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THESIS

**COMMERCIAL OFF-THE-SHELF BOARD GAMES
FOR PROFESSIONAL MILITARY EDUCATION**

by

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**COMMERCIAL OFF-THE-SHELF BOARD GAMES FOR PROFESSIONAL
MILITARY EDUCATION**

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ABSTRACT

Wargames have been a part of military study and planning for over a century. These often involve large and complex setups with relatively few people participating in a bespoke scenario. While these have their uses, their one-off and tailored nature often preclude the participation of additional members, let alone rapid iteration. These factors limit the usefulness of traditional wargaming for educational purposes, especially when one considers the effort required to design, set up, and run the game, let alone the time required for all participants. The modern commercial board game industry can fill this gap between traditional wargames and education by providing an inexpensive, easily repeatable, and reduced-time commitment experience tailored to specific lesson objectives. Reviewing Air Force professional military education programs for common themes and objectives finds six common themes and objectives on which to judge commercial off-the-shelf board games for educational usefulness: decision-making, communication, ethics and morality, critical thinking, creative thinking, and systematic thinking. Considering those topics while analyzing several off-the-shelf games finds multiple examples where commercial board games can act as tools for teaching said topics. As tools, the games analyzed are not expected to teach the topic, but are part of a greater lesson plan.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACSC	Air Command and Staff College
AF	Air Force
AFI	Air Force Instruction
AU	Air University
AWC	Air War College
COTS	commercial off-the-shelf
DOD	Department of Defense
GBL	game-based learning
IDE	intermediate developmental education
JADS	Joint All Domain Strategist
PDE	primary developmental education
PME	professional military education
SANDS	School of Advanced Nuclear Deterrence Studies
SDE	senior developmental education
SOS	Squadron Officer School
SSS	Schriever Space Scholars
TFD	Total Force Development
TI	<i>Twilight Imperium</i>

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EXECUTIVE SUMMARY

Wargames are an integral part of today's military. They allow for calm, contemplative analysis of the deadliest actions while often generating new ways of thinking and action methods to use in future efforts. Unfortunately for education, today's wargames often involve significant and complex setups with relatively few people participating in a bespoke scenario. While these have their uses, their usually one-off and tailored nature often precludes the participation of additional members, let alone rapid iteration. These factors limit the usefulness of traditional wargaming for educational purposes, especially when considering the effort required to design, set up, and run the game, let alone the time requirement asked of participants. While instructors can and do develop creative and effective gamified learning tools, other options may fill the gap more easily. This gap is where the modern commercial board-game industry may prove helpful. Commercial board games can provide a filler between traditional wargames and education, without requiring the bespoke efforts of an instructor. Commercial off-the-shelf (COTS) board games, specifically games easily purchased at any local game or bookstore, can provide a relatively inexpensive, easily repeatable, shorter time commitment experience tailored to specific lesson objectives across the professional military education (PME) spectrum and beyond.

While board games and education can range across disciplines, this research focused on applying COTS games to PME objectives, specifically Air Force (AF) PME objectives. At the same time, today's military focuses on joint knowledge and objectives, with all branches relying on common joint PME goals. Just as no game analysis in this study is meant to apply one-to-one to an AF PME objective, the same goes for other branches. The topics and themes for each game are essential—and in this case, AF PME is the model on which those game themes are compared.

This review identifies common themes and objectives by focusing on the three primary AF officer PME programs' in-residence curricula. These programs—Squadron Officer School (SOS), Air Command and Staff College (ACSC), and Air War College (AWC)—see most AF officers and form the core of AF PME. Utilizing the course descriptions and learning objectives in the Air University catalog, as well as some of their

individual classes, reveals six main themes and learning objectives common to all programs: decision-making skills, communication ability, ethics and moral considerations, critical thinking skills, creative thinking skills, and systematic thinking skills.

Several open-source resources provided information on popular and well-regarded board games to analyze for the common themes and objectives critical common across PME programs. These resources highlighted dozens of games worth studying, but time constraints narrowed the pool to eight entries. The discovered games ranged from simple affairs to all-day endeavors and represented some of the best in the commercial board game industry. The games, and the themes and objectives they might help teach, are listed in Table 1.

The games studied here are not a comprehensive list nor represent the only way COTS games can be incorporated into education. Instead, the expectation is that the analysis here is an example for course designers and instructors when looking for new teaching tools and methods to add to their lessons. With some time and research, instructors can find games that might help their lesson plans—this study represents one way to approach that effort.

Whether intending to discuss the latest development in military decision-making schemes, arguing over the finer points of diplomacy, or planning the ultimate power move, the commercial board game industry is a resource that must not fall under the radar. The breadth of topics, mechanics, themes, structures, and more offered by the myriad of entries on any game store’s shelf provides a near-limitless pool of possible tools.

In the end, games are fun. Any time something tedious can be improved with a touch of fun is a good thing. While not all classes are inherently dull, there is something noteworthy in pushing educational settings beyond PowerPoint presentations and lectures. Learning programs should be as fun and engaging as possible to ensure the lessons are absorbed rather than simply tolerated. Adding COTS board games to PME is one way of achieving such a goal. But, as anyone who has participated in a game night will attest, the important thing is to pull the right game off the shelf.

Table 1. Board Game Common Themes and Objectives Overview

Game Title	Publisher	Common Themes and Objectives
<i>Brass: Birmingham</i>	Roxley Games	critical thinking, systematic thinking
<i>Dune: Imperium</i>	Direwolf Games	decision-making, systematic thinking
<i>Mysterium</i>	Libellud	communication
<i>Root</i>	Leder Games	decision-making, critical thinking, creative thinking, systematic thinking
<i>Scythe</i>	Stonemaier Games	decision-making, ethics and morality, systematic thinking
<i>Twilight Inscription</i>	Fantasy Flight Games	decision-making, systematic thinking
<i>Eclipse – Second Dawn for the Galaxy</i>	Lautapelit.fi	decision-making, critical thinking
<i>Twilight Imperium Fourth Edition</i>	Fantasy Flight Games	decision-making, communication, critical thinking, creative thinking, systematic thinking

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I. INTRODUCTION

Wargames are an integral part of today's military. They allow for calm, contemplative analysis of the deadliest actions while often generating new ways of thinking and methods of action to use in future efforts. Unfortunately, for educational purposes, specifically professional military education (PME), today's wargames often involve significant and complex setups with relatively few people participating in a bespoke scenario falling under the purview of Title 10 of the U.S. Code. While wargames can and do occur at all levels of military preparation, all variants see weeks to months of planning and development by dedicated, invited teams before outside participants are brought in to learn and play that one specific wargame. Although these types of "traditional" wargames have their uses, their usually one-off and tailored nature often precludes the participation of additional members, let alone rapid iteration.¹

This complexity of design and setup, plus the dedicated and invited participant list, limits the usefulness of such wargaming for PME purposes. This limited utility is exacerbated when adding in the time requirement asked of participants—especially when considering travel and TDY requirements. While PME instructors and programs can and do develop creative and effective gamified learning tools, some even going so far as to invent whole sports like Flex ball from Air Force (AF) Squadron Officer School (SOS), other options may fill in the gap between major wargame and classroom activity with less required overhead.² This is where the modern commercial board game industry can prove helpful. Games can provide a filler between traditional wargames and education, without requiring the bespoke efforts of an instructor or development team. Commercial off-the-shelf (COTS) board games, specifically games easily purchased at any local game or bookstore, can provide a relatively inexpensive, easily repeatable, and shorter time

¹ Mitch Reed, "USAF Title 10 Wargaming with Mitch Reed," <https://www.youtube.com/watch?v=fZ-7iSSGSbs>.

² Tammie Ramsouer, "CGOs Enhance Airpower through FLEXibility," *42nd Air Base Wing Public Affairs*, April 19, 2016, <https://www.maxwell.af.mil/News/Features/Display/Article/750147/cgos-enhance-airpower-through-flexibility/>; *Enhancing Air Power Through FLEXibility*, 2016, https://www.youtube.com/watch?v=N_nSulwrdTs&t=1s.

commitment experience tailored for specific lesson objectives across the PME spectrum and beyond.

The past decade has seen a renaissance in the commercial board game and role-playing game industry, today making it a \$3.3 billion industry.³ No longer is a family relegated to a never-ending game of *Monopoly* or a group of friends forced to endure an unbalanced, random number generator-filled *Settlers of Catan* session. As of early 2023, over 135,000 board games are tracked on the crowd-sourced website Board Game Geek with numerous designs, tools, gimmicks, and themes.⁴ These games provide diverse rules sets, unique challenges, and exciting scenarios to challenge players. Such a large and varied market offers an effectively unlimited selection of possible tools for teaching any number of concepts, ideas, or habits.

The following sections delve into what makes games useful for education, some of the mechanics that make up games, and highlight some of the themes and learning objectives in the AF Air University (AU) PME curricula. While AU manages a wide-ranging set of officer, enlisted, and civilian courses, only the three primary officer PME programs are reviewed: Squadron Officer School (SOS), Air Command and Staff College (ACSC), and Air War College (AWC).

Following the discussion in AU courses, several games currently available on the market go under review for their applicability to those PME learning objectives and themes. Each product faces an analysis for themes, topics, ease of play, or even complete objectives that could prove applicable in an educational setting. The exact application method of any board game would depend on the course and instructor. Therefore, the products and the analysis on them here are far from a definitive list and do not provide instructions in an appropriate application. This study aims to demonstrate a framework for looking at commercial board games as something other than simply a toy or hobby.

³ “Board Games – Worldwide | Statista Market Forecast,” Statista, accessed July 17, 2022, <https://www.statista.com/outlook/dmo/app/games/board-games/worldwide>.

⁴ “BoardGameGeek Database,” Board Game Geek, accessed March 16, 2022, <https://boardgamegeek.com/browse/boardgame>; Calculated by looking at the full database of 1,350+ pages with 100 entries on each page = 135,000

II. BOARD GAMES AND EDUCATION

Depending on a person’s background and familiarity with board games, the idea that board games are educational may not be a surprise. Regardless, reviewing current research on “gamifying” education through board games is essential, as this study assumes that adding games to educational settings is helpful. Fortunately, numerous studies support this assumption by examining the benefits of using board games as educational and developmental tools.

One recent article by Rebecca Bayeck, titled “Examining Board Gameplay and Learning: A Multidisciplinary Review of Recent Research,” took a high-level look at board game research, reporting that “Recent years have seen the resurgence of board games designed for entertainment, and to teach or explicate real life problems.”⁵ Bayeck noted research demonstrating how games provide new learning methods that “enable cognitive and behavioral change” because participants must fully understand the game to interact and engage appropriately.⁶ Now, many researchers are looking at “board games as learning spaces.”⁷

Bayeck continues the review by noting how various studies demonstrated board games’ usefulness in mathematical learning, health and medicine, physics, astronomy, finance, language, culture, history, and even bullying. Much of the work reviewed in this article did focus on younger participants, but some studies found similar benefits for older groups and those with disabilities. In all cases, the data shows “that board games can enable participation in diverse practices that are creative, fun, and engaging,” they can also “motivate students to learn, and engage participants in forms of computational thinking.”⁸

⁵ Rebecca Yvonne Bayeck, “Examining Board Gameplay and Learning: A Multidisciplinary Review of Recent Research,” *Simulation & Gaming* 51, no. 4 (August 2020): 411, <https://doi.org/10.1177/1046878119901286>.

⁶ Bayeck, 412.

⁷ Bayeck, 412.

⁸ Bayeck, 424.

Interestingly, Bayeck’s work found limited studies (4 out of 45) that looked at commercial board games. In addition, most studies focused on “serious board games” as opposed to “commercial board games,” where serious games are those “designed with a learning or teaching goal” in mind.⁹ Bayeck notes this weakness, pointing out the need for additional research on commercial board games and games designed outside the Western world.¹⁰

Another article discussing game-based learning is Marc Cicchino’s “Using Game-Based Learning to Foster Critical Thinking in Student Discourse.”¹¹ As with some of the studies analyzed in Bayeck’s work, Cicchino’s study did use a younger student body (eighth graders), but he notes some essential aspects of what he calls “game-based learning (GBL)” that can prove helpful in the study of GBL in general. First, he notes how much of the work on GBL has been theoretical and thus far focused on video games instead of experiential, physical media such as board games. The engaging portion of Cicchino’s article is his enumeration of “Six principles of game-based learning,” with a breakdown of each principle’s purpose and desired outcome. His six principles can help generate a framework for analyzing games both as learning tools and as general entertainment; these include:

(1) be provocative of critical thinking via one or more problem states; (2) be appropriately challenging; (3) provide opportunities for players to discover and/or create their own knowledge; (4) provide a fictional world or fantasy driven metaphor; (5) be “social” (i.e., encouraging collaborative interactions between players); and (6) be winnable (so as to provide goals, as well as some sense of competition)¹²

In many ways, Cicchino’s framework ties nicely into good board game design. Overall, Cicchino’s work demonstrated aspects of GBL and some game cycles (which this paper refers to as *game mechanics*) “were effective in promoting higher levels of critical

⁹ Bayeck, 424.

¹⁰ Bayeck, 424.

¹¹ Marc I Cicchino, “Using Game-Based Learning to Foster Critical Thinking in Student Discourse,” *Interdisciplinary Journal of Problem-Based Learning* 9, no. 2 (January 20, 2015), <https://doi.org/10.7771/1541-5015.1481>.

¹² Cicchino, 4.

thinking” and helped develop independent beliefs in the participants before engaging in discourse and reflection.¹³

Another piece of literature from Ryu, Parsons, and Lee finds similar benefits to GBL. In their work “Using Game-Based Collaborative Learning to Enhance Critical Thinking Skills,” the team studied undergraduate students using a mixed reality business game. The gameplay involved electronic and physical materials used by both singles and paired groups. Their results showed that the three groups (individual in single-player mode, collaborative with pair-play, and collaborative with two single-player modes) experienced similar concept retention levels but did not comment on any change in critical thinking skills—more rote memorization than creativity. The significant difference in outcomes came in critical thinking skills improvement between those who worked with a partner and those who remained single. GBL, especially collaborative GBL, had a noticeable benefit to critical thinking skills.¹⁴

A search for studies focused on high-level, adult-focused education efforts found work by Yoon, Rodriguez, Faselix, and Liappis studying the use of experimental gaming strategies on traditional learning. Their work used a custom-designed board game to augment the continuing education of nursing staff at the Washington, DC, Veterans Affairs Medical Center. The short match focused on indwelling urinary catheters and followed a patient’s journey through their hospital stay with different spaces representing various risks. The study found that the gamified “setting offered quick feedback and teamwork with peers and engaged participants to recall previous knowledge and experiences.”¹⁵ In addition, the writers noted previous studies showing how using games in education facilitates active learning, encourages critical thinking, and increases knowledge retention.¹⁶

¹³ Cicchino, 1.

¹⁴ Hokyoung Ryu, D. Parsons, and Hyunjeong Lee, “Using Game-Based Collaborative Learning to Enhance Critical Thinking Skills,” 2014.

¹⁵ Bona Yoon et al., “Using a Board Game to Reinforce Learning,” *The Journal of Continuing Education in Nursing* 45, no. 3 (March 2014): 110–11, <https://doi.org/10.3928/00220124-20140224-14>.

¹⁶ Yoon et al.

Finally, Yusof, Adzi, Din, and Khalid’s “Study on the Effectiveness of a Board Game as a Training Tool for Project Management” looked at the board game *TASKMANAGER* as a teaching tool to “increase [sic] student’s comprehension and understanding of the concepts and strategies in project management.”¹⁷ Their study noted how previous research found that teacher-centered and student-led learning complement each other. They also noted that other studies indicate board gaming provided “hands-on and heads on skill and knowledge development” while making learning more enjoyable regardless of the player’s age.¹⁸ Yoon concluded that the *TASKMANAGER* board game was an effective tool for teaching project management. Additionally, the results showed that students enjoyed playing the game and were “consistently focus [ed] on their objective and committed [to] the game,” which helped lead to active communication and discussion between participants.¹⁹ An important note from the study is the importance of a pre-brief to participants, or more generally, a way to ensure participants are ready for the game before the game begins.²⁰

Overall, current research shows a consistent positive relationship between the use of board games in educational settings and positive learning outcomes. However, the lack of formalized studies on using specifically COTS material is concerning. The discussion on board games here should be a starting point for more formalized studies. In any case, it is clear that when it comes to using board games for education, the key is to find a suitable game for the lesson, ensure players are aware of the game and its rules, and that players are available to invest themselves in the game. In other words, avoid last-minute, rushed sessions.

¹⁷ Shahrul Azmi Mohd Yusof et al., “A Study on the Effectiveness of a Board Game as a Training Tool for Project Management,” *Journal of Telecommunication, Electronic and Computer Engineering* 8 (January 2016): 171–76.

¹⁸ Mohd Yusof et al.

¹⁹ Yoon et al., “Using a Board Game to Reinforce Learning.”

²⁰ Yoon et al.

III. AIR FORCE PROFESSIONAL MILITARY EDUCATION THEMES AND OBJECTIVES

Instead of attempting to cover the wide breadth of topics and studies touched on in Chapter II, this research focused on applying COTS games to PME objectives, specifically AF PME objectives. At the same time, today’s military focuses on Joint knowledge and objectives, with all military branches relying on common Joint PME goals. Just as no game analysis in this study is meant to apply one-to-one to an AF PME objective, the same goes for other branches. The topics and themes for each game are what is important—and in this case, AF PME is the model on which those game themes are compared.

The AF relies on Air Force Instruction (AFI) 36–2670 to lay out its Total Force Development (TFD) structure, wherein enlisted, commissioned, and Department of Defense (DOD) civilian careers are guided from intake to completion. TFD is a long and complex process that constantly shifts and changes with technology, personnel management philosophies, and, most importantly, the needs of the AF. Built into the TFD structure is Developmental Education (DE), which the publication defines as “an array of resident, non-resident, and blended educational opportunities composed of formal and experiential programs including but not limited to graduate education, service and joint professional military education, fellowships, and education with industry.”²¹ Inside DE is where the traditional forms of PME occur.

As with TFD, AF PME splits between enlisted, officer, and civilian paths. For simplicity’s sake, this study focuses on the three main components of AF officer PME: Squadron Officer School (SOS), Air Command and Staff College (ACSC), and Air War College (AWC). These three schools all fall under the prevue of AU, which manages the in-resident and in-correspondence versions of all three programs. AU also manages enlisted and international officer programs, which are omitted from this study.²²

²¹ “AFI36-2670 Total Force Development” (United States Air Force, June 25, 2020), 80, https://static.e-publishing.af.mil/production/1/af_a1/publication/dafi36-2670/dafi36-2670.pdf.

²² “Air University Catalog 2022–2023,” n.d., 151, https://www.airuniversity.af.edu/Portals/10/Registrar/catalogs/AU_CATALOG_2022_2023.pdf.

The programs reviewed below are specifically the in-residence programs. The themes and objectives in in-residence and distance learning programs are relatively equivalent. However, to best represent the fact board games are typically played in person, this study reviews only the objectives delineated for the in-residence programs. Additionally, learning objective analysis remained closer to the top-level goals of the program rather than delving into individual courses. The expectation is that course objectives harmonize with overall learning objectives, so if a board game applies to the overall learning objectives, it can apply to one or more individual classes or programs.

Furthermore, while it does not bear directly on how this study progresses, it is helpful to understand how PME progression tracks along an officer’s career. In general, the number of in-residence participants decreases at each level of education. The PME objectives go from individual to global as the learning level increases while, at the same time, rigorousness increases. For example, the AF sends all officers to SOS in residence, but fewer to ACSC, and even fewer to AWC. This reduction occurs due to both the rate members separate from the AF and the more selective requirements of higher levels of education; AWC finds those with senior command and staff potential only, for instance.²³ This distinction helps frame the fact that while similar, or even identical, high-level learning objectives appear throughout the PME programs, the strategic level they apply to evolves.

A. SQUADRON OFFICER SCHOOL

SOS is the AF’s Primary Developmental Education (PDE) program, wherein all four-to-seven-year AF captains (O-3s) attend to build a unified mid-career officer corps. There are three primary outcomes in SOS: Leadership, Designing to Accelerate Change, and Air and Space Minded Officers.²⁴

With leadership, the goal is for graduates to be “more effective at the art and science of deliberately influencing others to achieve positive outcomes in a wide range of

²³ “AU Catalog,” 28.

²⁴ “AU Catalog,” 180–81.

contexts.”²⁵ This includes an improved ability to “analyze and align critical, creative, systematic, and ethical thinking” in a complex and changing environment while utilizing diverse viewpoints to “create shared goals and inform decision making.” In addition, students must apply “models of leadership/followership/teambuilding” in creating productive interpersonal relationships that improve organizational performance.²⁶

Designing to Accelerate Change comes from an Action Order released by General Charles Q. Brown, the current Chief of Staff of the Air Force. In his publication, Gen Brown highlights that to remain the preeminent air force in the world, the USAF must “accelerate change to control and exploit the air domain.”²⁷ To do anything less would result in both the AF and the U.S. losing the long-term fight, as “good enough today will fail tomorrow.”²⁸ AU took the goals outlined by Gen Brown and determined SOS graduates should “demonstrate proficiency in designing answers for a diverse range of complicated and complex challenges.”²⁹ Meaning graduates should be able to take a multidisciplinary approach when addressing organizational problems, which considers the needs and abilities of their people into account while also acknowledging environmental conditions and resource availability.

SOS’s third primary learning objective is to graduate air and space-minded officers. Regardless of a service member’s specific occupation or task, all work supports the greater air and space enterprise. Regardless of someone’s background, an officer should be able to “articulate how their individual technical knowledge [sic] integrates into Joint All Domain Operation.”³⁰ This comes down to understanding where they, and the AF, fit into the grander picture. It means that students should be able to understand their place in the

²⁵ “AU Catalog,” 180.

²⁶ “AU Catalog,” 180.

²⁷ Charles Brown, *Accelerate Change or Lose* (Washington, D.C.: United States Air Force, 2020), 3, https://www.af.mil/Portals/1/documents/2020SAF/ACOL_booklet_FINAL_13_Nov_1006_WEB.pdf.

²⁸ Brown, 4.

²⁹ “AU Catalog,” 180.

³⁰ “AU Catalog,” 181.

grandeur “geopolitical conditions of Strategic competition” and how that shapes the design and utilization of “Joint Force capabilities.”³¹

To facilitate the completion of SOS’s learning objectives, AU splits the curriculum into five program areas: leadership, design thinking, joint warfare, team building, and administration. While all five have some academic components, only the first four are academic class topics. Administration is just that: administrivia requirements rather than educational concerns. Combining the program area descriptions with the overall learning objectives reveals several overarching themes that can guide game analysis in this study.³²

First off, students must understand themselves and how to relate to others. Communication is critical in this endeavor. Students must also develop the interpersonal skills necessary to understand those with whom they work to best lead and develop the teams they both create and of which they are naturally a part.

Second is decision-making and critical thinking skills. SOS focuses on team problem-solving and collaboration through human-centric design. It wants students to learn to collaborate and communicate with diverse groups while developing solutions to complex situations.

Finally, by introducing students to the joint domain, SOS reveals the importance of broader system analysis and systematic thinking. In this case, system analysis refers to an ability to take the individual parts of a greater whole and understand how they fit together and how best to utilize the tools dispersed throughout the network. At SOS, it starts with students viewing their careers and mission sets not as a tiny world in and of itself but as part of a greater whole. Comprehending how various components work together is critical to today’s military, and the skills necessary to view the joint world can also apply to any complex system or organization. These unified themes and objectives are summarized and simplified in Table 1.

³¹ “AU Catalog,” 181.

³² “AU Catalog,” 182.

Table 1. SOS Themes and Objectives Summarized

Theme or Objective	Description
Communication	General dialog, interpersonal interactions, and relationship development.
Decision-Making	Team and human-focused problem analysis and resolution using critical thinking.
Critical Thinking	Considering all aspects of a problem, delving deep into the causes and possible solutions
Creative Thinking	Thinking outside of the box to create unique, innovative solutions
Systematic Thinking	Studying and understanding the parts of a system to better make use of the whole said parts make up.
Ethical Thinking	Considering the moral and ethical implications of actions and decisions

B. AIR COMMAND AND STAFF COLLEGE

The second principal PME program AF officers attend, ACSC, attempts to develop and enhance “critical thinking skills and effective communications and articulation to develop higher-order thinking within the context of the war-fighting profession.”³³ Unlike SOS, which has no degree associated with it, ACSC takes a more academic approach, earning students a Master of Military Operational Art and Science. This format allows students more flexibility in their learning path than SOS, where students can now choose from specific concentrations rather than face the same curriculum as everyone else. These concentrations change the list of themes and objectives specific to a student, but those narrower concentrations are subordinate to AU’s overarching goals. From the AU Catalog, it is clear graduates should be able to:

- demonstrate creative thinking, critical analysis, and persuasive communications in operational problem solving;
- demonstrate leadership and ethical decision-making based on the shared values of the profession of arms;

³³ “AU Catalog,” 72.

- describe the capabilities, limitations, and integration of the instruments of national power across the spectrum of competition, conflict, and war, and their integration with allies and partners;
- analyze operational environments marked by complexity, uncertainty, and surprise within the continuum of competition, conflict, and war;
- apply military theory, doctrine, strategic guidance and joint warfighting principles to plan for all-domain, globally integrated operations; and
- explain the conduct of contemporary and emerging warfare, to include adaption and innovation.³⁴

The next step in teasing out the themes and objectives for ACSC is to review the three concentrations in which students may focus: Joint All Domain Strategist (JADS) Concentration, the School of Advanced Nuclear Deterrence Studies (SANDS) Concentration, and the Schriever Space Scholars (SSS) Concentration.

The JADS concentration focuses on “developing leaders who understand the employment of joint all domain operational maneuver to counter future threats in contested and degraded environments.”³⁵ The program desires to engender in students the ability to utilize critical thinking and problem-solving skills to prepare for future assignments across all six military domains: electromagnetic, space, air, land, maritime, and human. While going through the JADS concentration, students will also “study and apply strategic and operational design, reflexive control theory, aggregation theory, decision-making theory, and risk analysis.”³⁶

SANDS students narrow their focus from an overall joint picture and instead focus on the implications inherent in nuclear warfare and preventing it, specifically “strategic deterrence.” In the program, officers “study the history of deterrence application, modern operational deterrence theory, and formulate how deterrence will change in the future.”³⁷

³⁴ “AU Catalog,” 72.

³⁵ “AU Catalog,” 76.

³⁶ “AU Catalog,” 76.

³⁷ “AU Catalog,” 78.

The newest of the three ACSC concentrations, SSS focuses on creating military members who are world-class experts in “space history, strategy, operations, and policy.”³⁸ Students take most of the same courses as those in JADS and SANDS, but instead cap their learning off with space-centric electives that tie the greater fight and space’s role in it more tightly. As a result, SSS concentration graduates are “capable of acting as national leaders on space questions at all levels.”³⁹

Combining the overall ACSC goals with the objectives evident in each concentration reveals similar themes to those in SOS. The first bullet in ACSC’s goals alone reflects the importance of creative and critical thinking, plus communication. That remains true for all the areas of ACSC and a military career in general. The ethical decision-making theme also appears in ACSC’s second bullet and remains a critical plot point for all concentrations. The remaining bullets and all three concentrations continue the prevalence of system-focused thinking—tying the parts together into the whole. In the case of ACSC, as opposed to SOS, the role of the students goes beyond just operating effectively in a complex system; their job now is to learn how to operate and command the system. Moreover, the ever-present theme of decision-making, and the tools that both allow and enhance it, permeate all corners of ACSC. These unified themes and objectives are summarized and simplified in Table 2.

Table 2. ACSC Themes and Objectives Summarized

Theme or Objective	Description
Decision-Making	How best to analyze data, make a decision, and act on it. In this case not as team building focused as in SOS, but still reliant on a greater joint focus.
Communication	Conveying plans and ideas in an effective manner
Critical Thinking	Considering all aspects of a problem, delving deep into the causes and possible solutions
Creative Thinking	Thinking outside of the box to create unique, innovative solutions
Systematic Thinking	Studying and understanding the parts of a system to better make use of the whole said parts make up.

³⁸ “AU Catalog,” 79.

³⁹ “AU Catalog,” 80.

C. AIR WAR COLLEGE

The AF's senior developmental education program, AWC, brings together officers and civilians from all military branches and throughout the U.S. government to participate in one of the highest levels of PME provided. As with ACSC, the AWC curriculum is an accredited master's program with graduates earning a Master of Strategic Studies degree through completion. As mentioned above, the ever-growing participant pool restricts students to "officers who have demonstrated an outstanding potential for senior command and staff positions."⁴⁰ These requirements come together to reflect that AWC is the culmination of a career of development, tying together previously learned lessons into an overarching strategic lens. From the AU catalog, a graduate of AWC can:

- Think strategically to analyze the security implications of past, present, and future operating environments and effectively communicate complex ideas.
- Analyze strategic leadership and the values of the profession of arms including sound moral judgment and character.
- Assess and develop strategies and joint warfighting plans across the spectrum of conflict in pursuit of national security objectives, highlighting the role of airpower.
- Evaluate the nature and character of war and conflict and the employment of military capabilities, in concert with other instruments of national power, in a joint, interagency, and coalition environment.⁴¹

The AWC curriculum contains core and elective courses offered through three academic departments: "Strategy; Leadership and Warfighting; and International Security."⁴² The program also allows students to participate in individual research, a research task force, or take two electives. As with ACSC, student choice supplements overall learning objectives. Thus, divining any summarized themes and objectives relies more on the overarching list rather than specific programs.

⁴⁰ "AU Catalog," 28.

⁴¹ "AU Catalog," 27–28.

⁴² "AU Catalog," 29.

Once again, the importance of strategic, critical thinking is apparent from AWC’s learning objectives. In this case, AWC wants students to absorb implications from a wide breadth of history and knowledge while maintaining a sound ethical base to communicate complex ideas effectively. Those skills then tie into one’s ability to strategize and plan operations across the evolving future of warfare in the furtherance of national security objectives. Finally, said plans should utilize a strong knowledge of military capabilities and all aspects of national power in a joint, interagency, and coalition world.

In the end, nearly identical themes and objectives from previous levels of PME are present in AWC’s curriculum. Decision-making, communications, and ethical considerations are evident, as is the importance of systematic thinking, considering all parts of a system when planning. Table 3 summarizes these themes and objectives.

Table 3. AWC Themes and Objectives Summarized

Theme or Objective	Description
Decision-Making	How best to analyze data, make a decision, and act on it. In this case focusing on a strategic level plan rather than organizational or interpersonal.
Communication	Conveying plans and ideas in an effective manner
Ethics and Morality	Understanding ethical implications, making informed decisions based on ethical considerations.
Critical Thinking	Considering all aspects of a problem, delving deep into the causes and possible solutions
Systematic Thinking	Studying and understanding the parts of a system to better make use of the whole said parts make up.

D. COMMON THEMES AND OBJECTIVES

Summarizing common themes and learning objectives from across all of AF PME is a matter of balancing the various programs and classes against each other. As discussed previously, the goal here is to find overarching concepts to focus on rather than hyper-specific course learning objectives. With that said, it is somewhat unsurprising that all three PME programs reviewed have nearly identical objectives—after all, the AF has a vested interest in a continuum of education where officers continually build on previous

experiences and lessons. The expectation is that these overarching themes are what specific course objectives will build around. Instructors plan and develop their course material to satisfy the overall learning through their individual course objectives.

Combining and refining the themes and objectives from the three principal AF officer PME programs reveals six main topics, what this study calls their “common themes and objectives”: decision-making, communication, ethics and morality, critical thinking, creative thinking, and systematic thinking. Each theme is described with an eye toward its eventual connection to a board game and its mechanics, plus a general assessment of a game’s ability to support student learning. Some entries lend themselves to gaming more than others, but all present a fresh lens to view board games.

1. Decision-making

Decision-making takes many forms across the military environment. Officers can find themselves on a decision-making spectrum ranging from simple, informal, day-to-day actions to massive transcontinental operations. Depending on the level and topic of PME, there may exist formalized decision-making processes students should learn and utilize as part of their classes and careers.

There are innumerable formal and informal methods of making decisions. Rather than focus on a particular method, this study will streamline the discussion and focus on overall decision-making challenges. In other words: asking whether or not a game presents a challenging decision-making space regardless of how a player approaches the decision. That means instructors, or their students, will be able to approach the challenge presented by a game using whatever decision-making process the curriculum requires. In addition, this approach should allow the games discussed to have the widest breadth of usability regardless of how this study viewed the material.

A foil to the stated goal of allowing games to have the widest breadth of usability is the argument that, in the end, any game is about decision-making. However, such a statement in this context ignores the range of complexities a decision could encompass. Just as a person makes thousands of individual choices throughout their day, and any given game requires players to make decisions, some will carry more weight than others. When

reviewing games for decision-making utility, the goal is to find games that present unique and interesting decision-making challenges, questions that not only force a player to stop and think but also reward them for doing so. It needs to be more than a simple need to pick some generic A or B; here, it is about more than buying “Park Place.”

2. Communication

Just as in decision-making, communication takes many forms across the military enterprise. Whether one-on-one discussions, organization-wide emails, or massive in-person briefings, effectively communicating one’s message is an ever-present challenge. Another wrinkle within the military’s hierarchical command structure is the need to effectively communicate someone else’s message—a challenge when said communication may be poorly generated or antithetical to an individual’s expectations or desires. At any given time, a communicator may need to both receive and understand a message before wholeheartedly transmitting said message down the chain of command without losing the message’s importance or contents.

Continuing a connection to decision-making, communication is another inherent part of playing board games. They are, by their very nature, a communal activity. Here a game will flag as noteworthy if it presents a unique way to communicate or require communication and discussions as part of gameplay. These communications could be via the game’s topics of conversation, the arguments it asks a player to make, or even the method of communication itself. Here communication must go beyond simply discussing the rules. It must allow the instructor to see the game as a tool to teach a lesson or impart a concept.

3. Ethics and Morality

Ethics and morality are the most challenging themes and objectives to quantify as linkable to specific gameplay mechanics and settings. While a set of shared beliefs and expectations exists in the profession of arms, individual choice and experience still play a role in how officers view the world and interact with their responsibilities. How those standards change and shift with time and experience, both nationally and individually, adds an even more challenging aspect to the discussion. Things get even more complicated when

considering the different rules on which other cultures and groups base their ethical and moral systems.

When searching for gameplay that can help broach ethical and moral considerations, the challenge will most likely fall on how the material is presented rather than the game itself. Considering this study focuses on commercially available games, it is understandable that few games would ask the paying public to confront the horrors of humanity's ethical failures. Despite that, games may provide a valuable foil for these discussions if the setting, rules, or actions players take are viewable through an ethical or moral lens. Of course, the game itself may not punish a player for doing something unethical. However, the instructor may use a player's action as a starting point for more comprehensive discussions.

4. Critical Thinking

Explicitly mentioned 54 times throughout the AU catalog, and a significant focus for dozens of classes, critical thinking is essential to an AF officer. Unfortunately, the AU Catalog does not state how the AF defines critical thinking, nor are any official documents stepping up to fill the gap. Searches across AF-centric journals find articles discussing the importance of critical thinking, with some relying on definitions from outside sources. However, for the most part, they argue for the importance of critical thinking without putting forth a clear definition—just assuming the reader agrees with a generic definition.

One exception is Col Adam Stone's *Air & Space Power Journal* article "Critical Thinking Skills in USAF Developmental Education." Here, Stone focuses on developing assessment methods to analyze the prevalence and effectiveness of critical thinking in the AF. As part of his discussion, he relies on a definition of critical thinking from Lewis Vaughn. Scott quotes Vaughn defining critical thinking as "the systematic evaluation or formulation of beliefs or statements by rational standards."⁴³ Stone then breaks Vaughn's definition down more with the Watson-Glaser Critical Thinking Appraisal definition, where critical thinking separates into five skills: inference, recognition of assumptions,

⁴³ Adam Stone, "Critical Thinking Skills in USAF Developmental Education," *Air & Space Power Journal* 30, no. 3 (Summer 2017): 54.

deduction, interpretation, and evaluation of arguments. While the five individual skills come into play when evaluating a game for critical thinking utility, the discussion will still combine them under the overarching critical thinking definition.⁴⁴

Like decision-making, most games will require some form of critical thinking. How worthy a game is of inclusion in critical thinking teaching tools depends on how much of a challenge, and how especially how effective of a challenge, it presents. Here it goes beyond just a need to make a decision, but rather how a player approaches the thought challenges inherent in a game’s mechanics and setting.

5. Creative Thinking

While a critical partner to critical thinking, and often conflated with it, creative thinking is a discipline in and of itself. Stone, in his discussion of critical thinking, also addresses this conflation. He delineates the two types of thinking by pulling a definition of creative thinking from work by Richard Paul and Linda Elder, quoting them when saying, “creative thinking is ‘resulting from originality of thought; having the ability to create or produce; having or showing imagination and artistic or intellectual inventiveness; stimulation the imagination and inventive power.’”⁴⁵

Stone finishes his short discussion of creative thinking by highlighting the importance of creative thinking, arguing that ideas must first be generated before they can be critiqued.⁴⁶ Therein lies the key to finding games applicable to creative thinking education—the generation of ideas. Of course, the forms those ideas take, and the problems they solve, will vary depending on the game. Plus, some games require players to be more creative and inventive than others. Those are the games that will shine when it comes to creative thinking.

⁴⁴ Stone, 55.

⁴⁵ Stone, 54–55.

⁴⁶ Stone, 55.

6. Systematic Thinking

Mentioned explicitly as part of SOS and referenced in other programs through their continued focus on understanding and implementing joint, interagency, and coalition organization and goals, systematic thinking represents both the methodical application of a process and the more important and relevant need for skills relating to understanding large-scale systems and organizations. For AF PME, that can mean everything from understanding a simple organizational chart, to seeing how one's role fits into the bigger Joint picture, all the way to comprehending the moving pieces of a major military operation.

For board game applications, the focus is finding game mechanics and settings that encourage systematic thinking through large rule sets, interrelated mechanics, and multi-layered gameplay. It is less about how complicated a game is but rather how well the systems underlying the game's rules reward players for fully comprehending their inner and interconnected workings.

IV. COMMERCIAL BOARD GAME ANALYSIS

A. DEFINING A GAME

The concept of games, even something as “narrow” as board games, is a wide-ranging field. Claiming a particular game fits this study and another does not is almost more a matter of preference rather than any scientific rigor, especially as including any game in a course is up to an instructor and how they view the game materials. To further delineate the games utilized here, this study breaks wargames/board games into three main categories: Title 10 games, war hobbyist games, and general consumer games. The latter is the focus of this study, and best fits Chicchino’s principles.

The first category contains the typical, traditional military wargame introduced in Chapter I. These can be designed by services, major commands, their subunits, or outside corporations and organizations to test future operation plans, technological developments, and general military strategy. The largest of these often fall under Title 10 of the U.S. Code and are defined as “any of a series of wargames conducted by each of the U.S. armed services addressing its duties under Title 10 of the U.S. Code to organize, train, and equip its forces...”⁴⁷ These games inform senior leaders on “how to best budget, design, and present their forces for future conflicts based on operational experimentation” with a focus on warfighter needs.⁴⁸ Two major games the AF run typically every other year (sometimes more annually) are “Futures Game” and “Global Engagement.”⁴⁹

The fact that these games have such high, policy-level stakes is not intended as an argument that such games are pointless for education. On the contrary, the bespoke nature of these games means they can be explicitly designed for a class or topics, but the time frames and repeatability of such an effort are often limited. Plus, they tend to lack ease of implementation. Major war games take multiple days and require the involvement of dozens of participants, something not always available in a short class time.

⁴⁷ Reed, “USAF Title 10 Wargaming with Mitch Reed.”

⁴⁸ Reed.

⁴⁹ Reed.

The second category one can come across when looking for war games and board games to study war are designed for a more hard-core, almost reenactment-style gameplay and are referred to here as “war hobbyist” games. These games straddle the world of formal military war games and something more consumer-focused. Often publishers will focus on games in this category, with one example, Compass Games, having dozens and dozens of examples ranging from pre-Napoleonic conflict to modern war in all domains, to far-future science fiction. These games, while providing fodder for all manner of learning objectives, are not intended for the average consumer.⁵⁰

Interestingly, games in this category see use in current PME settings because they can and do help teach the six common themes and objectives from Chapter III. For example, as part of the SSS curriculum at ACSC, students participating in RE5124, Wargaming the Blue Water Space Force, spend the entire class learning and playing various scenarios in the Compass Games published *Stellar Horizons*.⁵¹ It is telling, however, that games in this category, like *Stellar Horizons*, require a dedicated class for students to learn how to play the game and then use that knowledge over multi-day exercises. These steep learning requirements help separate the “war hobbyist” games from the third and final category, general consumer games.

General consumer games in this last category are those that someone could find in a bookstore or on the shelves of their local game shop without asking for specialist help. These games are easily found on major shopping sites or big box stores. They are games meant for everyone, even if the settings, themes, and mechanics most likely reflect a target audience.

This category could also be broken down further into what might be called “big games” and “little games.” Big games, like the soon-to-be-discussed *Twilight Imperium Fourth Edition*, are grander in scope, price, and commitment. Little games, which most of the games to be discussed are considered, encompass party games or card games meant for

⁵⁰ “Compass Games,” Store Page, accessed April 18, 2023, <https://www.compassgames.com/?sfw=pass1681857415>.

⁵¹ “AU Catalog,” 84.

a quick or social icebreaker. Of course, both types have their uses, just as all categories of games discussed thus far have their niche, but to limit the scope to a manageable level, only a few of the “big” games are covered here.

The games discussed were, for the most part, selected based on their ranking and reviews on board game crowd-sourced sites like boardgamegeek.com or YouTube review channels such as *Shut Up & Sit Down*.⁵² On sources with ranked lists like boardgamegeek.com, only games rated in the top 25 (as of publication) were considered. Likewise, with review sites like *Shut Up & Sit Down*, only games considered “recommended” by the reviewers were considered. Beyond those considerations, a touch of randomness, availability, and researcher interest narrowed down the final selection. At the same time, there was an attempt to ensure multiple game settings, themes, and mechanics to reduce repetitiveness. Mechanics, or “the building blocks of games,” refers to everything from how players make moves, to the game end and victory conditions, to the game economy and even the pieces themselves.⁵³

At first glance, using crowd-sourced and social media-based reviews to find material may seem odd. However, the study aims to analyze common, popular, and enjoyable games that are easy to find and purchase. Using open resources such as those mentioned ensured the study would not focus on material too specific or narrow for general consumption, but rather live up to the goal of finding COTS board games and seeing what objective they might help teach.

B. PERFORMING THE ANALYSIS

Once selected based on their reviews and rankings, ease of acquisition, and general themes, games underwent a simple test: they were experienced. This included learning the rules, teaching others, and, eventually, play testing. All the included games are considered easy to acquire because they were purchased without going to the bowels of the internet or

⁵² “BoardGameGeek,” Board Game Geek, accessed August 29, 2022, <https://boardgamegeek.com>; “Shut Up & Sit Down,” n.d., <https://www.shutupandsitdown.com/>.

⁵³ Geoffrey Engelstein and Isaac Shalev, *Building Blocks of Tabletop Game Design: An Encyclopaedia of Mechanisms*, Second edition (Boca Raton, FL: CRC Press, 2022), xxxii.

unfamiliar and uncomfortable locations. However, the ease of acquisition may change as the current date gets farther from the game’s initial publication.

The playtesting was performed without formalized methods or action plans, instead relying on a general experience-based assessment to better represent the expected use case for these games—as one tool in a greater lesson plan. Considering the average PME experience, the expectation is that some students may read the rules, and even fewer may understand them, but at the end of the day, all would play.

While no formal checklist was used during gameplay to study utility, there was a common thread to all analyses that linked back to Cicchino’s six principles of game-based learning, as discussed in Chapter II. His six principles require a game to be “provocative of critical thinking,” “be appropriately challenging,” and encourage players to develop their knowledge, use a fictional or fantasy world, be social, and have win conditions.⁵⁴ These principles, combined with the six common themes and objectives from Chapter III and a general study of the mechanics and gameplay of a game, act as a guiding framework to judge a game’s utility.

With that said, the game analysis occurred with an understanding that their utility had to be relatively obvious or at least so well ingrained in the gameplay that even someone with zero experience or expectations would be productively challenged. The discussion on the eight games selected starts with a discussion on the game and its mechanics. Each discussion section then ends with a quick summary of one or more common themes and objectives from AF PME it may help teach. If the game does not list one or more of the themes or objectives, that does not mean the game has no utility for such a topic, but rather it would not be the main focus. Finally, it is notable that some games have a clear, straightforward utility, while others are more nebulous. Regardless, nearly any game can have some merit when presented in the right light.

⁵⁴ Cicchino, “Using Game-Based Learning to Foster Critical Thinking in Student Discourse,” 4.

C. ANALYSIS OF SELECTED BOARD GAMES

1. *Brass: Birmingham*⁵⁵

Brass: Birmingham, designed by Gavan Brown, Matt Tolman, and Martin Wallace; and produced by Roxley Games, “Is a competitive, heavy weight, hand management, network building, economic game.”⁵⁶ In it, players take on the role of an industrialist during the second industrial revolution in the United Kingdom (specifically, Birmingham). They aim to acquire the most money by building and upgrading industries, connecting their companies with canal and rail networks, and working the interlocking game mechanics between all components to their advantage. The theme and mechanics lead to three primary concepts the game could help demonstrate: complex system comprehension, attention to detail, and the importance of understanding second and third-order effects. In other words, systematic thinking and critical thinking are necessary to best utilize said systems.

As in many modern board games, the rules and mechanics presented by *Brass: Birmingham* are complex and interrelated. However, the actual number of rules is low, with only twelve pages of illustration-laden text, which differs from what someone might expect for a game as detailed as *Brass: Birmingham*. What makes the game complex and worthy of inclusion here are how the rules interact with each other and how those interactions cascade into results for themselves and other players.

One example is a player deciding to construct a building, taking it from their play area, and placing it on the board. In *Brass: Birmingham*, this improves a player’s industrial capabilities and reflects the innovation and technological development during the mid to late 19th century. Each subsequent building in that same building category is “higher-tech” and requires more resources to construct but provides greater benefits as the play session continues. The money comes from a player’s coffers, but the resources—coal and iron—come from the board, specifically from industries already placed on the board by any

⁵⁵ “Brass: Birmingham Deluxe Edition website,” Store Page, accessed March 7, 2023, <https://roxley.com/products/brass-birmingham-deluxe-edition>; “Brass: Birmingham Rulebook” (Roxley Games, November 20, 2018), <http://files.roxley.com/Brass-Birmingham-Rulebook-2018.11.20-highlights.pdf>.

⁵⁶ “Brass: Birmingham Deluxe Edition website.”

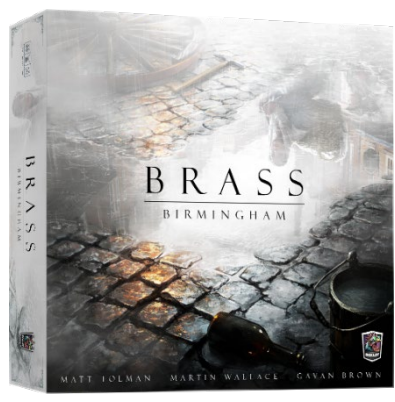
player. Each of those resource producers only produces so much, and when it is “used up,” the representative tile is flipped, and the owner gets money and victory points. This means that when one player decides to place a building, they may be required to use the resources from a competitor, who will flip their industry and earn them points and funds. The manual lays out the mechanics determining which resources the construction player must use. Still, it is up to the players to fully understand those rules to best control the cascading interactions. To fail to do so often means an ignominious defeat.

Here is where attention to detail comes into play, because while the rules themselves require constant consideration, the board upon which the game is played is in an eternal state of evolution. Players construct and upgrade industries constantly based on a continually growing network of canals and, eventually, railroads. Players must absorb these minute details spreading across the board while managing a hand of cards that determine where they can act. It can be a mental struggle to keep all the moving components of one’s own action space in mind while trying to understand and adapt to the complications generated by the other players. It is easy to misplace a card or forget to move a token and thus either accidentally gain an unfair advantage or, more egregiously, miss an opportunity to crush one’s opponents.

What makes *Brass: Birmingham* remarkable is that, despite being occasionally byzantine in its machinations, it is a fun and engaging game that provides recognizable, correctable, and low-threat mistakes from which players can learn. Its reliance on critical thinking and systematic thinking skills is evident through the tasks it asks of its players. Additionally, while the rules and systems are complex, the gameplay allows players to pick up the important parts along the way, with the metaphorical parts falling into place as the pieces of the board do the same.

The problems accosting players in *Brass: Birmingham*, and the tools necessary to fix them, are not one-to-one matches for real-world concerns. Nevertheless, they express the importance of identifying the risks and rewards inherent in any complex system and the importance of knowing how to navigate it properly. Such an example to fall back on when initiating a discussion can be a powerful tool. A summarized analysis of *Brass: Birmingham* is in Table 4.

Table 4. *Brass: Birmingham* Themes and Objectives

	Title	<i>Brass: Birmingham</i>
	Publisher	Roxley Games
	Common Themes and Objectives Found in Game	Critical Thinking Systematic Thinking

2. *Dune: Imperium*⁵⁷

Dune: Imperium is one of several modern gaming interpretations of Frank Herbert’s 1965 science fiction classic *Dune*. Designed by Paul Dennen and published by Direwolf Games, *Dune: Imperium* takes elements from Herbert’s work, his son’s additions to the *Dune* universe, as well as visual aspects from Hollywood’s latest adaption to create a profoundly thematic game that forces players to chart a course with limited information and even fewer options.

First, it is important to stress that *Dune: Imperium* utilizes two primary gameplay mechanics: worker placement and engine building. With worker placement, players claim spaces on the board using small markers to reflect where their efforts will go this round. Engine-building games require players to draw from a personal deck to generate their hand of cards. As the game progresses, positive and negative cards enter the player’s private draw deck. This shifting deck means the chance of a particular card decreases as the game continues—the absence of which can require a dramatic shift in a player’s strategy.

These two mechanics tie into one of *Dune: Imperium*’s most essential reflections of real life: planning with uncertainty. In most worker placement games, players have a

⁵⁷ Paul Dennen, *Dune: Imperium Rulebook* (Direwolf, n.d.), <https://www.direwolfdigital.com/dune-imperium/resources/rules/>; Dennen.

limited number of workers to place, but *Dune Imperium* takes this to an extreme. Players are initially capped at two workers, or agents, as the game refers to them. Players can gain temporary to permanent increases with significant investments, but someone will never be capable of acting with impunity. Furthermore, agents can only play to locations that match a card in the player's hand and do not have another player's agent present. Thus, depending on how the player's engine-building side of the game has progressed, a player may be stuck with few options of value when their turn comes around.

This combination of limited workers and engine-building mechanics means players have limited options (only what is in their hand) and limited opportunities to employ that choice (number of workers). As a result, a player's strategy, refined over multiple turns, may fall apart if their deck fails to produce the card for which they planned.


How players adapt to this ever-changing uncertainty is telling. It is easy to see players getting caught up in analysis paralysis or just giving up because what they expected or needed never appeared. However, few things are more certain in life than having what one needs fail to appear magically at the right place and time. At best, it is something adjacent to the actual requirement. How someone adapts to make reality work for themselves is all that matters. Use the tools at hand. *Dune: Imperium* excels at reflecting this truth.

Another aspect of engine-building mechanics utilized in *Dune: Imperium* is its tendency to lead players to a less wholesome skill: card counting. Here, card counting does not explicitly mean the same as a casino's kick-out policy, but *Dune: Imperium* requirement for players to know what is in their hand and the deck. Technically the same, but not. Regardless, for *Dune: Imperium*, a player begins the game with the same ten cards as all other players, with only five in their hand. Each player expands or contracts their total card number by purchasing and trashing cards. Along the way, players continually refresh their hand by drawing new cards from their draw pile while discarding used cards into a discard pile for eventual reshuffling back into a new draw pile. The way *Dune: Imperium* handles draw and discard piles forces players to experience a limited number of card refreshes throughout the entire game. Players will best succeed when they know what is in their deck, hand, and discard pile. Trying to plan a move without understanding what

options they have exhausted or are yet to be revealed will most likely see them picking a suboptimal move to complete their turn.

In the end, *Dune: Imperium*, as with many games, excels at teaching the importance of adaptability when making decisions in a complex system. No matter how hard someone tries to plan for every eventuality in their decision-making process, something will come into their hand that throws the whole plan into chaos. Here is where systematic thinking comes into play—the need to thoroughly understand the systems on which the game runs. *Dune Imperium* will not give people the solutions to that chaos. Still, it can provide a discussion platform to frame the problem as part of decision-making and systematic thinking lessons. A summarized analysis of *Dune: Imperium* is in Table 5.

Table 5. *Dune: Imperium* Themes and Objectives

	Title	<i>Dune: Imperium</i>
	Publisher	Direwolf Games
	Common Themes and Objectives Found in Game	Decision Making Systematic Thinking

3. *Mysterium*⁵⁸

Designed by Oleksandr Nevskiy and Oleg Sidorenko and published by Libellud, *Mysterium* takes players back to the occult-obsessed days of the 1920s. As some of the era’s most renowned psychics, players are tasked to determine the who, where, and how of a ghost’s murder. What makes this challenging is not the need for deductive reasoning as

⁵⁸ “Mysterium Rules” (Libellud, n.d.), https://www.libellud.com/wp-content/uploads/2020/11/MYST_RULES_EN_BD.pdf; “Mysterium website,” Store Page, accessed March 11, 2023, <https://www.libellud.com/en/our-games/mysterium/>.

with games like *Clue*, but instead the fact that the spirit can only communicate vague, esoteric images to the psychics. Complicating matters further, each player acting as a psychic has their own version of the suspect, weapon, and location. Still, all players work together to interpret the images provided by the one player acting as the ghost before coming together for the final decision and reveal. *Mysterium*'s open and cooperative nature means that communication plays an integral role, and how the players communicate with each other can significantly affect the game's outcome.


Starting with the ghost and their sole means of communication, the image cards, the player must determine what card from their hand of images will convince the psychic player to choose the correct suspect, location, or weapon. Is it the thread-looking item on this card filled with warm colors and flying unicorns, or rather the card covered in deep red tones but focused on a child's toy box that will convince the psychic to choose the seamstress in a red hat as the suspect? What quickly becomes apparent is that what the ghost takes as meaningful in each image card is not what the players view as important. The better the players know each other, the greater the chance of a similar interpretation, but often in life, people must work and communicate with strangers. A fact *Mysterium* portrays frustratingly perfectly.

Unfortunately, regardless of how well the ghost may know one of the psychics, another player may dominate the conversation and convince others to choose poorly. Alternatively, along the same lines, players may get into a group-think black hole where they keep misinterpreting the signs together, unknowingly refusing to branch out and approach the problem from a different angle. The misguided players are not malevolent in convincing others to choose poorly. *Mysterium* is cooperative, after all. Instead, the players fall victim to a dominant personality and communication style.

These challenges highlight the different ways people communicate and stress that it is easier to understand a message with a proper understanding of the sender, the message, and the receiver. Therein lies the most compelling part of *Mysterium*. It acts as a short and succinct example of threats to communication. For example, following a game session players quickly devolve into discussions about what the ghost player meant by a particular card, or how stupid one player felt misinterpreting a vision because of what a third player

said. These are all miniature versions of the same communication issues people face daily, and demonstrating them with *Mysterium* helps frame a more extensive discussion regarding communication. A summarized analysis of *Mysterium* is in Table 6.

Table 6. *Mysterium* Themes and Objectives

	Title	<i>Mysterium</i>
	Publisher	Libellud
	Common Themes and Objectives Found in Game	Communication

4. *Root*⁵⁹

Root: A Game of Woodland Might and Right, developed by and published by Leder Games, is one of the most highly regarded board games analyzed for this study. In it, players take on the role of a cute woodland faction in an asymmetric battle for domination of the forest. When it comes to *Root*, asymmetric takes on a whole new meaning. The base game contains four factions, and they all play differently. All of the factions gain victory points in different ways. One faction is just a single raccoon going around pitting the other three factions against each other!

This asymmetry is both remarkably evident and yet perfectly balanced. The mechanics lend themselves to such a perfectly succinct study of asymmetric warfare, and asymmetric competition in general, that the fact *Root* is not already studied is surprising. Focusing on the base game, one faction is a bunch of cats acting in a traditional “empire”

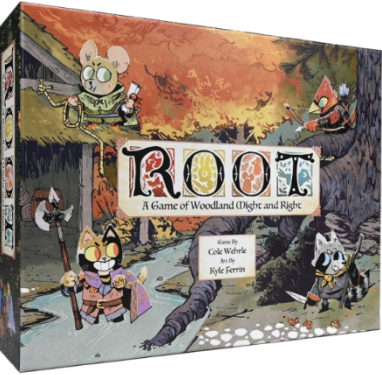
⁵⁹ “Root website,” Store Page, accessed March 11, 2023, <https://ledergames.com/products/root-a-game-of-woodland-might-and-right?variant=21931850596410>; “Root Rulebook” (Leder Games, June 2022), https://cdn.shopify.com/s/files/1/0106/0162/7706/files/Root_Base_Law_of_Root_June_10_2022.pdf?v=1661372308.

style that is easy to wrap one's head around. Another faction sees players taking on the role of regal birds who must act according to an ever-changing decree—and if the player cannot execute the decree, that faction falls into turmoil. A third faction represents the downtrodden people the more extensive powers fight over. That player works in the shadows to build resistance cells across the board before striking out at the powers that be to bring freedom to the creatures of the forest. Moreover, the vagabond is a single raccoon that travels between the warring forces giving and taking power from the backroom in their way. The faction a player plays requires massive shifts in their game plan. How the players play their faction also changes depending on which enemy factions are present, as each enemy will find victory in its way.

This asymmetry is also highlighted in how the different factions gain victory points differently. What is essential for the cats is meaningless to the people they oppress. What a regal bird finds important is pennies to the vagabond who wants that shiny bit of coin. Understanding both one's side and their opponent is the key to *Root*. It can be too easy to focus on one's faction mechanics and forget that, while it may look like things are going well, the enemy has been playing their own game and declares victory using a tool the first player did not even know mattered.

Root highlights the importance of understanding the resources and tools available not only to one's side but that of the opponents as well, of understanding the systems upon which each side relies. It expertly illustrates that what a great power may view as victory means nothing to the people being “victoried” over. *Root* forces participants to use effective decision-making, critical thinking, creative thinking, and systematic thinking throughout all levels of its gameplay. Players must know how others will follow, ignore, or create their own rules as the game progresses because not everyone plays the same game in *Root*. A summarized analysis of *Root* is in Table 7.

Table 7. *Root* Themes and Objectives

	Title	<i>Root</i>
	Publisher	Leder Games
	Common Themes and Objectives Found in Game	Decision Making Critical Thinking Creative Thinking Systematic Thinking

5. *Scythe*⁶⁰

In *Scythe*, game designer Jamey Stegmaier and worldbuilder Jakub Rozalski created an alternate history where The Great War was fought with giant, diesel-powered mechs and fantastic diesel-punk technology, all produced by a mysterious city-state called “The Factory.” Players take on the role of one of the great powers of Europa and vie for the factory’s secrets and land, all the while hoping to build a fresh empire based on the spoils of the last war. Interestingly, the success of any perceived empire in *Scythe* is not based on victory points or battles won but instead simply money—the most prosperous empire wins. How players approach the acquisition of funds as they and their opponents traipse across a fictional Eastern Europe will highlight the importance of understanding which metrics determine victory and how one’s actions can dramatically turn the result from apparent victory into total defeat.

The heart of *Scythe* is its alternate history and that timeline’s giant hulking mechanical machines. Players can deploy beautifully intricate plastic models of the mechs on the playing area to move workers and resources or act as combatants. These machines represent the fictional world of *Scythe* in such a visceral way that it is easy to forget that

⁶⁰ “Scythe website,” Store Page, accessed March 29, 2023, <https://stonemaiergames.com/games/scythe/>; “Scythe Rulebook” (Stonemaier Games, April 2022), https://www.dropbox.com/sh/f2tekc23yvb27w3/AADP3zg56oRQHdfN4_qTNkKpa/Scythe/Rulebook%20%28many%20languages%29/ScytheRules_15th_r24.pdf?dl=0.

Scythe is not a game solely about conflict. It is entirely possible to win *Scythe* without ever fighting a single round of combat, and in fact, attacking areas with civilians can diminish one's chances of victory. In this war, the ethical considerations of how war affects the people fought over matters. The higher a faction's reputation at the end of the game, the more their efforts during the game will be worth.

For military-minded players, such as those in a PME environment, it can be easy to focus on combat as the goal. It takes a concerted effort to step back and view the overall picture to realize that victory is measurable in more ways than battles won.


At the same time, the wide-open game board can seem too tempting a target to leave vacant or, worse, in an opponent's hands. Each hex on the board can provide a different resource, but players must weigh the cost and benefit of expensive workers or buildings to use those hexes. That is all while playing a unique faction with its advantages and disadvantages and juggling a unique "move board" that determines what each type of action will get done. Every player plays a slightly different game, game. Unlike many other games, how those actions interact with the board game state, their prior decisions, and other players presents a challenge.

While it is easy to say that a player should know the rules of a game before playing, *Scythe* demonstrates that just knowing the rules is not enough. It is not even about knowing the factions and how they all interact. While each plays slightly differently, all factions earn victory points similarly. Instead, it means understanding the relationship between the available actions and the end goal—players must understand how the end goal and victory are defined.

Therein lies the value of *Scythe* as an educational tool. As with other games discussed, *Scythe* presents a very different, but still familiar, world to our own. The game presents a frame with which problems facing today's militaries and government are discoverable through play and then analyzed through discussion. *Scythe* relies on judicious use of decision-making skills, systematic thinking, and even a touch of ethics and morality—as what happens to civilians matters. Just because someone has a pretty, new war machine does not mean war is the answer. The interconnected nature of conflict,

resources, and reputation presented in *Scythe* go far beyond a simple board game and delve into the world of true strategy. A summarized analysis of *Sycthe* is in Table 8.

Table 8. *Scythe* Themes and Objectives

	Title	<i>Scythe</i>
	Publisher	Stonemaier Games
	Common Themes and Objectives Found in Game	Decision Making Ethics and Morality Systematic Thinking

6. *Twilight Inscription*⁶¹

Any attempt to turn an eight-hour marathon into a 90 minutes sprint is a daunting challenge, but that is precisely the task Fantasy Flight Games took on when they converted their award-winning *Twilight Imperium* 4th Edition into the roll-and-write version seen in *Twilight Inscription*. Roll-and-write games exist in a mixed realm where players compete against each other, but often in their own play space. Points or a similar scoring mechanism are compared at the end to determine the ultimate victor.

In the case of *Twilight Inscription*, players must rule their faction across four major areas—exploration, expansion, military, and industry. How players decide to focus their limited actions and respond to dice rolls of questionable utility is a challenging and multi-faceted problem. While it is possible, and possibly effective, to focus on just one or two areas, any action that affects one will affect the others. In other words, second and third-

⁶¹ “Twilight Inscription website,” Store Page, accessed April 5, 2023, <https://www.fantasyflightgames.com/en/twilight-inscription/>; “Twilight Inscription Rulebook” (Fantasy Flight Games, September 9, 2022), https://images-cdn.fantasyflightgames.com/filer_public/9b/29/9b293b06-e58f-465f-9c13-6e2b8ad2d7cd/tin01_rulebook_eng_smaller-compressed.pdf.


order effects can never be far from a player's mind, as adequately accounting for them is the only way to ensure long-term success.

This need to account for secondary effects, which may not be evident at first or even second glance, adds to a complex gameplay environment that players may not fully understand. While a comprehensive study of the rules and multiple playthroughs will get players comfortable with the gameplay, the fact that *Twilight Inscription* is such a beast to comprehend is a valuable tool in and of itself. The game highlights both the importance of proper preparation and the undeniable importance of flexibility and adaptability in unfamiliar situations.

The complex action-reaction relationships and the steep learning curve reflect that *Twilight Inscription* demonstrates how little pictures make up the big picture. With its rule set and specific focus areas representing the complex nature of running empires and governments, players can quickly get decision-locked or tunnel vision on one aspect of the problem. However, as with any real-world institution or issue, the game is played across interrelated and connected focus areas. By stepping back and seeing the whole picture, players can fully understand the problem and hopefully see successful ways forward.

Ultimately, *Twilight Inscription* is probably not the best game to teach players the ideas of secondary effects and complex systems, even if systematic thinking is the course objective. The ideas are there, and the problems players face during the game could be twisted into valuable discussion points on decision-making and systematic thinking. However, the heavy weight of the game ends up turning it into more of a mental slog rather than a doorway to more significant ideas. It might be more beneficial to return to *Twilight Inscriptions'* inspiration and devote a whole day to its forbearer, *Twilight Imperium*. A summarized analysis of *Twilight Inscription* is in Table 9.

Table 9. *Twilight Inscription* Themes and Objectives

	Title	<i>Twilight Inscription</i>
	Publisher	Fantasy Flight Games
	Common Themes and Objectives Found in Game	Decision Making Systematic Thinking

7. *Eclipse – Second Dawn for the Galaxy*⁶²

In its second iteration of the *Eclipse* property, lautapelit.fi’s *Eclipse – Second Dawn for the Galaxy* is presented as a well-designed and easily learned game that hides remarkable complexity in a slick package. Appreciated for its easy setup and tear down, *Eclipse* provides an excellent introduction to complex game concepts while providing a delicate risk vs. reward decision-making space that challenges players to analyze a growing and changing map while also fending off the threats from both players and the game itself.

While other games in this section rely on similar empire-building mechanics, *Eclipse* presents a world both eminently accessible and yet dangerously complex. Every decision a player makes, every action they take, has a cost—both in terms of resources and risk. A chance to explore may provide opportunities for great wealth or may hide hidden advisories protecting valuable worlds or travel routes. A decision to build a military ship for defensive purposes may seem obvious, but the reaction of other players can tell a different story. What was an obvious choice for one is an extensional threat to another.


⁶² “Eclipse – 2nd Dawn for the Galaxy website,” Store Page, accessed April 7, 2023, <https://en.lautapelit.fi/product/42986/eclipse---2nd-dawn-for-the-galaxy-from-us-stock>; “Eclipse – Second Dawn for the Galaxy Rulebook” (Lautapelit.fi, April 27, 2021), https://www.dropbox.com/s/jlaooowg6eb27eh1/Eclipse2_rules-ENG_2021-04-27_web200.pdf?dl=0.

All these decisions are complicated by the fact that players can (though do not have to) play unique factions with their own strengths and weaknesses—though these differences are not as stark as some other games discussed thus far. Even if, for the sake of player symmetry, players all use the default “Terran” faction, player abilities will diverge as some focus on research, others upgrade ships, and yet others go for quantity over quality. This is all while balancing the need to explore and expand to new worlds, building the economic machine to power victory.

What determines victory is another area for participants to consider when approaching *Eclipse*. Victory in *Eclipse* is, as with many modern games, determined by victory points earned through various means. Combat, diplomacy, area control, exploration, and more can all add to a player’s total points. However, unlike some games, it is harder to focus on just one area in *Eclipse* and win. Hence, finding the proper balance between the various methods of earning victory points is critical to player success. How they go about that is just one of the myriad considerations to add to their decision-making process.

All this is to say that *Eclipse – Second Dawn for the Galaxy* is one of the best games analyzed thus far to discuss decision-making. While all games require various decision-making levels, *Eclipse*’s structure and mechanics are presented so that a simple “if this, then that” discussion can evolve into critical thinking-fueled analysis of second and third-order effects feels natural. It is not a math equation but a mental flow state of considerations. Whether the decision-making scheme is the Military Decision Making Process, Boyd’s OODA Loop, or any other number of decision-making methods, *Eclipse* provides a complex, yet surprisingly accessible, gameplay framework to approach the discussion. A summarized analysis of *Eclipse – Second Dawn for the Galaxy* is in Table 10.

Table 10. *Eclipse: Second Dawn for the Galaxy* Themes and Objectives

	Title	<i>Eclipse: Second Dawn for the Galaxy</i>
	Publisher	Lautapelit.fi
	Common Themes and Objectives Found in Game	Decision Making Critical Thinking

8. *Twilight Imperium Fourth Edition*⁶³

With a play time measured in appreciable portions of a day, Fantasy Flight Games’ *Twilight Imperium Fourth Edition* may seem an odd entry. However, few COTS board games a person would find at their local game store can provide the breadth of experiences presented in *Twilight Imperium (TI)* and do so in as engaging and fun a manner. With players doing everything from simple exploration and colonization, to risky combat, to complex politicking and debate, no iteration of *TI* is a stagnant affair. With new victory conditions appearing as the game progresses and the rules shifting with political votes, players must constantly be aware and ready for anything.

When approaching *TI*, it is easy to view it as yet another game where the main takeaway is more discussion on decision-making processes. And while that is true here, and any game to a certain extent, *TI* presents a “whole of government” approach to gameplay that other games, even games with similar faction-based mechanics, fail to deliver. Simply put, the massive scale presented by *TI* puts it in a category of its own, and trying to pin down a few themes or learning objectives to teach from it is daunting.

⁶³ “Twilight Imperium Fourth Edition website,” Store Page, accessed April 8, 2023, <https://www.fantasyflightgames.com/en/products/twilight-imperium-fourth-edition/>; “Twilight Imperium Fourth Edition Living Rules Reference” (Fantasy Flight Games, n.d.), https://images-cdn.fantasyflightgames.com/filer_public/da/df/dadf9f07-78f3-43ac-9cce-dd6b55b24ec2/ti4_living_rules_reference_v1_3_web.pdf.

Fantasy Flight Games partially attempted a simplification when making the previously discussed *Twilight Inscription*. While that game failed to provide easily usable themes due to its complicated nature, *Twilight Imperium's* original form enables its complexity to sprawl out in such a way as to limit incoherent complications. The complexity becomes manageable, despite just how much there is to absorb. Therein lies the heart of what makes *Twilight Imperium* useful—it demonstrates that, no matter how complex a system is, when allowed to operate in its full form, even complex things can be understood, and great things can happen. Confusion morphs into realization when problems are appropriately laid out and examined, rather than remaining tied in a Gordian knot of too-tight gameplay mechanics and systems—or organizational bureaucracy.

This may make *Twilight Imperium* more valuable as a case study of system design rather than a tool to teach something more esoteric like leadership or decision-making. At the end of the day, however, everything a person interacts with is part of a larger system. The knowledge of how to, or at least the importance of, analyzing a system from its base components up to the unified whole is a career in and of itself.

In the end, *Twilight Imperium* is a capstone. It demonstrates how the various parts of a system, be they government, player opponents, or simply chance, can interact. Along the way, players facing the challenges presented by the system must attempt to navigate their way to victory in an ever-shifting environment. *Twilight Imperium* is not a game for the faint of heart and would probably fail as a tool in a large class. However, when presented to a group dedicated to understanding how systems work together (or fail to), few commercial options will do so in as engaging a manner as *Twilight Imperium*. A brief summary of *Twilight Imperium Fourth Edition* is in Table 11.

Table 11. *Twilight Imperium Fourth Edition* Themes and Objectives

	Title	<i>Twilight Imperium</i>
	Publisher	Fantasy Flight Games
	Common Themes and Objectives Found in Game	Decision Making Communication Critical Thinking Creative Thinking Systematic Thinking

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V. CONCLUSION

Whether intending to discuss the last development in military decision-making schemes, arguing over the finer points of diplomacy, or planning the ultimate power move, the commercial board game industry is a resource that should not be ignored by those seeking to enhance educational programs. The breadth of topics, mechanics, themes, structures, and more offered by the myriad of entries on any game store's shelf provides new and informative tools across various disciplines. Even the analysis in this study found multiple examples of viable games in a small sample size. This small sample size is not an exhaustive list and is instead meant to be an example, a discussion road map, for PME course designers and instructors.

The games reviewed for this study showed promise in fulfilling the goal of finding games with themes and mechanics that could help PME instruction across at least the SOS, ACSC, and AWC. In the case of the eight games utilized as a test bed, all referenced at least one of the common themes and objectives from AU PME, with most containing two, while the largest was wide-ranging enough to include five of the six themes. The games had varying levels of accessibility, but due to their commercial nature, all proved accessible at a level one would expect of career military officers. Table 12 summarizes the common themes and objectives found in each game.

This study used play testing and general experience to tie some games to some learning objectives. Its informal nature provides a starting point for further discussion and analysis, with controlled experiments for effectiveness, in line with the studies in Chapter II, a possible future study. Even if planning to keep a study at the current level of formality and control, adding additional games for consideration is a logical next step. Additionally, expanding the range of PME to more AU courses, let alone the rest of military PME programs, may find similar themes and objectives, or even different ones, from those looked at in Chapter III to add to the game analysis. While the six common themes and objectives settled on here are rather general, service-branch unique or specifically flavored versions may exist.

The connections between PME themes and objectives and board games found here should open the conversation on PME and board games, not act as a definitive guide. The COTS sector has a plethora of games that any course designer or instructor can peruse to find the best game for their needs. Adding a COTS board game to a course is expected to be a detailed, iterative process that will vary depending on the course, the instructor, and the students.

As instructors consider adding games to their curricula, they should first consider the overall themes and objectives present in a game, like those derived in Chapter III and tied to specific games in Chapter IV. Those themes will help narrow down and identify games and mechanics on which to focus. Additionally, the overarching themes and objectives can help formulate specific learning objectives the game can teach or at least help teach. Next, while COTS board games are more accessible and usually easier than Title 10 or war hobbyist games, they will most likely require some pre-play familiarity. Instructors should consider the game's complexity and thoroughly understand the rules and mechanics before throwing the problem at students. Finally, as stated above, adding a game to a course is expected to be an iterative process. Seeing how students approach the problem, and assessing what they get out of it, can change the next iteration.

In the end, games are fun.⁶⁴ Any time something tedious can be improved with a touch of fun is a good thing. While not all classes are inherently dull, there is something noteworthy in pushing educational settings beyond PowerPoint presentations and lectures. Learning programs should be as fun and engaging as possible to ensure the lessons are absorbed rather than simply tolerated. Adding COTS board games to PME is one way of achieving such a goal. But, as anyone who has participated in a game night will attest, the important thing is to pull the right game off the shelf.⁶⁵

⁶⁴ Citation needed?

⁶⁵ Source: participated in a game night.

Table 12. Board Game Common Themes and Objectives Overview

Game Title	Publisher	Common Themes and Objectives
<i>Brass: Birmingham</i>	Roxley Games	critical thinking, systematic thinking
<i>Dune: Imperium</i>	Direwolf Games	decision-making, systematic thinking
<i>Mysterium</i>	Libellud	communication
<i>Root</i>	Leder Games	decision-making, critical thinking, creative thinking, systematic thinking
<i>Scythe</i>	Stonemaier Games	decision-making, ethics and morality, systematic thinking
<i>Twilight Inscription</i>	Fantasy Flight Games	decision-making, systematic thinking
<i>Eclipse – Second Dawn for the Galaxy</i>	Lautapelit.fi	decision-making, critical thinking
<i>Twilight Imperium Fourth Edition</i>	Fantasy Flight Games	decision-making, communication, critical thinking, creative thinking, systematic thinking

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