Innovative Game Curriculum Development Study

Pavinee Pornsalnuwat Tanariyakul, Ph.D.[9]

Sorralack Wongseree[9]

Abstract

The gaming industry is a rapidly growing area but studies contributing to the development of a curriculum to serve the industry needs are still limited. This study explores the needs of the industry and the subsequent development of the curriculum. The study utilizes two qualitative methodologies. The first is an in-depth interview of 10 gaming industry practitioners and five educators from two state universities. The second is a content analysis of the gaming curriculum in the United States, and France. The findings suggest that the university-industry collaboration is the best solution for the development of gaming curriculum. However, it is necessary to ensure that the program is truly reflective of the needs of the industry and the education requirements, which is a major challenge.

Keywords: Game curriculum, Practical game education, Open Innovation Model

[9] Digital Innovative Design and Technology Center (DIDTC)

Thammasat University ,Bangkok, Thailand

I. RESEARCH BACKGROUND

Games can be applied in various industries thus leading to its steady development. In addition new technologies are being added in an ever-challenging environment. The growth rate in the Thai gaming industry has been significant. The industry has grown by 14.7% in 2014 and 26.1% in 2016 while having a 213% revenue growth during the period (Newzoo 2014 Southeast Asia Games Market Report). Thailand is top on the list in terms of gaming revenues in Southeast Asia and among the top 20 globally.

Although PC games is still the undisputed leader in the gaming industry in Thailand, advancements in Artificial Intelligence, Augmented Reality, and Virtual Reality technologies are rapidly emerging. The Thai virtual reality game, Home Sweet Home, is a global hit showing that the Thai gaming industry is in sync with the trend. However, the changing landscape is moving at a pace that regular educational institutions find it hard to keep up. However, research in this area is still limited especially in Thailand. Literature review shows that there have been two studies to date. The first explores the practical education curriculum with industry collaboration at the Tokyo University of Technology (TUT), Japan (Mikami, Watanabe, Yamaji, Ozawa, Ito, Kawashima, & Kaneko, 2010). The second research explores the holistic game curriculum in Edinburgh, Scotland (Kenwright, 2016). These studies propose the ideal scenario for game curriculum as University-industry (U-I) collaboration under the open innovation model. As a result this study aims to understand the needs of the industry, explore the possible models, and develop a curriculum that best serves the professional requirements. The contribution to the industry is the development of a game curriculum that answers to the industry demands.

II. RESEARCH OBJECTIVES

From the discussion in the previous section the following research objectives have been developed for this study:

1. To study the needs of the game industry in Thailand.

2. To identify the best model for the development of the game curriculum.

III. RELATED LITERATURE REVIEW

Before going into the discussion regarding the curriculum development, the open innovation model would be explored as the over arching perspective needed for generating a framework for the curriculum. The open innovation model is designed as a strategy for innovating and creating profitable technology development (Gassman, 2006). It has its roots in the software development area, which requires dynamism to keep up with a challenging environment. One of the key factors driving the open innovation model is the understanding that knowledge is not bound to the organization but is imbued in the individual. The knowledge transfer is thus the key contribution that ensures the success of the organization in the long-term. This can be applied to the game curriculum development, which favors university-industry (UI) collaborations where the flexibility and know how of the industry can be used to spark innovative learning in the university setting (Bekkers and Freitas, 2008). The most important premise of the open innovation model is to integrate the employer into the curriculum development process, which suits the university industry collaboration framework. Teixeiria and Mota (2012) suggested that a critical factor to the success of knowledge transfer is the orientation of the university. The ideal successful collaboration thus should be made between knowledge-based firms and universities that have a high scientific orientation.

Gulbrandsen, Mowery, and Feldman (2011) explained that UI has been recognized as a separate field of research some 30 years ago. According to Bercovitz and Feldman (2006) universities and industry must collaborate because of the rapid

advances n the sciences driven by the need to find different sources for funding. Teixeiria and Mota (2012) conducted a bibliometric study of the field and found that interest in UI has been growing steadily. The researchers found that in addition to the management perspective the studies appeared to emphasize the area of innovation and technology as in this particular research.

UI has neoclassical roots as explained by Teixeiria and Mota (2012). The model is developed from the idea of evolutionary economics as explained by Nelson (1993). He proposed the idea that it is important to study the co-evolutions between technologies and institutions in addition to the co-evolutions between markets and technology. Leydesdorff (2001) explained that to understand this co-evolution in the innovation system such as UI collaborations it is important to recombine the perspectives of all stakeholders, which has led to the development of the research methodology used in this research.

IV. RESEARCH METHODOLOGY

This research is qualitative in nature, which is in line with previous research (Teixeiria and Mota, 2012). The first phase of the research is an in-depth interview with industry practitioners and educators, who are the stakeholders in the UI collaboration framework. The industry practitioners were drawn from members of Thai Animation Computer Graphics Association (TACGA). A question guide was developed based on the issues that needed to be discussed. This included the overview of the industry, the problems and challenges, then probe in detail about the employment of new graduates –the desired qualifications, the problems in hiring new graduates, the measures that can be developed to remedy the problems, their personal study experience in gaming, and which foreign universities should be used as a model for developing the curriculum. The number of in-depth interviews was determined by convergent interviewing (Rao and Perry, 2003). The interviews would terminate when there is no new information collected on the issues set in the question guide. As a

result there were ten practitioners and five educators interviewed. The second phase of the research was a content analysis of two institutions -DigiPen in the US and Rubika Supinfocom in France as suggested by the findings in the first phase of the study.

V. FINDINGS: THE THAI GAMING INDUSTRY

The major problem identified by industry practitioners is the lack of sufficient personnel. This is supported by the research findings by TDRI conducted in collaboration with TACGA. In particular the results indicated that there are a lack of staff for positions of 3D animators (21%), creatives (11%), and motion graphics animators (5%). The respondents also had a consensus on the problem that new graduates need training because their education is not sufficient to provide the necessary skills. This is supported by the TDRI research stating that 67% of the fresh graduates lacked the skills to work. The industry practitioners believed that the university was less dynamic than the real industry setting. The industry feels burdened in creating the training for employees who may not be committed to work in the long-term. This is in line with the finding from TDRI that the new employees tended to show a lack of motivation (42%). The industry practitioners were confident in the future of the Thai gaming industry. In terms of keeping up with technology and state of the art techniques the studios are certain they are cutting edge. However, they also stated that the problems regarding the qualified personnel must be addressed. A possible solution they suggested was university industry collaboration. This is because many of them are guest speakers and part time instructors at universities in Bangkok. Sometimes their studios also offered summer internship programs. They said it was necessary so that they could scout for good talent to work for their studios.

When asked about their personal backgrounds, it is found that the practitioners aged over 40 years tended not to have a direct education in gaming. They came from related fields such as computer graphics or totally unrelated fields

such as business. It is the passion that they have for gaming that propelled them to success in the field. The practitioners aged below 40 years have studied in more direct fields such as design, animation, and programming. However, they admit that there was always much to learn on the job before they made their mark. This is why they said they felt that the younger generation is less motivated.

In response to which programs they would suggest to be used as models for the game curriculum development, there were only a few suggestions. These included DigiPen in the US, VFS in Canada, Supinfocom and Gobelin in France.

The in-depth interviews of the academics from both public and private institutions teaching in the field of animation, computer graphics, and game design revealed that they believed industry collaboration would be beneficial for the development of capable graduates. They recognized the problem that the university was slow to adapt because the curriculums were bound by the Commission on Higher Education (CHE) regulations. These regulations set fixed criteria on the qualifications of instructors, the definition of the course contents, and implementation of the programs. It is not that these regulations are not good but the fact that changes can only be made in a five-year cycle, programs lose flexibility. The educators suggested that the CHE should not use the same mold for all programs because some areas of study are more dynamic than others. In effect these regulations made the institutions less flexible than their foreign counterparts. In addition the requirements created a lot of paper work for the educators. As a result instead of spending time developing the students, most of the educators had to spend time fulfilling the paper work and activities required by the key performance indicators (KPI).

In response to which programs they would suggest to be used as models for the game curriculum development, they had many suggestions. This is because most of the academics studied in the direct field or in one that was very closely related to what they were teaching. This is the result of the CHE requirement. Some of the

programs suggested are DigiPen, Academy of Art, and UCLA in the US, VFS in Canada, Supinfocom and Gobelin in France, Tokyo University in Japan, Bournemouth University in the UK.

VI. FINDINGS: THE US AND FRENCH CURRICULUMS

For the second phase of the research two programs were selected as a model for game curriculum development. The programs are from DigiPen in the US and Rubika Supinfocom in France. Both programs studied reveal an interesting common feature, which are the project-based class structure. The focus is on the development of projects where students can practice their expertise in specialized roles of their choice. The faculty members serve as mentors in developing the students' abilities. In addition the classes are supplemented by industry experts who come in to give extra lectures, training, and even comments on the student projects. The students are encouraged to have internships with companies so that they can further hone their skills.

In order to better hone the skills of the students, the courses at both DigiPen and Rubika Supinfocom are very dynamic. The course content and structure in the curriculum can be adapted annually depending on the assessment of the students, instructors, management, and industry. The monitoring and evaluation of the students' performance is done to continuously to support this flexibility in the program. Judging from the success of these two programs in placing students for employment in the industry, it appears that such evaluation and consequent modification is a successful strategy. Both programs are accredited in their respective countries. An analysis into their accreditation revealed that the accreditation bodies have different specializations. As a result the institutions can choose the right type of accreditation for their programs.

VII. DISCUSSION : THE DIDTC CURRICULUM

The Digital Innovative Design and Technology Center (DIDTC) was developed from the key findings explained in this study. The development of a game curriculum is different from the existing programs in the market thus the entrepreneurial spirit, which is important must be driven by the university culture (Carrick, 2016; Laukkanen, 2003; Owen-Smith and Powell, 1998). As a result DIDTC chose to partner with Thammasat University, which is a leading university in Thailand under the Faculty of Science and Technology.

DIDTC is the collaboration between the gaming industry supported by the Thai Animation Computer Graphics Association, Thai Game Software Industry Association, Digital Content Association of Thailand, and Bangkok ACM SIGGRAPH with Thammasat University. It is unique in Thailand but it is similar to the model used by the Tokyo University of Technology (TUT) (Mikami et al., 2010) wherein there is a strong demand for personnel in the industry. However, unlike TUT, DIDTC has the support from multiple industry associations as mentioned earlier. The TUT curriculum was developed based on the framework by the International Game Developers Association (IDGA). The studies of Kenwright (2016) and Mikami et al. (2010) focus only on the game curriculum with a programming focus. DIDTC offers two streams of study on a continuum from heavy programming base in Creative Digital Technology (CDT) to a more art focus in Innovative Digital Design (IDD). Under these two programs there are a total of four majors.

The strong point of the DIDTC curriculum is the close association with the industry. The project-based nature of the curriculum allows students to collaborate in the very same way that the game industry pipeline operates. DIDTC provides a strong education foundation and incubation opportunities. It is the goal to share to new technology, work experience, and digital knowledge. In the first year students would

be exposed to the industry through visits and guest speakers. The guest speakers come from internationally renowned companies such as Disney, Pixar, Square Enix.

The industry partners have clear roles in the development of the students and their projects. These local collaboration cover the areas of Intellectual Property (IP)/Licensing, Broadcasting, and market development creating a comprehensive ecosystem for preparing students for a career in the gaming industry. This is in line with the open innovation model by having each partner have a pre-determined role (for instance developing intellectual property, media partnership, and technology training support) rather than just a broad collaboration effort. This allows the curriculum to be more responsive to the five factors driving open collaboration namely globalization enabling faster innovation; rapid development of costly technology; technology fusion existing fields into new ones; new business models with new opportunities; and knowledge leveraging (Gassman, 2006).

However, there are challenges in the program operations. Some of the problems result from the government policy. Despite operating under a state university there are still glitches in the operations. This includes problems with the program development under the regulations of the Commission of Higher Education (CHE), Ministry of Education resulting in a large number of credits students must take due to general education requirements. As a result the curriculum has challenges keeping up with these changes within the constraints prescribed by the CHE. This is very different from accreditation in more developed countries where there are accreditation bodies that serve different specializations.

VIII. LIMITATIONS AND FUTURE DIRECTIONS

The game industry is expected to continuously grow at a steady rate well into the future. It is thus necessary that the curriculum that develops crucial long-term skills (Kenwright, 2016). These long-term skills must go beyond the programming skills or animation. This should include the creativity, entrepreneurial skills, and planning with

the understanding of the entire pipeline of gaming production. These skills are critical to the growth of the individual, which would lead to the long-term development of the gaming industry. As a consequence, it is important to take a holistic view to the future studies.

As discussed briefly in the literature review, the development of innovation needs a new way of thinking incorporating a more holistic approach. One future research direction would be the study for the possibility of applying the triple helix model (Etzkowitz and Leydesdorff, 2000). The triple helix model is considered a neo-evolutionary concept according to the authors. Leydesdorff (2001) explained that universities needed to carry out their functions however they must also change through the reconstruction of elements in the systems through reflexive operations. It is an expanded view of functional-structuralism introducing meaning creation from symbolic interactionism of the stakeholders. As a consequence it incorporates the government as an active partner in the development of gaming curriculum. This should be interesting since the role of the government in promoting the digital and in particular the gaming industry should be a good growth strategy for the future development of the business opportunities at the national and international level. Within this perspective another future research that should be pursued is the study of other stakeholders including students, parents, and high school counselors. This is because the focus of the study should not just be the gaming industry. It should also incorporate the environment within which the universities function to provide a clear picture of how the gaming industry fits its societal context.

REFERENCES

Bekkers, R., & Freitas, I. M. B. (2008). Analysing knowledge transfer channels between universities and industry: To what degree do sectors also matter?. Research policy, 37(10), 1837-1853.

Bercovitz, J., & Feldman, M. (2006). Entprepreneriall universities and technology transfer: A conceptual framework for understanding knowledge-based economic development. The Journal of Technology Transfer, 31(1), 175-188.

Carrick, J. (2016). Technology based academic entrepreneurship: How little we know.

Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: from National Systems and "Mode 2" to a Triple Helix of university–industry–government relations. Research policy, 29(2), 109-123.

Gassmann, O. (2006). Opening up the innovation process: towards an agenda. R&d Management, 36(3), 223-228.

Gulbrandsen, M., Mowery, D., & Feldman, M. (2011). Introduction ot the special section: Hetergeniety and university-industry relations.

Kenwright, B. (2016, November). Holistic game development curriculum. In SIGGRAPH ASIA 2016 Symposium on Education (p. 2). ACM.

Laukkanen, M. (2003). Exploring academic entrepreneurship: drivers and tensions of university-based business. Journal of Small Business and Enterprise Development, 10(4), 372-382.

Leydesdorff, L. (2001). Indicators of innovation in a knowledge-based economy. Cybermetrics, 5(1), 1-21.

Mikami, K., Watanabe, T., Yamaji, K., Ozawa, K., Ito, A., Kawashima, M., ... & Kaneko, M. (2010). Construction trial of a practical education curriculum for game development by industry–university collaboration in Japan. Computers & Graphics, 34(6),791-799.

Nelson, R. R. (Ed.). (1993). National innovation systems: a comparative analysis. Oxford university press.

Owen-Smith, J., & Powell, W. W. (2001). To patent or not: Faculty decisions and institutional success at technology transfer. The Journal of Technology Transfer, 26(1), 99-114.

Rao, S., & Perry, C. (2003). Convergent interviewing to build a theory in under-researched areas: principles and an example investigation of internet usage in inter-firm relationships. Qualitative Market Research: An International Journal, 6(4), 236-247.

Teixeira, A. A., & Mota, L. (2012). A bibliometric portrait of the evolution, scientific roots and influence of the literature on university–industry links. Scientometrics, 93(3), 719-743.