

# ***Program Vitality Gaming Final Report*** ***(5/1/19)***

## **Introduction:**

### **Brief description of the certificate and organizational structure being reviewed**

As noted from a memo dated November 30, 2018 from the Office of the Acting Vice President of Instruction, Albert Gasparian, the Gaming Certificate housed under Computer Science was identified for Program Vitality Review 2018-2019. It was noted that the Gaming Certificate is “relatively new certificate,” and the classes continue “to be under-enrolled along with low success rates.” The Program Vitality Review Committee was charged with the task of reviewing and making recommendations to the Administration using the following six elements:

1. Review and validate reasons certificate put into PVR
2. Document program inputs/resources
3. Analyze key performance indicators/Data
4. Identify root causes
5. Brainstorm possible solutions
6. State committee recommendations to Administration

A prologue to Program Vitality Review for Gaming was provided and several problems were identified by the Gaming faculty member. “Game Development” is the umbrella for the whole industry process of making a game. “Game Design” only refers to one department with “Game Art” and “Game Programming” being the other two. The focus here at Golden West College was on “Game Development.” UCI has an actual “Game Design” program focusing on story and structure which may be an interest to transferring students.

Last year’s college schedule listed G147, G148, and G149 as Beginner, Intermediate, and Advanced “Game Programming.” The problem exists that no one will sign up for a class that requires a three-class series to complete or recommended pre-requisites. The use of the word “Programming” in the course descriptor can be intimidating when the focus is on games and not computer science as it may seem. The three described classes above may require different levels of scripting or programming. In addition, the course descriptions have doctorate level complexities or at least upper level information as noted by the previous course instructor.

G150 is currently labeled as “Mobile Game Development” but is not needed for an entire class to cover the mobile side of games. It can easily be included in a new alignment of course work that could cover “memory optimization” and “gyroscopic input.”

Unity Certified Associates has recently put forth a Certification Program that would serve as a guide for further development and success of a Gaming Certificate Program at GWC.

The gaming courses currently include:

- 147 – Introduction: Rendering, shading, alpha blending, stencils, texturing, materials.
- 148 – Intermediate: Custom “shaders”, developing game engines, console controllers, physics, sound, animation, DirectX drivers
- 149 – Advanced: Developing advanced game engines, rendering pipeline, artificial intelligence, multiplayer networking, VS .NET, creating editors

It is difficult to gather research data on “Gaming” because current industry research only covers “Game Design” and none of the existing classes are about “Design” as of current Course Outline of Records (CORs). “Game Programming” research at least, and “Game Art” data are not readily available, but would be useful in predictability of future class needs. It could be construed that the Gaming Program Vitality Review is either four years too late or two years too early in assessing the certificate needs at this time.

### Pre-Data Included

- Program Vitality Review Members Contact Information
 

Chris Whiteside	cwhiteside4@gwc.cccd.edu	Division Dean
Diane Restelli	drestelli@gwc.cccd.edu	Division Assoc. Dean – outside of Program
Uyen Tran	utran@gwc.cccd.edu	Office of Institutional Effectiveness
Warren Carter	wcarter@gwc.cccd.edu	Department Chair
Graham Smallwood	gsmallwood1@gwc.cccd.edu	Faculty Member – hired for his expertise in Gaming Development & from the program; currently teaching C++
<b>Vacant</b>		Faculty Member – non-related discipline, Senate represented
Stephen Burns	sburns13@gwc.cccd.edu steve@chromeallusion.com	Faculty Member – outside division, Union representative
<b>Vacant</b>		Faculty Member – outside division appointed by Council of Chairs and Deans
Toby Venegas, <u>ASGWC Activities</u>	asgwcactivities@gwc.cccd.edu	Associated Students representative

- Documents Reviewed/Information Collected
  - Program Data (**Exhibit A1, A2**)
  - Complete Student Survey (**Exhibit B and full data results at end of report**)
  - SLO Reporting (**Exhibit C**)
  - Marilyn Cuneen (HUBSD) representative meeting April 1<sup>st</sup> 2019 at 0900 sharing classes and pathways of current offerings (part of the plan is to reach out on what they are doing--using 4G Tools) OC {High School (HS)/Elementary Schools} Innovations Fair last week join in with CAD Program Matthew Valerius info??
  - Michael Little (Video Game Developer/eSports Consultant) representing e-Sports meeting April 1<sup>st</sup> 2019 at 0900 providing information on what colleges and universities are doing with opportunity and industry growth. Note: Information not currently useful in the PVR on Gaming as this time.
  - Occupation Codes & Descriptions-Job Titles-Job Postings
  - UCI Game Program Analysis (Smallwood, G)
  - Unity Certified Associates Learning Outcomes & Exam Objectives
  - PVR Team Input-Meetings 3/14, 4/3, 4/10, 4/24, 5/1

### Step 1:

Validate Reasons (certificate) is Under Review

- Low enrollment
- Gaming certificate out-of-date
- Working with not up-to-date course outlines previously created before faculty specialists in gaming hired
- No successful Advisory Meeting

**(See Highlighted Data Exhibit A1)**

## Program Vitality Review Data

Gaming Certificate  
Spring 2019

The data in this report is provided by the Office of Research, Planning, and Institutional Effectiveness to aid in decision making for the Program Vitality Review process. Data in this report includes data on enrollment and course offerings from the past 6 academic years, 2013-2014 to 2018-2019. The 2018-19 Program Review data will be used as reference for data on unduplicated headcount, student demographics, course retention and success rates, certificates and degrees awarded, and transfer.

Follow-up data will include Full-time Equivalent Student (FTES) and Full-time Equivalent Faculty (FTEF).

## Enrollment and Course Offerings

Computer Science courses offered at GWC that is applicable to the Gaming Certificate (Table 1). Total number of sections and enrollment at census for Computer Science courses applicable to the Gaming Certificate offered at GWC between 2013-2014 and 2018-2019 (Table 2).

**Table 1. Computer Science courses offered at GWC that is applicable to the Gaming Certificate**

Course Name	Course Title
CS G147	Game Programming, Introduction
CS G148	Game Programming, Intermediate
CS G149	Game Programming, Advanced
CS G150	Mobile Game Programming

**Table 2. Total Sections Offered and Enrollment for Computer Science (Gaming Certificate) Courses Offered at GWC by Academic Year**

Course Name	2013-2014		2014-2015		2015-2016		2016-2017		2017-2018		2018-2019	
	Total Sections	Enroll (Census)	Total Sections	Enroll (Census)	Total Sections	Enroll (Census)	Total Sections	Enroll (Census)	Total Sections	Enroll (Census)	Total Sections	Enroll (Census)
CS 147	2	58	2	49	2	51	2	46	3	41	0	0
CS 148	0	0	0	0	0	0	1	16	1	12	0	0
CS 149	0	0	0	0	0	0	1	7	0	0	0	0
CS 150	0	0	1	20	1	14	1	4	1	10	0	0

Additional data requested by Diane Restelli for review in this PVR process for Computer Science courses that are “Possible feeder courses OR future feeder courses associated with Gaming [Certificate]” Table 3.

**Table 3. “Possible feeder courses OR future feeder courses associated with Gaming [Certificate].”**

Course Name	2013-2014		2014-2015		2015-2016		2016-2017		2017-2018		2018-2019	
	Total Sections	Enroll (Census)	Total Sections	Enroll (Census)	Total Sections	Enroll (Census)	Total Sections	Enroll (Census)	Total Sections	Enroll (Census)	Total Sections	Enroll (Census)
CS 102	2	69	4	126	4	124	4	109	4	121	4	153
CS 121	0	0	1	15	1	31	1	17	1	18	1	18
CS 154	0	0	1	31	1	30	1	26	1	34	1	30
CS 175	7	260	6	249	6	274	7	311	6	346	7	334
CS 178	2	34	1	20	1	22	1	14	0	0	1	15
CS 189	2	46	2	40	3	81	2	52	2	48	2	62

### Full-time Equivalent Student (FTES) by Full-time Equivalent Faculty (FTEF)

Full-time equivalent student (FTES) is a measure of full-time enrollment. One FTES is equaled to a student who enrolls in 15 units per semester. Full-time equivalent faculty (FTEF) is the measure of instructional hours with one FTEF is equaled to 15 lecture hour equivalent (LHE) of teaching in a semester. The FTES per FTEF ratio is a measure of efficiency between the number of FTES generated per full-time equivalent faculty (Table 4). To break even, the average FTES/FTEF needs to be at 35 FTES/FTEF.

Table 4. Total FTES and FTES/FTEF ratio for Computer Science courses offered at GWC that is applicable to the Gaming Certificate.

Course Name	2013-2014		2014-2015		2015-2016		2016-2017		2017-2018		2018-2019	
	Total FTES	FTES/FTEF (30)	Total FTES	FTES/FTEF (30)	Total FTES	FTES/FTEF (30)	Total FTES	FTES/FTEF (30)	Total FTES	FTES/FTEF (30)	Total FTES	FTES/FTEF (30)
CS 147	12	34.3	10	19.3	11	29.4	10	26.0	9	13.6	0	0.0
CS 148	0	0.0	0	0.0	0	0.0	3	12.4	3	13.7	0	0.0
CS 149	0	0.0	0	0.0	0	0.0	1	7.9	0	0.0	0	0.0
CS 150	0	0.0	4	26.2	3	20.7	1	4.5	2	11.4	0	0.0

## Exhibit A2

### Program Vitality Review Data

Gaming Certificate

Table 1. Retention Rate based on Modality for CS 153 and CS 175 by All Instructors

	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
<b>CS 153</b>					
Traditional	75.3%	86.1%	84.8%	75.5%	80.4%
Online				70.2%	73.5%
<b>CS 175</b>					
Traditional	76.1%	87.0%	85.0%	80.4%	86.0%
Online	78.3%	82.4%	72.5%	79.2%	79.1%

Fig. 1 Retention rate for traditional and online CS 153 courses between 2013-14 and 2017-18

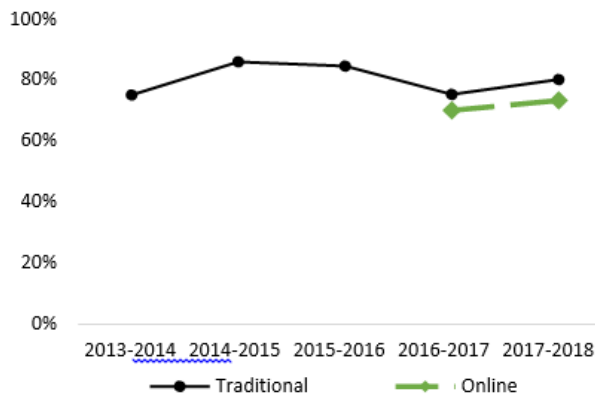


Fig. 2 Retention rate for traditional and online CS 175 courses between 2013-14 and 2017-18

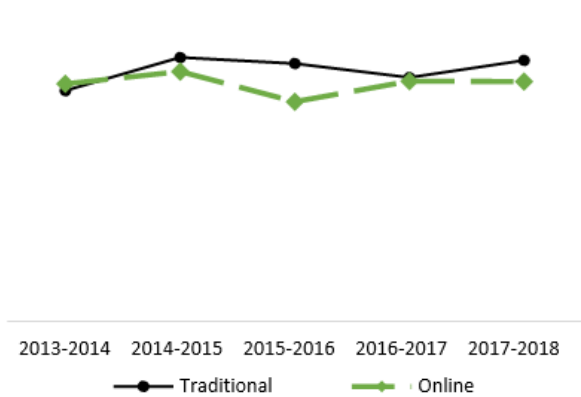


Table 2. Retention Rate based on Modality for CS 153 and CS 175, Instructor: Graham Smallwood

	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
<b>CS 153</b>					
Traditional					
Online					75.0%
<b>CS 175</b>					
Traditional			69.7%	66.2%	64.7%
Online			56.7%		

## Summary of Exhibit A2

Although CS 153 CS 175 are not the specific to CS 147, CS 148, and CS 149 classes in Gaming Development the data demonstrates that the retention rate hovers around the high 70s and 80s with the best retention in traditional classes. This may be of importance in scheduling future CS classes to improve retention rate with a modality of favoring more traditional classes and instructor preference.

## EXHIBIT B Gaming Spring 2019 Survey Summary:

In noting survey results in which 50% of the respondents reported the following are reported in the bullet points:

- 72% would be interested in a “Gaming Development” class if they could not fail
- 89% would be interested in the Teacher him/herself was a game programmer
- 89% would be interested in a class if they could compose any game they wanted
- 83% would be interested in the class covered how to publish a game on a phone
- 58% would be interested in they could pick the theme of the class each semester
- 100% would be interested in the class lead to an industry certification.

As far as deterrents to taking the Game Development class the respondent reported as follows:

Too busy, classes get canceled, concentrating on Adobe Certification, classes cost money, need a job, class conflicts.

Further, respondent reported that they would need experience in game design, knowledge of computers, not canceling the class, better timing of classes, proof it leads to a job, and a computer.

(Gaming Survey completed by Graham Smallwood with Computer Class students—spring 2019 at Golden West College)

## Step 2:

### Document Certificate Results

- Certificate Resources
  - Staff-Graham Smallwood (main faculty)
  - Other feeder classes **Exhibit A1 Table 3**
  - Class number restrictions were present
    - Can the numbers for CTE class is lower??
  - Agreements
    - EA Industry Dept.—no agreement-meeting 10/2018
    - Blizzard—no agreement—meeting 10/2018
  - Other
    - Programming Software can be free-however, District Adobe license is fee based
    - Classroom computers are updated
    - Industry Certification-Unity/Adobe— is currently available
    - High School—offering Gaming—
      - Marilyn Cuneen, District Career Technical Education Facilitator for Huntington Beach Union High School District is currently writing course outlines related to “Game Development”
    - What are other colleges doing with gaming?-Check Launch??
    - UCI has degree in “Game Design” (UCI is really Programming then comes Design)
      - The UCI program is geared for both Game Design and Game programming jobs.
      - With a Computer Science Degree, the majority of classes are for Programming with a few i.e. 61, 162 and 166 are pure design
      - In transferring to UCI CS 148, CS 149 (Design & Programming) would be logically related to UCI’s 61 & 161 classes (Source Graham Smallwood’s Report)
    - The College can buy an engine drop design for “Game Development”—Unity has it so the College does not have to start from the ground up. A “design course is putting on more paint,” whereas a “development course is building the core.”
    - E-Sports Gaming--Game portion does not connect with Computer Science. It is “Game Production.” However, there is a 33% cross over.
    - A Development course includes: Design/Art/Programing

## Step 3:

### Analysis of Key Performance Indicators/Data

- Track Dat Data—SLOs Pulled out for CS Courses—Little or no cSLOs for the 2015-Spring 2018 reporting
- cSLOs are written for CS 147, CS 148, and CS 149 and CS 150 (**See Exhibit C for full write-up**)

- Transfer History—there is no direct transfer. Universities will not take our courses because no programming is included in which 2 semesters of programming is needed
- Game Design Labor Market prepared by Los Angeles/Orange County Center of Excellence for Labor Market Research prepared July 2017 for previous full year 2016
  - Difficult to ascertain due to overlap of Art & Design needs
  - Job Postings due exist but not noted in Development
  - SOC Code is for Video Game Design and Multimedia Artists and Animators
- Other
  - Associate of Arts-Video Gaming Certificate (Cross Disciplinary Nature of what this is) elective courses, CS Degree with Gaming certificate, need Advisory Committee to guide the path
  - Gaming Development Certificate revision– 3/2017 was not completed through CCI (Graham Smallwood was trying to address revision needs) due to cancellation of CS classes.
  - A certification does exist through Unity Certified Associate & Unity User: Programming (new since re-write of CORs by Graham Smallwood)

## See Highlighted Data EXHIBIT C

### PROGRAM REVIEW – CURRICULUM PACKET

2018-2019

#### COMPUTER SCIENCE

This report includes course student learning outcome (cSLO) assessment summaries from 2015-16 to

2017-18. Table 1. Course offerings per academic year from 2015-16 to 2018-19

Table 2. Course assessment status between 2015-16 and

2017-18 Table 3. cSLOs that were not assessed between

2015-16 and 2017-18 Table 4. cSLOs assessed and

corresponding Data Evaluation

Table 5. cSLOs assessed and corresponding Data Planning

#### COURSE OFFERINGS

Table 1. Course offerings per academic year from 2015-16 to 2018-19

Course Name	2015-2016	2016-2017	2017-2018	2018-2019
CS G147	x	x	x	x
CS G148		x	x	x
CS G149		x	x	x
CS G150	x	x	x	x



## COURSE ASSESSMENT STATUS

Fully Assessed



Partially Assessed



No Assessment



Table 2. Course Assessment Status between 2015-16 and 2017-18

\*No enrollment data between 2013-14 and 2018-19

Course Name	Total cSLOs	No. cSLOs Assessed	Assessment Status	Last Term Offered
CS G147	7	0 out of 7	No Assessment	Spring 2018
CS G148	3	1 out of 3	Partially Assessed	Fall 2017
CS G149	3	0 out of 3	No Assessment	Spring 2017
CS G150	3	0 out of 3	No Assessment	Spring 2018

Table 3. cSLOs that were not assessed between 2015-16 and 2017-18

Course Name	cSLO Name	cSLO to Assessed
CS G147	cSLO 1	Understand and describe the world of 3D interactive game programming.
CS G147	cSLO 2	Compare and contrast the functionality in the existing gaming engines.
CS G147	cSLO 3	Demonstrate knowledge of current and popular gaming engines for the Windows
CS G147	cSLO 4	Distinguish and apply the theory and principle of the mathematical algorithms utilized in 3D
CS G147	cSLO 5	Apply theoretical knowledge with hands-on lab assignments for drawing primitive objects
CS G147	cSLO 6	Integrate sound and video into the fabric of a computer game design games that interact
CS G147	cSLO 7	Use the internet and library resources to research topics and communicate via e-mail.
CS G148	cSLO 1	Compare and contrast existing game engines.
CS G148	cSLO 2	Describe the internal components of a game engine and their interactions.
CS G149	cSLO 1	Understand the basic principles of computer networking.
CS G149	cSLO 2	Describe the components of a Multiplayer Online Game and the distribution and
CS G149	cSLO 3	Explain the tools used by teams of developers to create Massively Multiplayer online
CS G150	cSLO 1	Describe the current state of the mobile game environment.
CS G150	cSLO 2	Explain the component internals of mobile games and the interactions of these
CS G150	cSLO 3	Compare and contrast the current design tools, development environments, Debugging facilities and deployment packages.

## DATA EVALUATION

Table 4. cSLOs assessed and corresponding Data Evaluation.

Course Name	cSLO	Semester Assessed	cSLO Data Evaluation
CS G148	cSLO 3	Fall 2016	The class format of a once-weekly six hour class made it easy to ensure that all students were able to work along with what was being discussed in class. The only student who had problems was the one who regularly skipped class.

## DATA PLANNING

Table 5. cSLOs assessed and corresponding Data Planning.

Course Name	cSLO	Semester Assessed	cSLO Data Planning
CS G148	cSLO 3	Fall 2016	I thought this project turned out to be too easy based on the success rate. I am currently changing the assignment to cover more, but in smaller pieces. The individual parts should have the same success rate since they are the same size, but we will be able to cover more.

#### Step 4:

##### Identify Root Causes of Certificate Performance Gaps

- List all Potential Causes
  - Not knowing certificate is available
  - Limited out-reach efforts
  - Discrepancy of classes—CORs wrong
  - Not knowing if there is a correlation between gaming and computer science classes
  - Having the right classes and order in which they are offered
  - Minimum enrollment number accepted for class to commence (18, 20?)
  - Modality of class (face-to-face, online) what works best?
  - Demand time for class—morning or evening
  - Preparation of students for industry hire
  - Syllabi not current
  - Certificate viability i.e. Unity Certificate
- Causes Beyond the Control of the Certificate
  - Need student enrollment in classes and take exams
- Causes Within the Control of the Certificate
- Rank the Most Critical Root Cause Within the Control of the Certificate
  - Compulsory Advisory Meeting every 2 years needed or Program Discontinuance—Certificate needs to be within current trends. Top people **GDC**-Game Development Conference, **Vital** Link do Advisory Meetings
  - COR updates
  - Information given & advertisement timely (student do not know the certificate or classes exist)

#### Step 5:

##### Brainstorm Solutions

- Make the three classes G 147, G148, G149 independent of each other and focusing on the *use* of the topics instead of the *creation* of each. For example, you don't need to know how "shaders" work to use lighting techniques as an artist. This lets the classes be surveys of the three game development courses to let students see what they are interested in. As noted:
  - 147** – Art Topics: UI appearance, lighting, animation, environments, effects, models, sound.
  - 148** – Design Topics: Level design, scripting, character implementation, UI functionality, vector math, camera moves
  - 149** – Programming Topics: Object communication, prototyping, optimizing, threads, state machines, AI, networking, object modeling
- CS 102 would be the root of everything. Picture 147, 148, and 149 as columns after that. 121 leads to 147. 148 stands alone. 175 and 189 are required for

149. 147 and 148 together qualify someone for the Unity Associate Certification test and CS 149 (separately) qualifies for a Programmer Certification (new).

- 147 + 148 can be a mini certificate, which can make 147, 148, 149, 175, and 189 the full Game Development Certificate.
- Advisory meetings every 2 years or as needed to maintain currency and market need
- Follow industry advisement solutions in getting Certificates and meeting employment needs

### Step 6:

#### Select Best Solutions and Present PVR

- Committee Recommendations to Administration
  - Revise courses as described in **Step 5** and follow Unity and Game Development Certification & Advisory meeting recommendations
  - Make course outcomes measurable—PLOs/cSLOs/Time line (Fall 2019 update CORs) Use Advisory information and “Gaming Program” commits to this.....a time-line with conditions
  - Suspend --Hold on running classes until “Gaming” becomes more popular and influenced by local HS Unified School District (lower level courses are primitive in HS??) Different Entry Points---always changing
  - Support & Develop Course Pathway to support “Gaming” part of Matthew Valerius’s role with HS etc. in the future plan of more class interest in Gaming Development
- Certificate Improvement Plan Costing Less Than \$10,000
  - Unity Certificate Program—free/Certificate test costs money  
Pay for a licensing fee—contract—optional if a testing center
  - Cost of instructor when enrollment not made—42 minimum enrollment break even (22 carries cost of instruction)
  - Advertisement costs (CTE skill builders)/Information to students
- Certificate Improvement Plan Costing More than \$10,000
  - No plan

## Exhibit B

### Survey of Students from Computer Sciences Classes at GWC Spring 2019

#### Respondents

18 Students from Computer Science classes.

#### Questions:

1. Have you ever registered for one of GWC's game development classes?  
45% Yes
2. Have you ever attended a meeting of the Game Development Club?  
33% Yes
3. Have you ever attended a meeting of the eSports Club?  
11% Yes
4. How often do you play computer or console games?  
10% Never 71% Daily
5. How interested are you in taking a game development class?  
44% Somewhat 22% Very 33% Extremely
6. Would you be more or less interested if you knew you couldn't fail the class?  
72% More
7. Would you be more or less interested if you knew the teacher was themselves a game programmer?  
89% More
8. Would you be more or less interested if you knew you didn't need to know how to program already?  
38% More
9. Would you be more or less interested if you knew you could make any game you wanted?  
89% More

10. Would you be more or less interested if you knew you could take one class without taking the other two?

55% More

11. Would you be more or less interested if you knew the classes used Unity as a game engine?

58% More 8% Less

12. Would you be more or less interested if you knew the class covers how to publish a game on a phone?

83% More

13. Would you be more or less interested if you knew you get to pick the theme of the class each semester?

58%

14. Would you be more or less interested if you knew the class was an evening class?

33% More 25% Less

Would you be more or less interested if you knew the class can lead to an industry certification?

100% More

## PVR Committee Members Sign Off Page

**Golden West College  
Program Review  
Signatures Page**

Date: 5/1/2019

Program/Department Name: Gaming Certificate/Computer Science

Department Lead/Manager: Executive Dean Chris Whiteside

I have read/participated in the preceding report and accept the report as an accurate portrayal of the current status of the program/department.

(mark (X) as a signature and type names)

(X) Chris Whiteside, Executive Dean

(X) Graham Smallwood, Instructor

(X) Warren Carter, Professor

(X) Steven Burns, Instructor (by proxy Warren Carter)

(X) Toby Venegas, Student, ASGWC Vice President of Activities

(X) Diane Restelli, Assoc. Dean, Director Nursing