of using games in pedagogy, highlighting the opportunities games provide for students to plug into broader networks and new methods available to educators for measuring learning that were previously unavailable.<sup>18</sup>

There is compelling evidence that video game education programs at the post-secondary level are more likely to retain interested, committed students compared to other programs, thereby cultivating the next generation of workers for the industry. A survey by the Higher Education Video Game Alliance (HEVGA) of 73 colleges and universities in the United States offering video-game programs revealed that these programs have significantly higher retention rates than national averages, 88.0 percent versus 69.8 percent (private institutions) and 64.2 percent (public institutions).<sup>19</sup>

Another key point of attraction is the ability to fare well in the job market. A 2015 HEVGA study found the percentage of alumni from games-based programs in the United States who found gainful employment after a single year on the market was 93.1 percent, over eight percent higher than the national average. Even when graduates didn’t go to work in the video game industry, they reported that their entertainment software-based courses were of greater relevance and prepared them better for their subsequent careers than general tech courses.<sup>20</sup>

## SECTION TWO

# CORE CHALLENGES

## For the Video Game Industry

TODAY, THE CANADIAN VIDEO GAME INDUSTRY’S SUCCESS IS THREATENED PRIMARILY BY DOMESTIC AND GLOBAL IMPEDIMENTS TO TALENT SUPPLY.<sup>21</sup> LIKE THE BROADER TECH SECTOR, THE VIDEO GAME INDUSTRY FACES THE CONSTANT CHALLENGE OF FINDING AND ATTRACTING HIGHLY SKILLED WORKERS EQUIPPED TO LEAD DOMESTIC TEAMS AND KEEP UP WITH THE DEMANDS OF THE GLOBAL MARKET.

While the industry is resourceful and innovative, with many video game companies boasting deep relationships with local post-secondary institutions and educators, keeping pace with demand and training new talent simply isn’t enough to stay competitive in the global innovation and digital economies. In addition to an inadequate supply of domestic talent, fierce competition within the tech sector for available talent, both at home and abroad, makes the issue of attraction and retention even more difficult.

Canada’s information and communications technology (ICT) sector lacks sufficient homegrown talent to meet the hiring requirements of the next five years.<sup>22</sup> A 2013 study conducted for Industry Canada found that every ICT firm interviewed was hiring, and three-quarters of hiring managers noted a lack of Canadian talent to fill the positions, creating

15 Jennifer Booton, “27 million watched this video game tournament – matching NCAA final audience,” *Marketwatch.com*, (29 July 2015).

16 ESAC, (2015a).

17 Neil Herndon, “Video Games Should Be Taught In School,” *Forbes Tech*, (31 January 2016).

18 R.F. Mackay, “Playing to learn: Panelists at Stanford discussion say using games as an educational tool provides opportunities for deeper learning,” (1 March 2013).

19 Higher Education Video Game Alliance (HEVGA), “Our State of Play: Higher Education Video Game Alliance Survey 2014-15,” (February 2015b).

20 HEVGA, (2015a), 4.

21 Sapieha, (2015).

22 Information Technology Association of Canada and the Information and Communications Technology Council, quoted in Department of Finance Canada (Finance Canada), “Jobs Report: The State of the Canadian Labour Market,” (2014), 33. The Information and Communications Technology Council (ICTC), “The smart economy reshaping Canada’s workforce,” (2015a), xi.



a greater reliance on foreign talent to satisfy Canadian industry needs.<sup>23</sup>

Companies rely on global talent to both fill vacancies in their organizations and also to transfer knowledge and skills to “level-up” their broader workforce. Global knowledge transfer is essential for companies in Canada to stay competitive against their global competitors, which requires an agile immigration policy that facilitates the movement of high-skilled talent as a requisite for success. However, ever-changing Canadian immigration policies continue to stifle access to the global talent pool, making efforts to regenerate the domestic talent supply all the more urgent.

Globally and at home in Canada, efforts to produce an adequate supply of graduates with science, technology, engineering, and math (STEM) degrees have fallen short. In the video game world, not only is the right kind of education needed to produce good games, but the foundational skills taught from primary levels upward play a critical role in engaging and developing the next generation of video game designers, artists, producers, and technology developers. A key question to address is: are these skills being delivered effectively in Canada’s schools and, if not, what has to change?

Stemming from the disconnect between the education system and industry needs, fierce competition over the limited pool of skilled individuals around the globe has intensified, making innovation and domestic growth in the digital economy even more challenging. As a result, many countries and companies have been forced to address the lack of skilled talent required to compete in the global digital economy. Other countries have been overhauling early education to include computing and digital skills, championing industry-led skills initiatives, and collaboratively developing national strategies to support and solidify their interests in the digital economy.

## i. The widening skills gap

The Government of Canada has long identified digital skills as one of nine essential workplace skills.<sup>24</sup> Despite the recognition, Canada’s video game industry, along with the broader technology sector, is suffering from a shortage of skilled workers. One of the main obstacles to job growth in Canada is the misalignment between the skills of individuals ready to enter the labour market and those required by employers.<sup>25</sup>

Over the past four years, Canada’s relative competitiveness has declined and there are shortfalls in the number of graduates with STEM degrees, as highlighted in several reports:

- In 2012, Canada ranked 20<sup>th</sup> out of 23 OECD countries on STEM education;<sup>26</sup>
- In 2013, the Science, Technology, and Innovation Council of Canada (STIC) warned that Canada’s talent base, which had previously been strong, was showing serious signs of erosion;<sup>27</sup>
- In 2013, the Conference Board gave Canada a grade of “C”, for falling to the bottom of the list of countries graduating students from STEM fields;<sup>28</sup>
- In 2014, Finance Canada acknowledged that the country is lagging behind its peers with relatively fewer STEM graduates and lower apprenticeship rates;<sup>29</sup> and,
- In 2015, STIC reported that Canada ranked 15<sup>th</sup> out of 33 countries for the presence of advanced research talent in the private sector, leading the Council to conclude that Canada is not globally competitive in business innovation.<sup>30</sup>

As the skills gap widens, the calls for government action from tech industries will only increase. In the ICT sector alone, hiring requirements in Canada are expected to reach 182,000 by 2019.<sup>31</sup> And while this shortfall will affect some occupations more than others, computer programmers, interactive media developers and data analysts (all key occupations for the video game sector) are already among Canada’s top five in-demand occupations.<sup>32</sup>

23 CIC News, “Canadian Immigration Opportunities for IT Workers in 2014,” (June 2014).

24 Skills Canada, “9 Essential Skills.”

25 Finance Canada, (2014), 4.

26 OECD, “PISA 2012 Results: What Students Know and Can Do – Student Performance in Mathematics, Reading and Science,” (February 2014).

27 Science, Technology and Innovation Council, “Canada’s Innovation Challenges and Opportunities: 2014 report on the state of Canada’s science, technology and innovation system,” (27 November 2015).

28 Conference Board of Canada, “International Ranking: Education and Skills,” (March 2013).

29 Finance Canada, (2014).

30 Science, Technology and Innovation Council, (2015).

31 ICTC, (2015a).

32 The Information and Communications Technology Council (ICTC), “Strengthening Canada’s Digital Advantage: Summer 2015,” *Quarterly Monitor of Canada’s Digital Economy*, (2015b), 9.





The video game industry is anticipating that more than 1,400 intermediate and senior level vacancies will need to be filled in the next 12 to 24 months.<sup>33</sup> For the industry to remain competitive a ready supply of highly trained individuals is necessary, but they are nowhere in sight. The needs are particularly acute at the intermediate, senior, and expert levels.<sup>34</sup>

In terms of the skills video game companies seek, optimal workers bring to the table a mix of technical and soft skills, which are fostered from the earliest stages of education.<sup>35</sup> Video games are designed and developed in a highly collaborative and multidisciplinary setting. Teams may be made up of several hundred members for large projects and include computer programmers, designers, music composers, and editors.<sup>36</sup> For this reason, technical skills alone are not sufficient to succeed in the industry.

STEM skills are necessary, but they are not sufficient to equip graduates for high tech jobs. In order to sustain innovation in creative industries, a mix of creative and technical skills must be emphasized. Art and design are poised to transform economies in the 21st century, just as science did in the previous century. The “STEAM” movement adds ‘Art & Design’ to the STEM equation. STEAM is now being integrated into curricula in countries around the world. As a champion of this movement, the Rhode Island School of Design encourages the integration of art and design at all levels of education; places art and design at the center of research policy; and promotes the hiring of artists and designers to drive innovation alongside traditional technologists.<sup>37</sup>

While each company will have its own list of specific skills required, the sector generally requires a mix of skills from two categories: technical skills (e.g. computer programming, software development, art and animation, and database management); and soft skills (e.g. entrepreneurship, creativity, adaptability, and team orientation).<sup>38</sup> Most of the studios interviewed for this research do not believe that they have access to an adequate supply of candidates with the

requisite mix of technical and soft skills to draw from to fill key vacancies.<sup>39</sup>

The skills gap is further exacerbated by the fact that women are not gravitating toward these roles at a fast enough pace, further limiting the overall pool of talent in Canada. Currently, less than one quarter of the 820,000 workers in the technology sector in Canada are women, and many are not employed in technical roles.<sup>40</sup> This number represents a decline from previous years, and the disparity is predicted to worsen unless action is taken to reverse this troubling trend.<sup>41</sup> The unemployment rate of women in the tech sector is roughly the same as the overall average,<sup>42</sup> which suggests that the problem is not in the hiring practices or industry acceptance of women, but rather that it is an issue of education and skills.

## WOMEN IN THE VIDEO GAME INDUSTRY

At the local level, the video game industry is involved in many external and voluntary efforts to engage girls and women in game making. These groups aim to provide education and mentorship in an open and friendly setting in order to counter stereotypes and to welcome girls and women into the industry. Pixelles (Montreal), Dames Making Games (Toronto), and Girl Force (Ottawa) are a few Canadian examples of these efforts.



33 Entertainment Software Association of Canada (ESAC), “Press Release – Canadian Video Game Industry Continues to Grow,” (16 November 2015b).

34 Ed Komarnicki, “Labour and Skills Shortages in Canada: Addressing Current and Future Challenges,” *Report of the Standing Committee on Human Resources, Skills and Social Development and the Status of Persons with Disabilities*, (December 2012).

35 Corporate Research Associates, “Nova Scotia 2015 ICT Study,” Prepared for the Government of Nova Scotia, (March 2015), 24.

36 Ian Livingstone and Alex Hope, “Next Gen, Transforming the UK into the world’s leading talent hub for the video games and visual effects industries,” NESTA, (2011), 21.

37 For more information visit: [www.stemtosteam.org](http://www.stemtosteam.org)

38 Dragana Martinovic and Viktor Freiman, “Digital Skills Development for Future Needs of the Canadian Labour Market,” *University of Windsor*, (2013).

39 Industry Roundtable conducted by Dawson Strategic, January 2016.

40 ICTC, (2015b), 6.

41 Deloitte, “Technology, media, and telecommunications predictions” (2016), 4.

42 ICTC, (2015b), 6.



Canada's Minister of Science Kirsty Duncan notes "increasing awareness of science-based careers among our girls is critical to our country's continued success."<sup>43</sup> Raising awareness of possible career paths is important, but attracting and retaining women in the tech sector means reconsidering Canada's approach to computing skills education. Simon Peyton-Jones, a leading researcher and advisor at Cambridge University, identifies gender stereotypes as a significant obstacle keeping women out of technology careers. He suggests that introducing computing education in elementary school, before gender stereotypes are established, is one key step to ensuring more women stay interested and engaged in developing technology skill sets.<sup>44</sup>

## ii. Fierce global competition for talent and industry localization

A robust talent pool is needed to ensure Canada retains world-class video game companies, as well as industry leading technology companies overall. The highly mobile nature of these companies is a double-edged sword for Canada.

The mobility of video game companies can be advantageous. Digital inventories that are stored on cloud-based servers and new technologies for long-distance collaboration mean that companies can locate in a wider range of sites and use lifestyle benefits such as recreation, safe communities, green space, quality health care, lower cost of living, and good schools as tools to attract and retain employees.<sup>45</sup>

However, mobility is a disadvantage for a country that wants to retain firms when domestic business conditions deteriorate. Because they have fewer dedicated brick-and-mortar requirements than more traditional manufacturing or commodities companies, it is easy for firms to relocate to more desirable business environments.

The talent that firms are seeking is also highly mobile. Dur-

ing the roundtable discussions with Canadian video game companies, industry leaders spoke at length about the challenges of losing talent to the United States (especially to Silicon Valley in California). Few Canadian companies can compete in terms of salary and benefits offered in the United States. A low Canadian dollar paired with personal tax rates that are often higher than in the United States further compounds this problem. In fact, Canadian tech executives across a number of industries have stated that the low dollar has made the already challenging task of recruiting talent more difficult.<sup>46</sup>

Companies across the country also face regionally specific challenges that can hinder their ability to attract talent. For example, in Vancouver, high living costs further erode the real wages of workers who live there, creating more incentive for new recruits to look to the United States.

It is important that Canadian policy makers at all levels of government are attentive to the full range of factors influencing location decisions for high-tech companies. Some areas in which Canada is relatively weaker are resistant to policy change, such as market size, proximity to major population centers, higher travel and transportation costs, and lower wages. But, there are other areas where policy can make a difference, such as offering provincial support and tax credits for the Canadian video game sector, without which Canada would not have achieved its historic record of success and current global leadership status.

The competition to attract companies to invest is just as fierce as the hunt for talent. It is difficult to overstate the critical role of well-designed tax incentives to drive industry growth. In Canada, provincial digital media tax credits and other provincial tax measures have helped attract foreign investment and allowed companies in the industry to focus on what they do best: developing and publishing world-class video games for a global market place.

International examples further reinforce the important role of tax incentives to attract investments and promote industry growth. For example, in the United States, Texas has rapidly become the state with the second highest rate of video game industry employment, driven by the implementation of one of the largest tax incentive programs in the United States.<sup>47</sup> More broadly, targeted changes to the tax code have been credited as a major factor in the sustained

43 Kirsty Duncan, "Actua National Conference 2016: Speaking Points, The Honourable Kristy Duncan, PC, MP, Minister of Science," *Government of Canada: News: Speeches*, (22 January 2016).

44 Simon Peyton-Jones, Bill Mitchell, and Simon Humphreys, "Computing at school in the UK," *Microsoft Research*, (May 2013), 5.

45 Richard Florida, Kathrine Richardson, and Kevin Stolarick, "Locating for Potential: An Empirical Study of Company X's Innovation Centre in Vancouver, British Columbia," *Martin Prosperity Institute Working Paper Series*, (October 2009), 5.

46 Alastair Sharp, "Canada tech execs says weak Canadian dollar toughens talent hunt," *Reuters*, (28 January 2016).

47 Joe Harpaz, "Will Tax Incentives Make Austin The Video Game Capital Of The World?" *Forbes*, (28 January 2014).

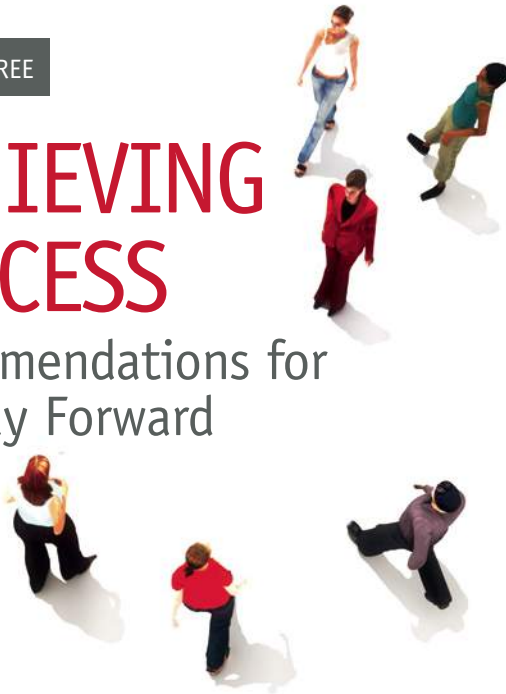


growth of the video game industry in the United States, with the industry growing four times faster than the American economy.<sup>48</sup> Similarly, in 2014 the British Government enacted the Video Games Tax Relief policy,<sup>49</sup> which quickly started attracting foreign talent from competing economies.<sup>50</sup>

### SECTION THREE

# ACHIEVING SUCCESS

## Recommendations for the Way Forward



COORDINATED ACTION THAT MOBILIZES GOVERNMENT, BUSINESSES, EDUCATORS, AND OTHER KEY STAKEHOLDERS IS ESSENTIAL. EMPLOYERS MUST BE ABLE TO HIRE THE PEOPLE THEY NEED IN CANADA IF THEY ARE EXPECTED TO STAY IN THE COUNTRY AND NOT MOVE TO MORE SKILLS-ABUNDANT JURISDICTIONS. FOR COMPANIES THAT FOCUS ON TECHNOLOGICAL INNOVATION AND DESIGN, “HUMAN CAPITAL IS SEEN TO TRUMP PHYSICAL AND FINANCIAL CAPITAL AS A PRIMARY DETERMINANT OF LOCATION.”<sup>51</sup> IF CANADA WANTS TO ATTRACT THESE COMPANIES, ITS POLICIES MUST COMPETE WITH THOSE OF OTHER MORE RESPONSIVE COUNTRIES, SUCH AS THE UNITED STATES, FRANCE, AND THE UNITED KINGDOM.

The United States is the world leader in video game production with over 1,800 video game facilities across the country. The industry generates over US \$22 billion in revenue and directly employs 42,000 people in 36 states.<sup>52</sup> It plays a critical role in promoting 21<sup>st</sup> century skills, with innovative educational initiatives such as GlassLab, which is a developer, distribution platform, and ecosystem for learning-based games that empower youth.<sup>53</sup>

France also has a vibrant video game industry and is one of the largest producers globally. It is home to large, well-established companies such as Ubisoft and Gameloft. The government has taken clear measures to make the industry a national priority and safeguard its competitive edge in the digital world.

The UK video game industry has a long tradition of producing world-class games, but has also struggled with tapping into a sufficient supply of domestic talent and industries “suffer from an education system that doesn’t understand their needs.”<sup>54</sup> The government has moved to address the problem through everything from introducing coding into core national curricula to tax incentives and funds for industry partnerships.

The recommendations in this section are inspired by some of the actions already taken by our global competitors and aim to help Canada achieve innovation and productivity growth to keep pace in this fast moving market. The benefits of these actions go far beyond the video game industry. Everyone stands to gain if graduates enter the labour market with the skills they need to thrive in a digitally competitive world.

48 John Gaudiosi, “The 10 most successful states for video game development,” *Fortune*, (24 February 2015).

49 Government of the United Kingdom: HM Revenue and Customs, “Corporation Tax: creative industry tax reliefs: Video Games Tax Relief.”

50 Charles Arthur, “UK video games tax breaks expected to protect more than 10,000 jobs,” *The Guardian*, (16 June 2014).

51 Florida et al., (2009), 4.

52 Entertainment Software Association (ESA), “Industry Facts.”

53 Entertainment Software Association (ESA), “GlassLab.” For more information see: <http://about.glasslabgames.org/>

54 Livingstone and Hope, (2011), 5.

## RECOMMENDATION 1: The federal government is encouraged to create a comprehensive national computing and digital skills strategy and task force by January 1, 2017.

In Canada, key players including schools and provincial governments are already implementing measures to address digital skills deficits, but what is lacking is coordination and coherence. An overarching framework to align these initiatives would help maximize the benefits for the country as a whole.

Convening a task force and producing a national strategy requires input from a broad range of stakeholders including multiple levels of government, industry, academia, and the non-profit sector. The multi-stakeholder task force should establish clear objectives and milestones to put Canadians' digital skills back on track with international competitors. The Department of Innovation, Science and Economic Development Canada would be an ideal focal point for these efforts since the department is responsible for equipping Canadians with the "skills and training they need to compete and prosper in the global, knowledge-based economy."<sup>55</sup>

To be most effective, the national computing and digital skills strategy must integrate solutions across the talent pipeline, from promoting coding in primary and secondary schools to partnerships with industry to familiarize students with career opportunities in the video game sector. The development of a national strategy and the work of the task force is anticipated to be an iterative process, reflecting the changing landscape of industry needs and provincial educational interests.

A strong example of such an effort is the UK Information Economy Council's *Digital Skills Strategy*. The strategy was developed in close partnership between government and industry and focuses on accelerating the growth of the

digital economy through new talent and new markets.<sup>56</sup> Similarly, the Swedish Government's broader digital agenda is illustrative of a strategy developed through an open process that takes a whole-of-government approach, encompassing the relevant authorities of all affected Swedish Government offices.<sup>57</sup>

Industry members are eager to participate in the creation of a national digital strategy as evidenced by the strong foundational work already taking place in organizations such as the Business Council of Canada (formerly Canadian Council of Chief Executives), the Canadian Chamber of Commerce, the Information and Communications Technology Council (ICTC), the Information Technology Association of Canada (ITAC), MediaSmarts, and the Entertainment Software Association of Canada (ESAC).

The task force should identify clear, skills-related challenges to digital competitiveness and recommend progressive and feasible solutions that can be implemented both over the short and longer term. One of the priorities of the task force should be the identification of ways to better engage under-represented groups such as women in the digital economy.<sup>58</sup> Operational guidelines for the taskforce should include regular stakeholder meetings to help maintain forward momentum and an annual progress report. In short, the task force would focus on clear objectives and milestones that realign Canadians' digital skills with those of a world-leading industry.

This effort will re-instill confidence in industry leaders who have chosen to make Canada their primary place of business, educators who are committed to seeing their students thrive, and students themselves, who deserve access to an inclusive, and relevant education to pursue their goals.

55 Innovation, Science and Economic Development Canada, "Mandate," *About Us: Our Organization*.

56 The Information Economy Council, "Digital Skills Strategy," (July 2014).

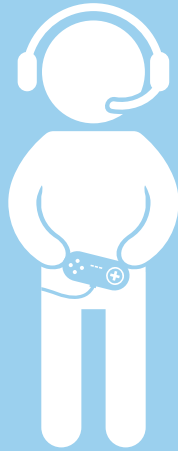
57 Government Offices of Sweden, "ICT for Everyone – A Digital Agenda for Sweden," *Ministry of Enterprise, Energy and Communications*, (November 2011).

58 The U.S. Department of Labor established a US\$100 million dollar fund to offer digital skills development to particularly vulnerable populations. This grant will serve both unemployed and low skilled workers. It will prioritize people with barriers to accessing training, such as disadvantaged youth, those with disabilities, childcare responsibilities, or limited English proficiency. Source: The White House, "FACT SHEET: White House and Department of Labor Launch \$100 Million TechHire Grant Competition Including \$50 Million for Young Americans," *Office of the Press Secretary*, (17 November 2015).



## THE CODEX PROGRAM

In November 2015, Ubisoft Montreal announced the launch of its CODEX program, uniting thirteen initiatives in support of school perseverance and developing the next generation of techno-creative workers. The activities under the CODEX umbrella are implemented at all levels of education. Representing an \$8 million investment over five years, it is developed collaboratively by Ubisoft Montreal and 18 partners ranging from non-profit organizations to education institutions. As Yannis Mallat, President and CEO of Ubisoft Montreal-Toronto, explains:



*Our mission through the CODEX program is to share our technological expertise and our knowledge of creative processes to prepare future generations for the challenges that await them. We are putting all our knowledge of video game production at our partners' disposal so they can be equipped to motivate, inspire and teach the youth that form our next generation.*

The CODEX program encompasses a wide array of initiatives, such as video game programming workshops (in collaboration with kidsCODEjeunesse), designed to teach children aged 7 to 13 how to code; video game development projects where students from participating high schools work to create a video game (in collaboration with Fusion Jeunesse); and the Ubisoft Game Lab Competition, which is held in partnership with a number of top universities in the Montreal area, including Université de Sherbrooke, McGill University, Polytechnique Montreal, and École des arts numériques, de l'animation et du design (NAD).

For more information visit: <http://montreal.ubisoft.com/en/codex-program/>

## RECOMMENDATION 2: The federal government should develop policies and programs that support industry stakeholders to be active participants in digital skills education.

Video game companies have had to become resourceful in addressing Canada's skills gap. Many have forged relationships with post-secondary institutions, advising on curricula in some cases and designing challenging and engaging co-op and internship programs for students.

In the UK, the government provides support to dedicated co-op programs that allow university students to gain hands-on experience in the video game sector.<sup>59</sup> The government also supports apprenticeships in the industry, working with the "Tech Partnership," a network of tech industry employers provided with governmental authority to enact skills development strategies. The partnership identifies, accredits, and promotes apprenticeships in the tech sector that provide relevant and high-quality training.<sup>60</sup>

While this report is not specifically aimed at local municipalities, it would be an oversight not to acknowledge the role they can play in facilitating industry participation in computing and digital skills development. For example, the City of London launched a "Digital Talent Programme," establishing a £5 million digital skills fund to support programs that teach computing and digital skills to youth ages 14 to 21.<sup>61</sup> The partnership identifies, accredits, and promotes apprenticeships in the tech sector that provide relevant and high-quality training.<sup>62</sup>

Internships and co-op programs are often pointed to as practical solutions to help align students' education with the real needs of industry. In roundtable discussions, Canadian video game companies noted that while these types of programs can work well, studios would benefit from support to help offset the cost of time and resources devoted to training and oversight of students.

59 The Education Foundation and UKIE, "Digital Skills Research," (2015), 7.

60 The Tech Partnership, "About the Tech Partnership."

61 Clare McDonald, "Mayor of London launches tech fund for digital skills," *ComputerWeekly.com*, (5 November 2015). See also, Sophie Densham, "Ukie welcomes £5m Mayor of London Digital Skills Fund," *UKIE*, (6 November 2015).

62 The Tech Partnership, "Tech Industry Gold Accreditation."

In the United States, President Obama recognized the national importance of addressing the disconnect between education and industry needs, most recently highlighting it in his state of the union address.<sup>63</sup> In this context, the government established the national “TechHire Initiative”: a multi-faceted endeavour that seeks to “create programs that match curricula in the classroom to the needs of the boardroom.”<sup>64</sup> This highly collaborative initiative involves the federal, state, and municipal governments, as well as employers and non-governmental organizations, with the goal of empowering Americans with the digital skills they need to find a long term, high quality job in the modern economy. This is done both through traditional secondary education and non-traditional programs such as online courses and coding boot camps.<sup>65</sup>

In addition to efforts to engage students through the traditional education system, many studios have created in-house learning centres, such as EA University, to address skills gaps in new recruits and other team members. Given the rapid pace of innovation in the technology sector, “upskilling” talent has become imperative for video game companies to remain competitive globally. This places constant pressure on companies by taking up internal resources and creating new expenses.

Moreover, while many employees are happy to share their knowledge with their colleagues, they must also complete their work, often in a short amount of time, to meet employer and market demands. At the end of the day they are employed to do their jobs, not educate others, and this takes priority. Some provinces, including Quebec, have recognized the extra measures that studios must take and have created programs that support and offset some of the costs associated with these efforts.

In the UK, the government established a multi-million dollar fund to offer support for digital skills development initiatives aimed at students and graduates, competitions to develop and showcase new games, mentoring for businesses and individuals, and hands-on opportunities for highly skilled individuals to gain practical experience working on game development projects.<sup>66</sup> To spur industry involvement, the government is also offering up to £16 million in matching funds for industry to spend on digital skills training initiatives. For the video game industry in particular, this includes a number of schemes focused on both professional development and developing new talent.<sup>67</sup>

In sum, supportive measures designed to incentivize industry to promote computing and digital skills in the education system have a real impact on overall skills development, thereby contributing to the broader economic benefits that accrue across the country. Such an approach will help address the skills gap in the shorter term, while longer-term solutions are being pursued.

### RECOMMENDATION 3: The federal government should work closely with provincial governments to ensure computing and digital skills are included in elementary and secondary school curricula across Canada.

The success of the video game industry begins with education, which in Canada primarily falls under provincial jurisdiction. Each province, and to a certain extent each municipal school board, has a significant amount of control and influence over the curriculum that ultimately makes its way into the classroom.

As our country’s digital skills gap acts as a drag on the Canadian economy as a whole, there is an important federal role to ensure Canadians are equipped with the skills required to drive our economy forward. We are impressed with the current government’s proactive approach to collaboration with provincial governments on a range of issues, and are optimistic for the prospects of effective federal-provincial collaboration to steer Canadian students back onto the course of long-term economic success.

In Canada, educators, governments, and industry have worked together to help create mechanisms to transition post-secondary students into jobs. Yet in spite of the obvi-

63 The White House, “Remarks of President Obama – State of the Union Address as Delivered,” (13 January 2016).

64 The White House, “Building Skills for America’s Future,” (4 October 2010).

65 The White House, “Technology.”

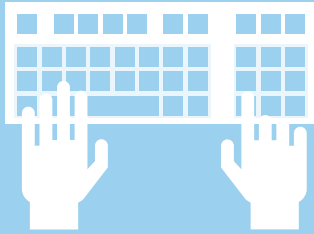
66 United Kingdom Department for Culture, Media & Sport, “£4m fund to kick-start the next ‘Tomb Raider,’” (12 October 2015).

67 Creative Skillset, “Skills Investment Funds.”



## kidsCODEjeunesse

KidsCODEjeunesse is a Canadian not-for-profit organization dedicated to cultivating the essential digital skills needed to thrive in a technology-driven



society. Supported by industry leaders like Ubisoft, the organization takes a broad approach to digital skills development, working with teachers, parents, and community leaders to empower youth with tech skills. Through an education development plan, the program works with educators to introduce coding in schools and community centres that is tailored to the students' progression.

KidsCODEjeunesse supports pre-service and in-service teachers by offering workshops at conferences and professional development days, speaking at national and international education conferences, providing online teacher training, and presenting in University Education departments.

The organization's Education Committee curates educational resources and provides an online platform for teachers to share and access content. It partners with teachers to help them introduce coding into their language, arts, math and technology curricula. Erica Cuthbertson, a Special Needs teacher, described her participation in kidsCODEjeunesse programming as a positive and enriching experience, saying that with their help in teaching coding to her students she "was excited [her]self and that excitement passed onto them."

For more information visit:  
<http://kidscodejeunesse.org/home/>

ous skill gaps and increasing vacancies in technology careers, little intervention is taken to help young students identify, develop, and explore the skills that will serve them well in the future workforce.

There are a number of possible ways in which this task may be achieved. Some of these include:

- Introduce coding as a mandatory part of the curriculum for K-12;<sup>68</sup>
- Socialize and teach computing and digital skills in a fun and accessible manner, possibly using "gamified" lesson plans;
- Expand coding capacity through programs such as the Hour of Code;<sup>69</sup>
- Foster a cross-disciplinary approach to education that combines ICT courses with other fields such as fine arts and design;<sup>70</sup>
- Increase the role of co-op and internship placements;
- Build awareness of career paths in the video game industry and broader technology sector early on; and,<sup>71</sup>
- Facilitate interaction with industry representatives and explore the range of opportunities through career day events.<sup>72</sup>

British Columbia<sup>73</sup> and Nova Scotia<sup>74</sup> lead the way by committing to introduce coding from K-12 to cultivate digital skills in all students. In the long run, initiatives like these will make a difference, but some degree of coordination and national objectives would be beneficial to guide and ignite further initiatives in all provinces.

Our global competitors have moved in this direction. In the UK, computing and digital skills have been made a part of the core educational curriculum by the "National Computer Curriculum" initiative.<sup>75</sup> The program benefits from strong partnerships with private sector leaders. It provides broad training and support to educators along with extracurricular initiatives with partners that go beyond in-class lessons.

Renewed provincial partnerships with the federal government would advance computing and skills education through the

68 Nancy Russell, "School computer coding should start in Kindergarten," *CBC News Prince Edward Island*, (12 November 2015).

69 The 'Hour of Code' is a one-hour introduction to computer science that reaches tens of millions of students in over 180 countries. It is designed to demystify computer coding and show that anyone can do it. For more information visit: <https://hourofcode.com/ca>

70 Industry Canada, "Digital Canada 150, Building digital skills for tomorrow," (2014).

71 Corporate Research Associates, (2015), 35.

72 Corporate Research Associates, (2015), 34.

73 Sean Silcoff, "B.C. to add computer coding to school curriculum," *The Globe and Mail*, (17 January 2016).

74 Government of Nova Scotia, "Minister Announces Coding as a Priority During Education Day," *News Releases*, (21 October 2015).

75 Stuart Dredge, "Coding at school: a parent's guide to England's new computing curriculum," *The Guardian*, (4 September 2014).

provinces and the Council of Ministers of Education, Canada (CMEC). The CMEC is an ally poised to lead discussions on the topic of elementary and secondary education, along with representatives from colleges, institutes and universities. The CMEC has already developed a toolkit of best practices intended to help upgrade skills, align secondary and post-secondary education programming to labour market demand, and build labour market linkages with target populations.<sup>76</sup> These best practices give a useful blueprint for the federal government to develop national goals for computing and digital skills education in communities across Canada.

A close review of domestic and international efforts to engage students at all levels reveals that computing and digital skills must be made available early in the education process to all students, in a variety of engaging ways, and included in the core curricula.<sup>77</sup>

While inclusion of computing and digital skills in K-12 curriculum is essential, teachers must also have access to the training required to feel confident teaching this material in their classroom. In Canada the opportunities for teachers to gain experience and skills in this area are few and far between, but highly sought after. Debbie Adams, a science and technology specialist with the English Montreal School Board notes:

*There is not enough teacher training currently in any technology... If we want our children to be more aware of technology, to go beyond just mastering apps, then we need to include computer programming as part of teacher training. We need to help teachers to see its cross-curricular advantages: problem-solving, logical thinking, tenacity, etc. What better way than to let teachers explore coding themselves?*

This sentiment is widely shared across the country and has spurred the existence of educational organizations, like kidsCODEjeunesse in Montreal, to work with industry to provide training opportunities for teachers and expose them to the various career options within the video game industry.

Other countries have come to similar conclusions and have formalized programs that address this need. A challenging

problem in the United States has been that most American teachers did not have an educational background or interest in technology. This was tackled at its source through a partnership with Microsoft, whose team worked collaboratively on a government website for the recruitment of teachers, Teach.org. As baby boomer-aged teachers retire, workers in tech or graduates with STEM degrees will be sought out to fill those teaching positions. Teachers with such skills are more credible and effective in teaching essential math and science skills and instilling interest in tech careers.<sup>78</sup>

In 2012, France's Ministry of National Education, Higher Education, and Research began developing and implementing a comprehensive strategy to bring all schools in France into the digital age. Last May, President Hollande committed €1 billion in funds to further France's digital education plan.<sup>79</sup> France has also successfully established internationally renowned courses to prepare students for careers in the video game industry.

The *école du numérique*, or "Great Digital School," is a national training initiative that is open to all, with the goal of cultivating digital skills in the population and empowering disadvantaged sectors of society through the development of these skills.<sup>80</sup> *École du numérique* consists of a vast network of partnerships with the private and public sectors, all focused on fulfilling local needs. This is done through supporting and building partnerships with those organizations already engaged locally in skills development programming.<sup>81</sup>

In the UK, the video game industry worked closely with educators to create the Digital Schoolhouse London Programme (DSL). The DSL aims to support the computing curriculum by building local networks of teachers and training them so that they can offer more dynamic lessons, develop new ideas and teaching skills, and ensure that student skills continue to advance each school year.<sup>82</sup> It is funded by the municipality of London and run by the video game industry through its national association.

There are many ways in which teacher training may be facilitated. Some have suggested identifying "master teach-

76 Council of Ministers of Education, Canada, Forum of Labour Market Ministers, and Skills for the Future, "Toolkit of Promising Practices," (16 January 2016).

77 Clear evidence and an exemplary path forward is provided in Peyton-Jones et al., (2013).

78 Gary J. Beach, "The U.S. Technology Skills Gap: What Every Technology Executive Must Know to Save America's Future," *John Wiley & Sons*, (10 July 2013), Section: 2012: Microsoft's Teach.org.

79 Ministère de l'éducation nationale, de l'enseignement supérieur et de la recherche, "The French Digital Plan for Education," *République Française*, (20 January 2016).

80 Government of France, "Rejoindre la grande école du numérique," (17 September 2015).

81 Stephane Distinguin, Francois-Xavier Marquis and Gilles Roussel, "La Grande École du Numérique, une utopie realiste," *Government of France*, (2015), 7.

82 Digital Schoolhouse, "Welcome to the Digital Schoolhouse."





ers” who already have a high skill level and are able to teach other teachers,<sup>83</sup> while others have suggested seeking out collaborative partnerships between elementary, secondary, and post-secondary institutions. There are even online education courses offered at low cost or no cost including Khan Academy, Udacity and Code Academy. However it is accomplished, the goal remains the same – we must build the competence of our teachers and enable them to share their knowledge and teach computing curricula to students across Canada.<sup>84</sup>

To achieve this goal, the federal government should:

- Define national goals and best practices for computer science and digital skills education and work with the provinces to ensure that all students in K-12 are equipped with and offered the opportunity to pursue careers that require these skills; and,
- Support provincial programs designed to empower and train teachers to develop computing and digital skills for the purpose of teaching them to their students.

#### SECTION FOUR

# CONCLUDING REFLECTIONS



EVERYTHING IN THIS REPORT COMES DOWN TO COMPETITIVENESS. CANADA'S COMPARATIVE ADVANTAGE IN THE COMING DECADES WILL DEPEND ON CANADIANS' CAPACITY TO DEVELOP AND COMMERCIALIZE TECHNOLOGY.

It is clear that high-quality investments in STEM (and STEAM) skills “in both early education and in more advanced training are critical to Canada’s prosperity.”<sup>85</sup> But STEM is just a starting point: twenty-first century jobs will operate at the nexus of right-brain creativity and left-brain logic. The challenge is not just “upskilling” but “rightskilling.” In other words, future-proofing young students and graduates for successful participation in a digital workforce. As this report illustrates, the digital economy will not slow down while Canada catches up. Competitors from other nations are passing us by.

83 Peyton-Jones et al., (2013), 10.

84 Menchie Mendoza, “Websites to visit if you want to learn code for free: Codecademy, MIT OpenCourseWare, Coursera, And More,” *Tech Times*, (20 May 2015).

85 Council of Canadian Academies, “Some Assembly Required: STEM Skills and Canada’s Economic Prosperity,” (2015), vii.



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