

The New Era of Teaching: Using Video Games to Teach Macroeconomics

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This paper discusses how the commercial video game Civilization VI can be used as an experiential learning tool in the economics classroom. The game simulates the progress of civilizations over the past 6000 years of human history and can be used to cover principles of economics, economic history and economic growth theory. Students experience and learn the importance of natural resources, human capital, physical capital, technology, trade, government stability, property rights, geography and openness to trade to economic growth and development. The paper discusses specifically how the game relates to specific economic topics. The game is available in Mac, IOS, Windows, PS4 and most other platforms.

Keywords: economics education, teaching and learning, teaching innovation, student engagement, experiential learning, critical thinking

INTRODUCTION

(Watts and Schaur, 2011) and (Ongeri, 2017) highlight how the traditional lecture style of teaching described by (Becker and Watts, 1996) as “talk and chalk” continues to be the standard in the economics classroom. Nonetheless, (Watts and Becker, (1998 and 2008)) show how innovations in teaching are also appearing in the field of economics. This paper describes an unconventional and innovative teaching technique that uses a commercial video game titled *Civilization VI* to teach some undergraduate-level concepts, lexicon and theories regarding economic history, economic growth and economic development. The video game is an enthralling conduit that allows students to apply what they have learned in the economics classroom to the virtual life within the game. *Civilization VI* simulates 6000 years of progress for a number of different civilizations amongst which the player’s own civilization is competing and collaborating. Much like the economic models taught to undergraduates, the simulation is a simplification of reality that incorporates several of the evidently important factors that determine the fate of a civilization. Population growth, institutions, trade, technological progress, education, food production, industry, exploration and a large number of variables create a simplified virtual version of the rise and fall of civilizations in human history that provide students with an invaluable experiential learning opportunity.

By teaching the immediate and deep determinants of economic growth and then allowing the students to play *Civilization VI*, a development and conflict strategic simulation, in the classroom, at home and/or online, one is able to create an exercise in experiential learning. (Kolb, et al., 2005) discuss the value of experiential learning in higher education, while (Silberman, 1996), (McKinney, 2010) and Baumann, et al., (2016), amongst many other authors, highlight the value of active learning in the classroom. In class discussions and higher order questions that make the students think critically about the relationships between theory, the simulated world of *Civilization VI* and the real world are crucial to extracting the most

value out of this pedagogical innovation. The paper now turns to a brief discussion of the literature and a formal introduction to the game before describing how different dimensions of the game can be used to discuss a set of specific concepts and theories in economics.

LITERATURE

(Sheridan, et al., 2014) and (Picault, 2019) highlight in their work the many innovations that have been recently added to the economics pedagogical toolkit. Economics pedagogues now use a variety of engaging tools and interdisciplinary approaches to teaching in order to engage students in the modern economics classroom. (Al-Bahrani, et al., 2015) and (Al-Bahrani, et al., 2016) discuss economic theory using social and popular media. (Vazquez, et al., 2014) and (Davis, 2015) stimulate the discussion of economics by analyzing the creative arts in the classroom. (Watts, 2003) and (Bohanon and Vachris, 2012) use literature to teach economic theory, while (Rousu, 2018) uses show tunes to teach about markets. (Van Horn and Van Horn, 2013) use music to teach the history of economic thought, and (Holder, et al., 2016) show how using music to teach economics can improve student learning. (Tierney, et al., 2015) use episodes from the popular TV show *The Big Bang Theory* to teach economics. (Burke, et al., 2018) teach game theory using film, (Leet and Houser, 2003) used film and documentaries as an integral part of their course design, while Diaz Vidal et al. (2020) discuss how film can be used to help students learn how to think like an economist. (Hall, 2012), (Moryl, 2013), (Luther, 2014) and Diaz Vidal (2020) effectively use podcasts in the economics classroom.

The use of serious video games, created for education, and of commercial video games as pedagogical apparatuses in primary, secondary and higher education has been studied extensively in the literature over the past few decades. (Gee, 2007) unravels the misconception that learning has to feel like a chore while playing is simply a ludic experience by emphasizing that deep games trigger deep learning. (Squire, 2011) discusses the importance of adopting new teaching methodologies for digital age students by stressing the value of video games in education when targeting the newer generations. (Squire, 2003), (Baek, 2008) and (Annetta, 2008), amongst others, further accentuate the value of incorporating video games in education. (Barr, 2017) specifically addresses the purpose of video games in the undergraduate classroom by identifying a set of intangible transferable skills that students may acquire as they critically experience the game. (Squire and Giovanetto, 2008), (Tannahill, et.al, 2012), (Farrell, et al., 2017), (Garcia Martinez, 2014), (Barr, 2017) and (Farrell, et al., 2017) and (Gilbert, 2019) further the case for the use of video games in higher education.

There are also a number of papers addressing the use of video games in the classroom that are more specifically related to the academic discipline and the particular set of topics and intangible transferable skills that *Civilization VI* is used for in this paper. The use of video games to learn history is extensive. (Metzger and Paxton, 2016), (Wright-Maley, et al., 2018) and (Boom et al., 2020) identify strategies regarding the effective use of video games to teach history. (Squire and Barab, 2004) and (Pagnotti and Russell, 2012) more specifically study how earlier versions of the *Civilization* game series can be used to teach history. (Lawson and Lawson, 2010), (Youngberg, 2019) and (Ng, 2019) discuss how games specifically created for the economics classroom can be instrumental in achieving an economics education. This paper proposes the use of a commercial video game as an unrealistic, yet useful, simulator for economic growth, history and development that may be critically analyzed and used to illustrate a number of important economic concepts and theories.

GAME DESCRIPTION

Sid Meier's Civilization VI (the full title of the game) is a turn-based strategy video game developed by Firaxis Games, published by 2K Games, and distributed by Take-Two Interactive. Students can gain access to the full game for about 15 US dollars as of March, 2020, and they can play using a number of platforms: Nintendo Switch, PlayStation 4, Xbox One, macOS, Microsoft Windows, iOS, Macintosh operating systems and Linux. The game simulates about 6000 years of the development of a civilization, from the

Bronze Age to quantum computing. The player must strategically decide where to create settlements which then allow the use and extraction of nearby natural resources, the production of capital, the training of military and civilian units and the construction of structures, amongst making other important decisions. The player commands the destiny of a civilization for thousands of years and decides who to trade with, who to wage war against, what type of a military to build, what kind of scientific research to pursue, what kind of culture and religion to follow, and must deal with the consequences of each decision taken along the way.

The game is used to allow the students to learn key economic concepts and theories in an introduction to economics class while putting them into practice in the simulated world created by the game engine. In class discussions regarding the game focus on its relation to economic history as well as a number of basic concepts taught in introductory economics classes and both the immediate and underlying determinants of economic growth. Students are encouraged to think critically about the game engine which is, to a large extent, a model of economic growth and development. As will be shown in the following section, the game engine incorporates many of the variables empirically recognized in the literature as determinants of economic growth and as explanatory variables behind the economic disparities between different economies around the world. The game presents a simplified and incomplete, but ultimately useful, model that can be used to help us understand, in a very immersive way, the complexity of the world we live in.

Gamers prefer complex games and game developers struggle to create intricate simulations that are also appealing so that players enjoy themselves along the cleverly designed learning curve (see (Gee, 2003)). Since economic questions have driven human existence and our progress through history, it is therefore not surprising that many games are deliberately based on economics. Titles such as *EVE Online*, *Railroad Tycoon* or *Imperialism II* are all clear examples of strategy computer games which have been made more successful and immersive by incorporating economics into the game mechanics. Analyzing the economics of this type of game and critically discussing in class the predictive capacity of the simulation is an exercise that is invaluable to an economics education.

The next section discusses how different specific parts of the game can be used to illustrate some basic economic concepts, the immediate determinants and the underlying determinants of economic growth, and how one can relate real events in history to the actions of a player in the game.

IMMEDIATE DETERMINANTS OF GROWTH

Natural Resources

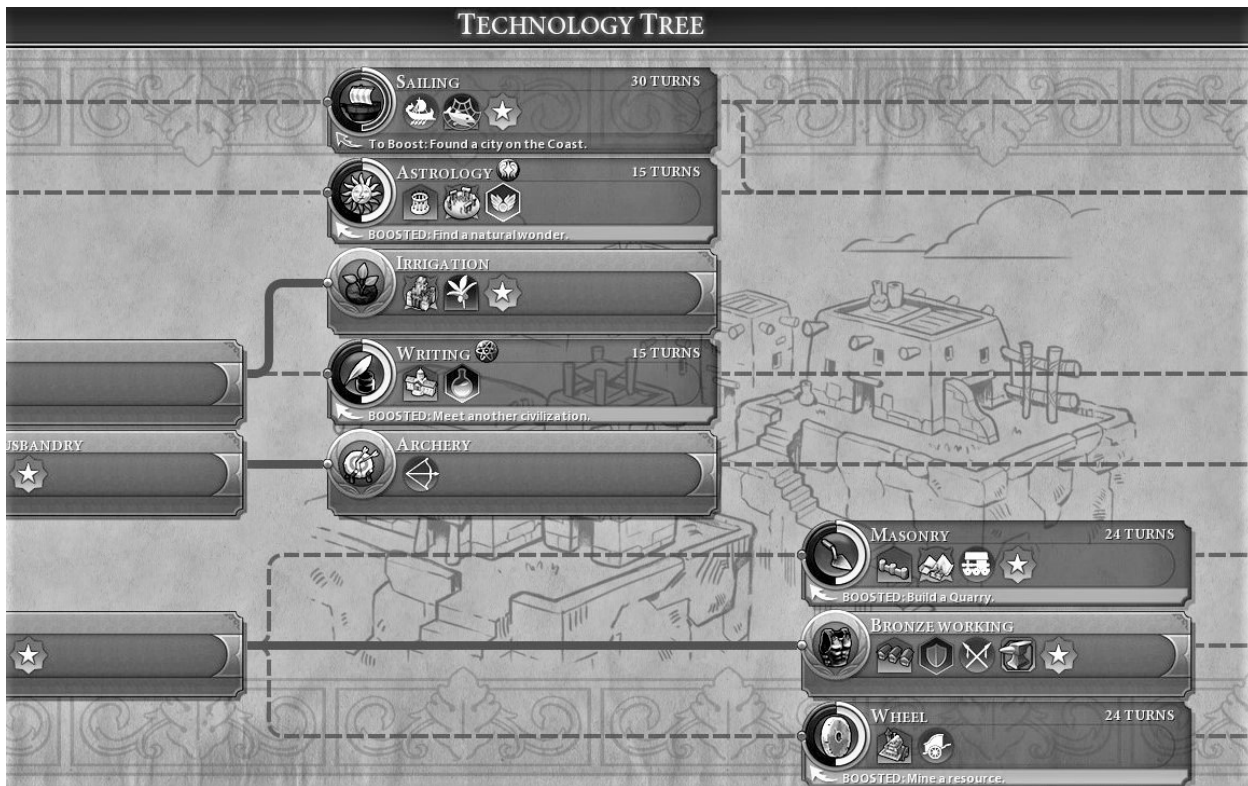
Just like in the real world, the virtual world created in the game adds a very diverse set of natural resources that play an integral role in the in-game economy. As can be seen in Figure one, the units of food and gold income generated by working a hexagon are represented by cobs of maize and coins respectively. Furthermore, hexagons can also have key luxury resources that passively make the in-game population happy or they can be actively traded with other civilizations for gold pieces. The two hexagons to the left are marshlands with a sugar luxury resource. Strategic resources, such as iron, coal, horses or aluminum, are necessary to produce or train certain units such as knights, legionnaires, P-51 Mustangs or Ironclads, and they can also be traded with other players in the game. The natural resources in the game play a crucial role in explaining conflicts amongst the different factions in the game and can be used to explain real life events, for example, the Franco-Prussian War, World War One or World War Two. As the game advances and technology improves, such as the advent of refrigeration, food can start to be shared with distant parts of the player's empire. An abundance of resource-rich hexagons can boost the population and infrastructure growth of a city in the game and of a civilization in the game's virtual world, clearly highlighting its importance in the real world.

Technology

Figure 1 shows the technology tree for the game. Each technology requires a certain number of technology points and tradeoffs can be easily illustrated by this dimension of the game. For example, in the short run players must decide whether or not they should pursue maritime technology or agricultural

technology. The students learn that no one strategy is valid for all locations and circumstances, which can be used to draw conclusions about the economic history and development of the real world. Technology points are a flow variable in the game that depends on population and on specialized R&D structures such as universities or telescopes, and on the number of engineers and scholars that the player places in them. Stopping to understand and discuss how several variables in the simulation determine the outcomes of other variables and how we might incorporate more real-world variables to make the game engine more realistic is invaluable in explaining the importance of the *ceteris paribus* assumption and inductive reasoning to economics.

**FIGURE 1
TECHNOLOGY**



Technology in the game clearly allows the player to benefit more from the same resources she already had at her disposal. In order to fully exploit a sugar resource in a marshy hexagon, the player must research the appropriate technology; once this has been accomplished, then the appropriate physical capital, a plantation, can be built to take further advantage of the resource. On the left-hand side of Figure 2, we see both an undeveloped sugar luxury resource, at the bottom, and a developed sugar resource, on the top. The top tile produces gold coins on top of food as the plantation allows sugar to be traded. Through the appropriate high order analogy questions, the class can discuss how their gameplay is clearly an illustration of the economic theory of growth and how both relate, abstractly, to the real world and to the history of human civilizations.

FIGURE 2
PHYSICAL AND HUMAN CAPITAL



Labor

Labor in the game is represented by citizens working hexagons in cities and by builder units which can be trained to build physical capital around cities. Figure 3 shows a city and the tiles that are being worked by the cities available labor. If labor were to increase, the city would be able to accelerate its rate of production or training. Without sufficient labor, the city will be unproductive and the civilization will fall behind relative to the rest of the virtual world. The game allows players to steal, or enslave, certain units that have been created by the other civilizations and force them to work for the benefit of their own civilization. As a matter of fact, it soon becomes apparent to all players that stealing these units is probably the best reason to start a war in the early game. Much like in the real world of 3000 years ago, there is plenty of land but not enough hands to work and develop it, so a big reason to wage war are the spoils in terms of forced labor.

**FIGURE 3
TRADEOFFS, POPULATION**



Human Capital

Training and specialized labor becomes increasingly important as the game progresses and the virtual civilization which the student is building becomes more sophisticated. On the right-hand side of Figure one, a band of warriors yielding clubs is directly next to the unit into which they can be upgraded or trained - the roman legion. The game creates a clear distinction between knowing how to organize soldiers into legions, a technological innovation, and actually training warriors to fight as a legion, an investment in human capital. In the cities of the mid to advanced game, citizens are not restricted to manning the hexagons around the capital, but may also work in a library, university or factory in order to increase the research output of the city or its industrial productivity. Having citizens working in these specialized structures also gives points towards a great citizen in the form of a Newton, Magellan or Rockefeller that would provide special benefits to the civilization in science, exploration or industry. The game can thus be used to explain the importance of training and experience on economic growth and productivity growth.

Physical Capital

Investments in physical capital primordially affect the yields of hexagons around cities and productivity within the city. A granary increases the cities food yield, a stable over a hexagon with horses increases the number of production costs by one, a farm over a hexagon of grassland next to a river provides housing and extra food. These investments on physical capital are very important in the mid to late stages of the game and accelerate the rate of growth and development of a civilization. As indicated earlier, on the left-hand side of Figure 2, we can see two identical hexagons with different yields due to the presence of physical capital in one of them. This example could be used to illustrate the link between technology and physical capital to the class. The instructor could repeat the analysis just made using his own saved game so that the students learn how to report on the progress of their civilization either in writing or, preferably, via

voiceover gameplay making sure that they use the appropriate economic nomenclature to describe what is happening in the game.

UNDERLYING DETERMINANTS OF GROWTH

Geography and Trade

(Diamond, 1997) highlights the importance of location in explaining the economic history of the world and the varying degrees of development in the world. Civilization does a great job at simulating the importance of geography on the prosperity of a nation. The game allows for a variety of different maps in which the players may interact. There is a map that simulates planet earth as accurately as possible whereas other maps could be composed of a set of isolated islands, a set of continents separated by oceans or a large Pangea in which all the players are landlocked with one another. The instructor can show the development of a civilization that started the game in a remote landmass that was not accessible via primitive naval technology. The game may progress with a certain degree of peace and prosperity for about one to two thousand years, until foreigners with technologically advanced ships and weapons find their way to the player's shore. Isolation prevents players in the game from trading their excess luxury resources for money they could have invested in physical or human capital. Furthermore, no technological exchange can take place with the other players if you have not met them. This can be used to exemplify the colonization of the Americas or different parts of Africa by the European powers.

The way in which strategic resources function in the game relates directly to the work of (Diamond, 1997). As technological progress allows societies to mine and use iron, a nation that had been prospering during the Bronze Age may find itself at a disadvantage if it cannot find any iron around its cities. The iron resource only appears in the game map once the technology has been discovered, so land that appeared useless in 2000 BC may not be so later on in the game once coal, iron, petroleum or uranium are found to be extremely useful to a civilization. Civilizations that colonized what appeared to be rich lands given the technology of the time may eventually need to rely on imports of a natural resource that technological innovations have turned into the key resource of that new era; one could think of transitions from tin and copper to iron, or from coal to oil. Without the possibility of trade, if your opponents do not wish to strengthen you, there is a need to colonize areas near foreign competitors or to invade their territories. These situations happen in the game and they can be used to illustrate, via analogy, the Meiji Restoration and the war in the Pacific.

Institutions and Government Stability

Property rights, as discussed in (North, 2002), are present in the game both in a passive and in an active manner. Passively, different civic innovations and structures that the player may research and build will have a corruption reducing and efficiency increasing effect on the economy. Players may also use their military units to prevent the marauding barbarians and enemy units to plunder their physical capital developments on hexagons around their cities. The student learns that there is no point in building farms, mines and plantations if they can be plundered and destroyed by the enemy. Property must be protected by "law enforcement" in the form of military units.

Government stability and efficient government are also present in many dimensions of the game and play a very important role in the economic development of a civilization. Figure 4 presents the different forms of government that the player may research through a civic achievement tree, and that provide different perks for the civilization. Autocracy and communism favor the military more than research, while democracy and a merchant republic specifically favor economic progress and research. It is important to critically compare these dimensions of the game to empirical evidence so that students also learn the value of inductive reasoning and of evidence-based research. Changing government types leads to penalties in public order and economic performance over a period of in-game time or turns. This is analogous to the effect of a lack of government stability in an economy and thus invaluable to a discussion of institutions and their role in promoting economic growth.

FIGURE 4
INSTITUTIONS AND GOVERNMENT STABILITY



Property Rights

The game has a civic cultural research tree under which “rule of law” can be researched, which has a passive efficiency effect in the game. As a population grows, corruption increases and you need to come up with more effective ways of doing things in order to attenuate this effect. A more active way to enforce property rights is by having strong borders followed by soldiers to protect your infrastructure developments. In this way, the marauding barbarians and opposing factions can be kept at bay. Without units to defend your farms, stables, etc., building them becomes irrational.

Population, Research and Education

(Kuznets, 1967), (Becker, et al., 1999) and (Clark, 2007), amongst many others, have studied the relationship between population and economic growth throughout human history. *Civilization VI* simulates this relationship in a variety of ways. The student/player soon realizes that population growth is crucial to be able to expand their economy and their production capability. A city requires food to grow and population is the key to success in the early game. Just as it was for the Roman Empire or the Incas, food sustains a numerous army and production force. Great walls, cities and pyramids require a lot of labor in the technologically unsophisticated early game of *Civilization VI* and also in the real world of three thousand years ago.

In agreement with introductory macroeconomics textbooks, more population in the game means a higher research yield for the player’s civilization. Therefore, and particularly in the early game, food production leads to innovation via the sharing of ideas. Successful players of the game learn that having big cities means that your technological progress will be accelerated. However, there is a limit on how much a population can grow before it begins to stress the economy. The game places a limit on the number of citizens a city may have which is firstly relative to the amount of housing the player has built. Furthermore, to have higher levels of population you have to consider how to manage corruption, pollution and the

thinning of your food supply. This in-game demographic behavior is clearly trying to mimic economic theory and the lessons that our history has taught us about economic growth and prosperity.

In the game, once the technological level has increased considerably, sheer increases in population will no longer have the same impact on technological progress and economic growth. Once the player's civilization has reached a certain degree of technological sophistication, the civilization must devote resources to the construction of research campuses, schools and universities that increase the effect that any one citizen has on the overall scientific yield. Furthermore, the city manager/player/student can place citizens in the university to gain an education which increases the probability of having a great leader emerge to the benefit of their civilization.

PRODUCTIVITY AND EFFICIENCY

In this final section there will be a discussion of the economic theory of productivity and efficiency, of how those concepts can be taught with the simulation, and of how to efficiently use this game, and video games in general, to teach in an economics classroom. The role of productivity and its determinants on human existence becomes evident to the students that play the game taking a critical perspective on their in-game actions and the consequences of those actions. At the beginning of a game that starts in 4000 BC, a worker in a city produces an average of three to four combined units of food, manufacturing output and currency. Once new technologies are discovered and investments in physical and human capital are made, the average yields from working hexagons is more than tripled. This allows for labor to be freed from agriculture and manufacturing so that they can become specialized citizens in universities, art centers or research campuses. *Civilization VI* is an ambitious and hands-on simulation of human socioeconomic development that is directly relevant to the discussions about economic growth and development that introductory economic students are a part of. The game creates an attractive, engaging, challenging and strategic simulation of human development that is an enthralling way of getting students interested in the study of economics hence heightening their appreciation of the subject.

The key to using this and other video games in the classroom is to make sure that the fun is analyzed seriously and academically. As highlighted in (Doyle, 2018), it is important that the lexicon and theories of economics are used to discuss in-game actions. If we understand learning as a process that requires change in one's ideas, behaviors, lexicon and ultimately in the way we think about what we do and about the world around us, then it would be advisable to teach the theory, let them learn how to play the game, and then proceed to mix the two through a set of high order questions that make them see how the theory, the real world and the virtual simulation relate to each other.

CONCLUSION

Some commercial video games are more engaging and interactive than traditional lectures and can be used to provide a learning-by-doing complement in the economics classroom. Such games create a complex and immersive environment that the players must learn in order to succeed, and in many cases that world is a simulated version of our reality. As such, video games function, in a similar way to an economic model, as a simplified yet useful abstraction of reality. This paper has shown how *Civilization VI*, a six thousand-year-long multifaceted civilization progress simulator, can be implemented in the economics classroom as an effective experiential learning tool for topics such as Economic Growth and Economic History in order to enhance the learning experience of the student.

This form of innovative teaching technique is appealing to the digital era generations and it is an effective strategy to attract students to the economics classroom. Therefore, in the future, one could explore the use of other commercial video games in order to be able to design a principles of economics class in which every unit is supported by a number of games that the students and instructor can play together during the semester. Furthermore, one could also explore the online multiplayer collaborative dimensions of commercial video games in both online and hybrid courses.

REFERENCES

- Al-Bahrani, A., & Patel, D. (2015). Incorporating Twitter, Instagram, and Facebook in economics classrooms. *The Journal of Economic Education*, 46(1), 56-67.
- Al-Bahrani, A., Holder, K., Patel, D., & Sheridan, B.J. (2016). The great digital divide: Using popular media to teach economics. *Journal of Economics and Economic Education Research*, 17(2), 105.
- Ambrose, S.A., Bridges, M.W., DiPietro, M., Lovett, M.C., & Norman, M.K. (2010). *How learning works: Seven research-based principles for smart teaching*. John Wiley & Sons.
- Annetta, L.A. (2008). Video games in education: Why they should be used and how they are being used. *Theory Into Practice*, 47(3), 229-239.
- Baek, Y.K. (2008). What hinders teachers in using computer and video games in the classroom? Exploring factors inhibiting the uptake of computer and video games. *CyberPsychology & Behavior*, 11(6), 665-671.
- Barr, M. (2017). Video games can develop graduate skills in higher education students: A randomised trial. *Computers & Education*, 113, 86-97.
- Baumann, P., & Farris, C.L. (2016). *Engaging Students in the Classroom Using Active, Team-Based Learning Strategies*.
- Becker, W.E., & Watts, M. (1996). Chalk and talk: A national survey on teaching undergraduate economics. *The American Economic Review*, 86(2), 448-453.
- Becker, W.E., & Watts, M. (1998). *Teaching economics to undergraduates: Alternatives to chalk and Edward Elgar*.
- Becker, G.S., Glaeser, E.L., & Murphy, K.M. (1999). Population and economic growth. *American Economic Review*, 89(2), 145-149.
- Bohanon, C.E., & Vachris, M.A. (2012). 21 Economics and literature: the gains from trade. *International Handbook on Teaching and Learning*.
- Boom, K.H., Ariese, C.E., van den Hout, B., Mol, A.A., & Politopoulos, A. (2020). Teaching through Play: Using Video Games as a Platform to Teach about the Past. *Communication the Past*, 27.
- Burke, S., Robak, P., & Stumph, C.F. (2018). Beyond Buttered Popcorn: A Project Using Movies to Teach Game Theory in Introductory Economics. *Journal of Economics Teaching*, 3(1), 153-161.
- Clark, G. (2007). The long march of history: Farm wages, population, and economic growth, England 1209–1869 I. *The Economic History Review*, 60(1), 97-135.
- Diaz Vidal, D., Mundegast, K., & Diaz Vidal, J. (2020). Economics Through Film: Thinking Like an Economist. *International Review of Economics Education*, 100186.
- Diaz Vidal, D (2020). *Macroeconomic Podcasts: Teaching the Internet Generation*. Manuscript submitted for publication. College of Business, University of Tampa.
- Davis, M.E. (2015). Bringing imagination back to the classroom: A model for creative arts in economics. *International Review of Economics Education*, 19, 1-12.
- Diamond, J. (1997). *Guns, germs, and steel*. Books on Tape.
- Doyle, J.B. (2018). *Using the Rhetoric of Video Games to Teach the Praxis of Critical Analysis* (Doctoral dissertation). The University of Texas Rio Grande Valley.
- Farrell, S.L., Neeser, A.E., & Bishoff, C. (2017). Academic Uses of Video Games: A Qualitative Assessment of Research and Teaching Needs at a Large Research University. *College & Research Libraries*, 78(5), 675.
- Garcia Martinez, S. (2014). *Using commercial games to support teaching in higher education* (Doctoral dissertation). Concordia University.
- Gee, J.P. (2007). *Good video games+ good learning: Collected essays on video games, learning, and literacy*. Peter Lang.
- Gilbert, L. (2019). “Assassin’s Creed reminds us that history is human experience”: Students’ senses of empathy while playing a narrative video game. *Theory & Research in Social Education*, 47(1), 108-137.

- Hall, J.C. (2012). Incorporating EconTalk podcasts into the principles classroom. *Journal of Private Enterprise*, 28(1), 113.
- Holder, K., Dirk, M., & O'Roark, B. (2016). *From the Beatles to Macklemore: Economics in Music in the Pop Culture Era*. Available at SSRN 2733042.
- Kolb, A.Y., & Kolb, D.A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education*, 4(2), 193-212.
- Kuznets, S. (1967). Population and economic growth. *Proceedings of the American Philosophical Society*, 111(3), 170-193.
- Lawson, C.L., & Lawson, L.L. (2010). Adventures in learning: Creating role playing video games to teach and learn economics. *International Review of Economics Education*, 9(1), 93-110.
- Leet, D., & Houser, S. (2003). Economics Goes to Hollywood: Using Classic Films and Documentaries to Create an Undergraduate Economics Course. *The Journal of Economic Education*, 34(4), 326-332. Retrieved January 9, 2020, from www.jstor.org/stable/30042560
- Luther, W.J. (2014). *Using NPR's Planet Money Podcast in Principles of Macroeconomics*. Available at SSRN 2391013.
- McKinney, K. (2010). *Active learning*. Illinois state university center of teaching, learning and technology.
- Metzger, S.A., & Paxton, R.J. (2016). Gaming history: A framework for what video games teach about the past. *Theory & Research in Social Education*, 44(4), 532-564.
- Moryl, R. (2013). T-shirts, moonshine, and autopsies: Using podcasts to engage undergraduate microeconomics students. *International Review of Economics Education*, 13, 67-74.
- Ng, C.F. (2019). A video game to supplement a hybrid principles of microeconomics course. *The Journal of Economic Education*, 50(1), 44-56.
- North, D.C. (2002). Institutions and economic growth: a historical introduction. In *International political economy* (pp. 57-69). Routledge.
- Ongeri, J.D. (2017). Instruction of economics at higher education: A literature review of the unchanging method of "talk and chalk". *The International Journal of Management Education*, 15(2), 30-35.
- Pagnotti, J., & Russell, W.B., III. (2012). Using Civilization IV to engage students in world history content. *The Social Studies*, 103(1), 39-48.
- Picault, J. (2019). The Economics Instructor's Toolbox. *International Review of Economics Education*.
- Rousu, M.C. (2018, Winter). Using Show Tunes to Teach about Free (and Not-So-Free) Markets. *Journal of Private Enterprise*, 33, 111-128.
- Sheridan, B.J., Hoyt, G., & Imazeki, J. (2014). A primer for new teachers of economics. *Southern Economic Journal*, 80(3), 839-854.
- Silberman, M. (1996). *Active Learning: 101 Strategies to Teach Any Subject*. Prentice-Hall, PO Box 11071, Des Moines, IA 50336-1071.
- Squire, K. (2003). Video games in education. *Int. J. Intell. Games & Simulation*, 2(1), 49-62.
- Squire, K. (2011). *Video games and learning. Teaching and participatory culture in the digital age*.
- Squire, K., & Barab, S. (2004, June). Replaying history: Engaging urban underserved students in learning world history through computer simulation games. In *Proceedings of the 6th International Conference on Learning Sciences* (pp. 505-512). International Society of the Learning Sciences.
- Squire, K., & Giovanetto, L. (2008). The higher education of gaming. *E-Learning and Digital Media*, 5(1), 2-28.
- Tannahill, N., Tissington, P., & Senior, C. (2012). Video games and higher education: what can "Call of Duty" teach our students? *Frontiers in Psychology*, 3, 210.
- Tierney, J., Dirk, M., Geerling, W., Wooten, J., & Smith, B. (2015). *Bazinganomics: Economics of The Big Bang Theory*. Available at SSRN 2657287.
- Van Horn, R., & Van Horn, M. (2013). What would Adam Smith have on his iPod? Uses of music in teaching the history of economic thought. *The Journal of Economic Education*, 44(1), 64-73.
- Vazquez, J.J., & Chiang, E.P. (2014). A picture is worth a thousand words (at least): The effective use of visuals in the economics classroom. *International Review of Economics Education*, 17, 109-119.

- Watts, M. (Ed.). (2003). *The literary book of economics: Including readings from literature and drama on economic concepts, issues, and themes*. Intercollegiate Studies Institute.
- Watts, M., & Becker, W.E. (2008). A little more than chalk and talk: Results from a third national survey of teaching methods in undergraduate economics courses. *The Journal of Economic Education*, 39(3), 273-286.
- Watts, M., & Schaur, G. (2011). Teaching and assessment methods in undergraduate economics: A fourth national quinquennial survey. *The Journal of Economic Education*, 42(3), 294-309.
- Wright-Maley, C., Lee, J.K., & Friedman, A. (2018). Digital simulations and games in history education. *The Wiley International Handbook of History Teaching and Learning*, pp. 603-629.
- Youngberg, D. (2019). Video Games in Teaching Economics. *Teaching Economics* (pp. 9-31). Springer, Cham.