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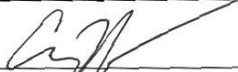
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MASTER OF MILITARY STUDIES**

AUTHOR:

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EXECUTIVE SUMMARY

Title: Student Wargame Iran-Iraq War: Battle of Dezful

Author: Major Kevin J Stier, USMC

Thesis: This essay describes how the student-designed wargame *Iran – Iraq War* (Battle of Dezful) can serve as an educational tool for marine and joint service officers. Iterative playtesting served as the primary method of acquiring data evaluating the educational effectiveness of the game. Data collection methods include: a pre – post-test, student observation checklist, post-play survey, and after-action group discussion.

Discussion: The purpose of the Gray Scholars - Education Wargaming course is enable students to design a wargame based upon a specific historical incident. Our group (Major Keith Toucey, Major Jessica Wruck, and Major Kevin Stier) designed a wargame based upon the Iran – Iraq War (Battle of Dezful). The Iran – Iraq War was a strategic conflict between Iran and Iraq that started in 1980 and ended in 1988. The Iran Iraq War game designed for this course was based on the Battle of Dezful. The game uses the Battle of Dezful tank battle scenario to provide instruction on inter-related learning objectives: maneuver warfare, logistics, terrain, and incomplete information. A variety of assessments were used to evaluate learn outcomes. These assessments validated aspects of the design, as well as offered insight into design changes for the game.

Conclusion: Evaluation and assessment data collection confirmed that the student wargame Iran – Iraq War (Battle of Dezful) could enable identified learning objectives. Players demonstrated learning by applying maneuver, logistics, and intelligence during playtesting. However, players demonstrated inconsistencies when applying intelligence during playtesting. By the conclusion of playtesting and initial development, the design team concluded that deliberate instruction was needed to inform players on utilizing essential intelligence through observation during play in order to enable that aspect of the learning objectives.

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I. Introduction

The Commandant of the Marine Corps has directed that the Marine Corps "must invest robustly in wargaming, experimentation, and modeling & simulation (M&S) if we are to be a successful learning organization."¹ The Marine Corps is familiar with wargaming as it is the third step in the Marine Corps Planning Process.² Although wargaming is not new to the Marine Corps, the learning from wargaming may be. The paper presents evidence from the evaluation of learning in a wargame developed as part of the Gray Scholars Educational Wargame program – the *Iran-Iraq War* (IIW). In this program, students designed the IIW wargame drawing on three components: the case of the Battle of Dezful during the Iran-Iraq War,³ the 38th Commandant's Planning Guidance,⁴ and Marine Corps Doctrinal Publication's (MCDP) 1 *Warfighting*,⁵ MCDP – 4 *Logistics*,⁶ MCDP – 2 *Intelligence*,⁷ and MCDP – 7 *Learning*.⁸ The student design team drew inspiration from playing *Friedrich*⁹ and *Conflict of Heroes: Storms of Steel – Kursk 1943*,¹⁰ to determine the desired educational learning outcomes. The culmination of this process was the successful completion and testing of a work-able educational wargame. This thesis explores how wargaming can function as a method of adult learning, through an example of wargaming development and design. The first section presents key information used to derive the learning objectives to help design the game. The paper then examines how wargaming can serve as an educational tool in the military. Finally, the thesis presents analysis from the evaluation of student learning assessments based on the playtests of the student-developed wargame, Iran-Iraq war.

A. Iran – Iraq War

The Iran-Iraq War game is based on the Battle of Dezful, a four-day tank battle that occurred in 1981 during the Iran-Iraq War. "The war began when Iraq invaded Iran on

September 22, 1980, after a long history of border disputes and demands for the overthrow of Saddam Hussein's regime."¹¹ The war featured a series of engagements, but did not end decisively. Iraq was successful early in the war, managing to capture Iranian Khuzestan, but they were eventually forced out of Iran.¹² The eight-year struggle resorted to millions of soldier and civilian deaths for both Iran and Iraq.¹³

In early January 1981, Iranian leadership executed a plan designed to regain territories that had been captured by the invading Iraqi forces in the preceding four months. Despite the advice of military leadership, the operation was launched months earlier than desired. Doomed from the start, the attack would be conducted on poor terrain, canalizing the Iranian force, and preventing the necessary maneuver. Compounding the issues, logistical considerations and fundamental tactics were disregarded."¹⁴

B. 38th Commandant's Planning Guidance

The Iran-Iraq War game also is drawn from directives established in the Commandant's Planning Guidance. The Commandant of the Marine Corps (CMC) has laid out specific guidance on how the Marine Corps will enhance wargaming. The CMC states that "What we need is an information age approach that is focused on active, student-centered learning using a problem-posing methodology where our students/trainees are challenged with problems that they tackle as groups in order to learn by doing and also from each other."¹⁵ This directive recognizes that crucial knowledge and professional competence can be acquired through experiential learning, such as wargames. Wargaming, in other words, provides a necessary complement to existing planning and exercise activities that simulates how leaders must think to outpace the enemy. "In modern military organizations, it is, along with the fear of violent death, precisely the element of real war that is hardest to replicate under peacetime conditions."¹⁶ The use of wargames

therefore fills an important void in the traditional training and analytical activities that prepare a professional force for complex challenges. "Wargaming historically was invented to fill this gap, and we need to make far more aggressive use of it at all levels of training and education to give leaders the necessary "reps and sets" in realistic combat decision-making."¹⁷ The CPG, in other words, offers clear justification for using wargames to educate and prepare a professional Marine Corps. The following subsections present the different aspects of warfighting integrated into the design of the game as a form of experiential learning.

C. Warfighting Function – Maneuver

The IIW student wargame focuses on using maneuver to achieve victory results during play. "The essence of maneuver is taking action to generate and exploit some kind of advantage over the enemy as a means of accomplishing our objectives as effectively as possible."¹⁸ Our group deliberately designed a game to educate players on ways to avoid repeating history. This required a few modifications to the capabilities and circumstances for Iran and Iraq in the battle that takes place in the IIW game. For example, our team designed the game to allow Iran to rely on speed. This allows for a more effective way to use the game to present the possibilities of maneuver to the players. MCDP – 1 suggests that "Maneuver relies on speed and surprise for without either we cannot concentrate strength against enemy weakness."¹⁹ Speed is what the Iran player requires to be competitive against Iraq. To achieve this, our team designed the game to provide Iran with speed to allow them maneuver space. According to MCDP – 1, "Superior speed allows us to seize the initiative and dictate the terms of action, forcing the enemy to react to us. Speed provides security. It is a prerequisite for maneuver and for surprise."²⁰ This capability is built into the rules of the game.

Iraq, on the other hand, has the advantage of using maneuver to defend. MCDP -1 suggests that the advantage here is that “a defender waiting in ambush may have the initiative if the enemy can be brought into the trap. The defense may be another way of striking at the enemy.”²¹ This characteristic in game design allows Iraq to observe Iran’s forward movement, providing them time to adjust to their decided tactical maneuver. However, Iraq also has the decision to remain mobile or to dig in. If the Iraq player decides to dig in, they gain accuracy in fire missions and increased survivability due to increased defilade. However, this requires the Iraq player to lose speed by going off roads, making them vulnerable to enemy penetration. MCDP -1 explains that in order to block Iran’s penetration, Iraq must reinforce quickly with its reserve. However, in order to avoid Iran’s deep air support, Iraq must stay off the roads, which means Iraq can only move slowly. If Iraq moves slowly, they cannot reinforce in time to prevent the Iran breakthrough.²² The game does not present the IIW just as a contest of maneuver. It also forces players to make decisions based on other crucial warfighting functions. If the player is Iran or Iraq, deliberate prioritization of logistical resources is key to achieving a victory.

D. Warfighting Function – Logistics

All Marines must understand how logistics influences the conduct of maneuver warfare. “The practice of maneuver warfare has fundamental implications on how a force is organized, moved, managed, and supplied.”²³ Throughout the wargame, players are challenged to prioritize their logistical resources. The logistical resources that must be effectively managed are fuel and ammunition. Without careful consideration, players risk unintentional depletion of their allocated resources to either help or hamper maneuver tempo. MCDP – 4 explains that logistics “makes a critical contribution to the generation and maintenance of tempo.”²⁴ The maintenance of tempo is increasingly vital for the players as it “forms the foundation for the development of detailed

tactics, techniques, and procedures for the execution of various logistics processes.”²⁵ A key element to successfully utilizing allocated resources is observing the opponent’s behavior and collecting basic intelligence to disrupt their decision-making process. In order for players to effectively incorporate maneuver and logistics in the game, they must account for available intelligence.

E. Warfighting Function – Intelligence

The student-developed wargame IIW incorporates intelligence to inform each player decisions. The purpose of this design is for players to assess their opponent during play. MCDP – 2 explains that “[a]ccurate and timely intelligence—knowledge of the enemy and the surrounding environment—is a prerequisite for success in war.”²⁶ The available intelligence in the wargame is available through observation only. This allows each player to use tools they are familiar with to think beyond their current move. For example, MCDP – 2 suggests that “Intelligence is thus a central component of the command and control process, which can be described by a simple model known as the observation-orientation-decision-action (OODA) loop.”²⁷ Moreover, MCDP – 2 continues by explaining that “[i]ntelligence activities make up a significant portion of the observation-orientation phases of the OODA loop with the primary purpose of supporting the decision phase.”²⁸ Lastly, MCDP – 2 makes it clear that “[i]ntelligence also supports the action phase by identifying targets for attack and by assessing results, bringing the OODA loop full circle to the next observation phase in support of a subsequent decision.”²⁹ The game is designed to allow for players to make observations, incorporating intelligence within limits analogous to the challenges faced by the combatants in the Battle of Dezful.

II. Literature Review

There are multiple objectives to create an educational wargame. Designers must first identify learning objectives for the players. Designers must also consider how the game design allows for players to learn from their game playing experience. Peter Perla argues that, "to understand what can be learned from playing a wargame, it is necessary to understand which game experiences are most like what goes on in actual combat operations."³⁰ This section presents a literature review of relevant wargame design concepts and practices, to explore how adult learners can benefit from game-based learning.

The United States military has used wargames as a training aid to assist in planning, decision making, and learning. Wargaming has become a tool used in the planning process used in real-world and educational environments. Within the planning process, wargaming serves as an opportunity for commanders and staff to find flaws in the plan by introducing adversarial actions and reactions. This process is called the 'red-cell,' designed to mimic enemy decisions. "During the planning phase, the commander must analyze his objectives and the alternatives for attaining them, assess the enemy's capabilities and possible courses of action and identify his strengths and weaknesses."³¹ During planning, a commander may refer to previous steps to make changes or updates to learn from the wargaming planning process. The end state is to produce a course of action, draft orders, and execute the plan. "Many, if not all, of these same activities must occur in a wargame. What differs, however, is the environment in which they take place."³² The practical use of wargames for planning also suggest the use of wargaming for training and education.

Wargaming outside of the schoolhouse create experiences that help professionals work through challenges, especially when direct experience is not available. Wargaming provides a

helpful tool to play out an enemy's most likely course of action (EMLCOA) or the enemy's most dangerous course of action (EMDCOA). However, it is not helpful when evaluating all the enemy's capabilities. "Aside from the fact that actual forces are not maneuvering and shooting at each other, perhaps the largest artificiality of the gaming environment is its generally poor recreation of communications and data-handling facilities and their effects on the quantity, quality, and timeliness of the information available to the commander."³³ These mechanics can be distributed through a series of methods to replace portions of the planning process, such as order development. "Some predefined structure of this sort can help players avoid overlooking critical staff functions whose performance would be impossible to ignore or forget during an actual combat operation."³⁴ Wargaming offers a different kind of perspective, to see the bigger picture.

A wargame will not, however, be able to replace the stress that a combat situation presents. For example, personality differences between commanders and staff or different human emotions experienced with the loss of a brother or sister in arms. "Although many artificialities limit the ability of a wargame to simulate the decision-making environment of a combat situation realistically, there are many aspects of a commander's operational activities that wargames can reproduce with a surprising amount of fidelity."³⁵ Decision-making at a higher rank than the individual playing the game serves as an example of introducing stress into a wargaming environment. This also makes them ideal methods for delivering learning content,

The intellectual experiences that result from such activities often reflect many critical aspects of similar real-world situations. Thus, a wargame can be not only a good vehicle for teaching lessons about the job of a commander to those

inexperienced at it, but it can also be an opportunity for commanders to practice the intellectual skills they need to do their jobs well.³⁶

The capability of wargames to deliver these benefits, however, require clear focus on outcomes from the game. Game designers need to be intentional about building in learning objectives into a game, from its objective to its rules and mechanic. Achieving the desired learning outcomes is determined by the design and mechanics of the game as much as engagement by the players.

The design and mechanics of a wargame can vary based on the historical event, the skill level of the design team, audience, and level of war (tactical, operational, strategic) used for design. One way to simulate a combat environment in a wargame is to focus on operational, command, and scenario attributes.³⁷ These attributes will give a design team the mechanics needed to determine what players will need to determine the size and array of forces, platforms, and counter platforms required to accomplish tasks, tactical and operational decision making, and system limitations.³⁸ Furthermore, this will allow a design team to narrow their focus to preventing a too complicated and time-consuming game. Additionally, design teams can determine if the game is appropriate to the level of war. Lastly, design teams decide what methods are needed to evaluate what players learned from the wargaming experience.

Philip Sabin argues that "wargames are, of course, an advanced form of active learning, as opposed to the passive absorption of information transmitted by the teacher."³⁹ They provide an experiential approach that can capture multiple and related learning objectives at the same time. However, the game rules and objectives reflected in the underlying mechanic should support these objectives. Understanding game mechanics is paramount for wargame designers to capture realistic scenarios to an actual war scenario. "The most important function of wargames is to convey a vicarious understanding of some of the strategic and tactical dynamics associated

with real military operations."⁴⁰ Wargames can create an environment that a commander would feel during an actual conflict. Players experience stress by being forced to make decisions based on limited information or time constraints built into the game." As variation in combat outcomes during the game creates unexpected threats and opportunities, players will be faced with other classic real-world dilemmas such as whether to reinforce success or salvage failure."⁴¹ Having a clear direction in the design and mechanics of the game will determine what players learn.

Gamed-based learning also requires that players be motivated to engage with the game. "When game-based learning is viewed from a motivational perspective, we emphasize the ability of games to engage and motivate players by providing experiences that they enjoy and want to continue."⁴² The level of enjoyment depends on the design and simplicity of the game. Players will abandon a complicated game and become bored with a game that is too simple. Finding a balance between complicated realism and playability is crucial to developing a successful game and providing players with a valuable learning experience.

Sabin offers a straightforward guidance to balance the competing requirements of an educational game. "Instead of a comprehensive theory of learning, we may therefore consider a simple model that describes the basic structure virtually all games appear to have. This structure consists of three key elements: a challenge, a response, and feedback."⁴³ Ultimately, wargame designers need to recognize common elements that audiences can reasonably expect from a game. By introducing a simplified format that focuses on future learning, new knowledge and skills, reinforcement of existing skills, and development of 21st-century concepts, players will be more likely to relate to the wargame design and walk away more intelligent than they were before they played."⁴⁴ A game that clearly communicates its objectives and rules can effectively

deliver learning objectives that are measurable, a crucial requirement for evaluation of student learning.

Evaluating what players have learned can be conducted in many ways. Some approaches may include observation, questionnaires, surveys, essays, discussion, question, and answer, or just fun engagement."⁴⁵ Another valuable post-game tool to measure learning is to have a simple conversation with the players to receive feedback. "In this case, facilitators should take extra care in annotating the dialogue to capture accurate responses"⁴⁶ The technique used to evaluate learning will vary based on the design of the game, the personality of players and facilitators, environment, the time allotted, and the players ability to play the game.

There is a significant amount of room for creativity in achieving the learning outcomes, and designers and players should not feel confined to believe that there is only one desired outcome. Furthermore, there is limited literature on how wargaming facilitates learning and a significant overlap amongst scholars. Wargaming, like other types of education and learning, is not meant for everyone, which means that wargaming is a hands-on style of learning that may benefit some more than others.⁴⁷ Despite all the scientific analysis that goes into understanding how players learn from wargaming, it should remain fun.

III. Adult Education Theory and Models

A. Adult Learning and Theory

General David H. Berger, 38th Commandant of the Marine Corps, suggests that "We must commit to a continuous cycle of learning and adjustment that ensures a margin of advantage over our adversaries while remaining ready to respond to crisis 24/7/365."⁴⁸ Although not specifically stated in the Commandant's Guidance, the most important part of the message is understanding how adults learn from playing wargames. Adult learning, also known as

andragogy, is the way that adult students are educated. Robert Mason, writing about the link between games and learning, argued that games support what Malcolm Knowles called andragogy, the characteristics in adult learning.⁴⁹ Mason draws parallels between several researchers that have studied adult learning, to show how games can help adults learn. Mason observes that Knowles discovered that adult students preferred immediate results from learning, problem solving scenarios, and a learning environment that mimicked a similarity to their working environment.⁵⁰

The theory of andragogy developed by Knowles is supported in several other studies of adult learning. For example, Mason presents the cognition theory work of John Brown, Allan Collens, and Paul Fugiud, who observed that adult learning comes through practicing in a familiar environment.⁵¹ Brown, Collens, and Fugiud argue that adult students prefer to learn in an environment that they are familiar with to support their educational advancement. Likewise, Russian psychologist Lev Vygotsky observed that learning increases during socialization, where cross-pollination of thoughts and experiences can occur.⁵² These ideas about learning inform Marine Corps University professional military education (PME), which provides environments and activities conducive to supporting adult learning.

Games-based learning is supported by research on *experiential* learning. “In 1984, D.A. Kolb proposed a cycle of learning that progressed in four stages: Concrete experience, reflective observation, abstract conceptualization, and active experimentation.⁵³ Concrete experience involves what the adult learner has observed during their career. Reflective observation involves how the adult learner draws parallels between what they experienced and what they have learned. Abstract conceptualization involves the student connecting their experience to their recent education. Lastly, active experimentation involves the student utilizing experience and

recent education to strengthen their skillset. Wargaming can offer educational outcomes for adult learners because it provides experiences for these different phases of learning.

This approach to learning underscores Marine Corps doctrine on professional development. Marine Corps Doctrinal Publication – 7 says that individuals can learn across an entire lifespan.⁵⁴ Wargaming provides adult learners with a simulated environment that is realistic. MCDP – 7 suggests that adult learners draw upon prior experiences, knowledge, competencies, and perspectives, and that these unique elements form the basis for understanding new information and learning.⁵⁵ Wargames can meet the needs for continuous learning, in part because adult learners can bring their experiences to the exercise and reinforce educational content. Just as important as wargames are the assessment tools used to evaluate game play. Evaluating what students take away from a games-based learning opportunity is critical to determine if the adult learner has achieved the learning objectives and if the instructor has been effective in delivering adequate information in a manner that can be understood and applied by the adult learner. MCDP – 7 explains that effective learning assessments facilitate and guide the learning process to determine whether the learner is proficient in required competencies.⁵⁶

IV. Assessment Methodology and Tools

In order to evaluate learning outcomes from the IIW game, the design administered a variety of methods to assess student learning during eight rounds of playtesting. The methods are described below. Each evaluation method returned data in a “yes” or “no” format in order to facilitate analysis by applying a “0” or “1”. “0” represented failure. The standard for passing or failing was based on a scale from 0 to 16. Failure was determined if a player earned a 0 through 7 when applying maneuver, logistics, or intelligence during game play. Conversely, passing was

determined if a player earned an 8 through 16. The pre / post-test, student observation checklist, group discussion, and post-play survey were used to measure failing or passing scores.

The evaluating process also compared game 1 to game 2, game 3 to game 4, game 5 to game 6, and game 7 to game 8. Each game comparison was played by different players, allowing the design team to evaluate sixteen separate players. The result evaluated eight players for Iraq and eight players for Iran. This linear comparison was analytically applied because the team facilitating the game was learning efficiencies during each game play. The efficiencies learned by the team facilitating the game were applied to help players better understand the rules game mechanics and develop victory conditions which helped with game improvement and learning efficiencies. Each playtest evaluated players on a series of questions and observation criteria that can be reviewed in pie charts below, and appendixes E, F, G, and H.

A. Pre – and Post-Test

The pre – and post-test were developed to evaluate a player’s knowledge about the Iran – Iraq war prior to and after game play. The test also presented questions that evaluated the effectiveness of maneuver, logistics, and intelligence warfighting functions during gameplay. Specifics about the test can be reviewed in appendix E.

B. Student Observation Checklist

The team used the student observation checklist to evaluate players from start to finish during gameplay. The checklist observed students reading the game instructions, applying maneuver, logistics, and intelligence warfighting functions during gameplay, and how each player reacted to injects from playing and chance cards. Specifics about the checklist can be reviewed in appendix F.

C. Group Discussion

The Group discussion provided an opportunity for the team to probe players on their gameplay experience. Questions were tailored to look at specific learning objectives associated with maneuver, logistics, and intelligence. This provided the team with an opportunity to explain game design techniques and methodologies to help draw out learning points. Specifics about the group checklist can be reviewed in appendix G.

D. Post-Play Survey

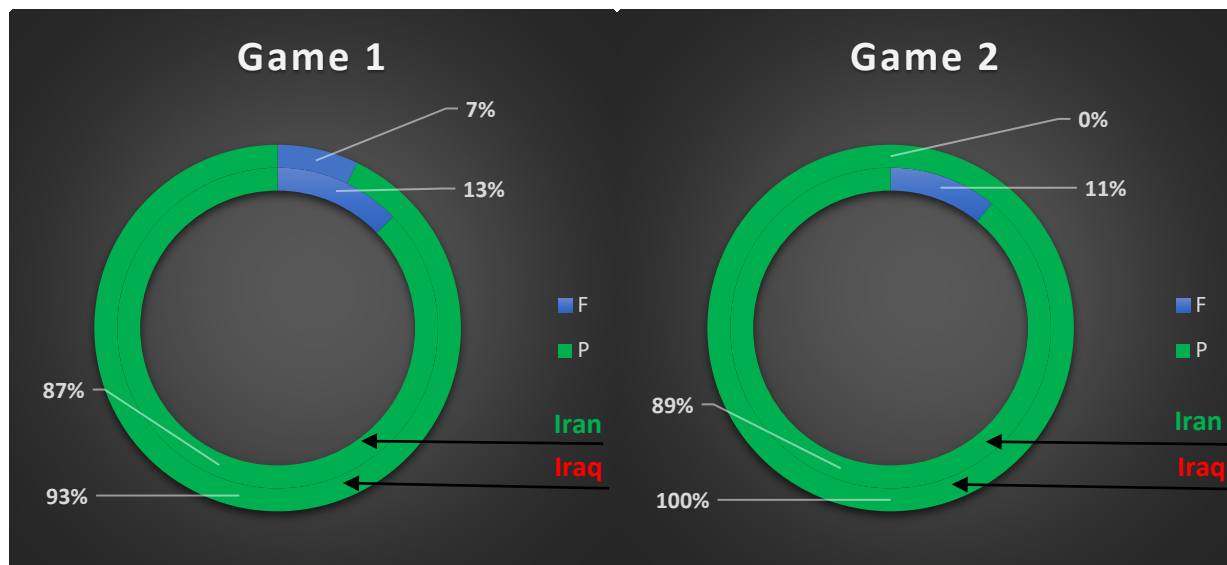
The post-play survey provided the team with feedback from each player. The questions were tailored to evaluate if learning objectives were achieved, warfighting functions were adequately incorporated into the game, and if the group discussion was practical. Specifics about the group checklist can be reviewed in appendix H.

V. Discussion: Assessment of Student Wargame Iran – Iraq War

Overall, the student-developed wargame IIW (Battle of Dezful) was successful because students demonstrated positive trends in learning how to apply maneuver, logistics, and intelligence during game play. The ratio of pass versus fail overwhelmingly demonstrates that players learned over time while playing. Players walked away with positive learning outcomes and achieved the game design team's intended goals. It should be noted that the team measured the presence or absence of learning, not the degree or depth of learning. Likewise, the evaluation methods did not assess the length of retention. Analysis of collected evaluation data presented below provides insight into how the playtest demonstrated the capability of the game to facilitate the learning objectives.

Furthermore, analysis of the data shows that learning outcomes for each iteration of the game improved over time. This improvement was mostly due to the team's ability to refine how

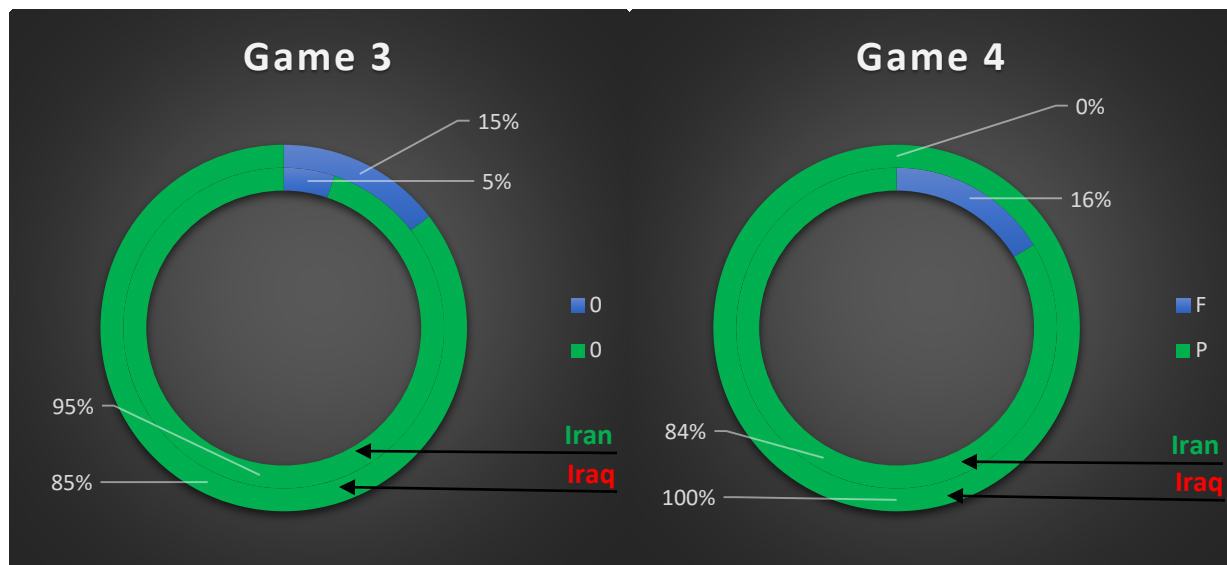
the game was administered. This is due to the team's ability to refine instructions, adjust the game design, mechanics, and evaluation criteria. While the results were positive, it also important to note that the playtesting environment was not consistent and ultimately had an impact on game results. The environment impacted game play based on the time of day that the game was played. For example, players that conducted game play in the afternoon demonstrated a lower attention span compared to players that conducted game play in the morning. Further playtesting is required in a controlled environment at a time that is conducive to players to achieve definitive results.



The above pie charts compare gameplay between game 1 and game 2. The green ring for Iran and Iraq denotes passing percentage rates for maneuver, logistics, and intelligence throughout the gameplay. The blue denotes failure percentage rates for maneuver, logistics, and intelligence. The takeaway from the comparison between game 1 and game 2 is two-fold. First, the team's ability to administer the game slightly improved. Second, the player's understanding of how to apply maneuver, logistics, and intelligence in a tactical environment was greater in game 2 than in game 1.

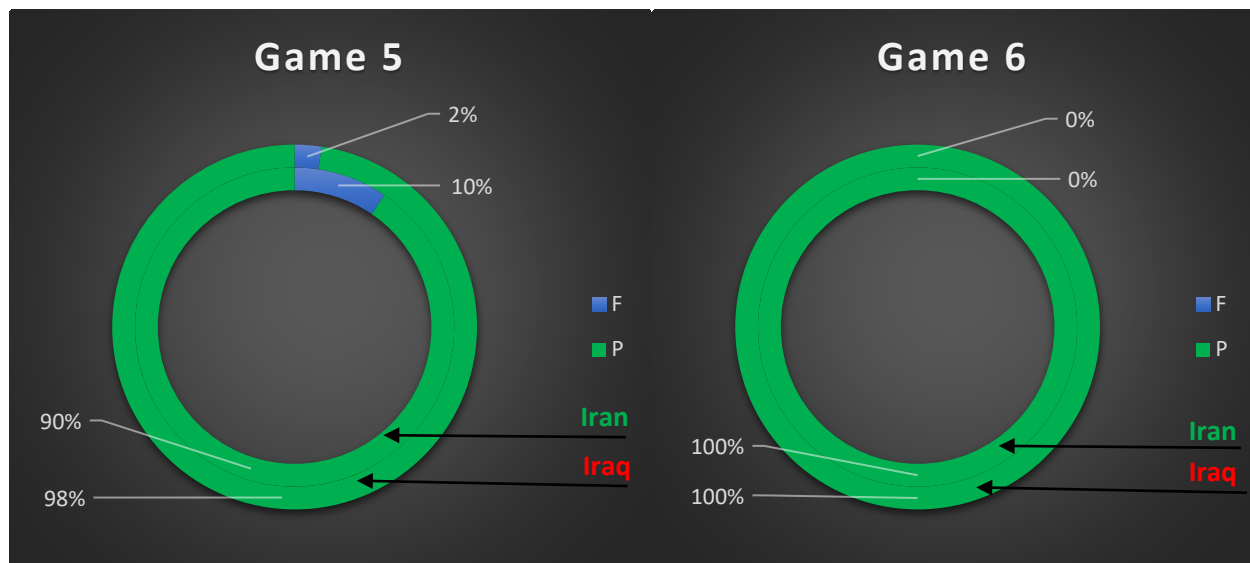
Furthermore, game 2 was not on a constrained timeline and focused on the game more than players from game 1. Because the players from game 2 did not have a constrained timeline, they were able to game play with well thought out maneuver, logistic, and intelligence techniques. For example, the Iran player conducted an envelopment with half of his forces, effectively drawing Iraq out of her logistics zone to defend the northern main supply route (MSR). Iran then used the other half of his forces to maneuver down the middle MSR, effectively splitting Iraq forces. Iran had lucky dice rolls, helping his probability outcome when engaging the Iraq player. Despite the well thought out maneuver by the Iran player, the Iraq

player defended her position and slowed the advancement of Iran. Neither the player for Iran nor Iraq achieved victory results from this gameplay due to insufficient resources. Our team adjusted the allowable spaces that could be moved during each turn to facilitate victory conditions. Our purpose for this adjustment was to deviate from the historical outcome and allow either the Iran or Iraq players to achieve victory results.



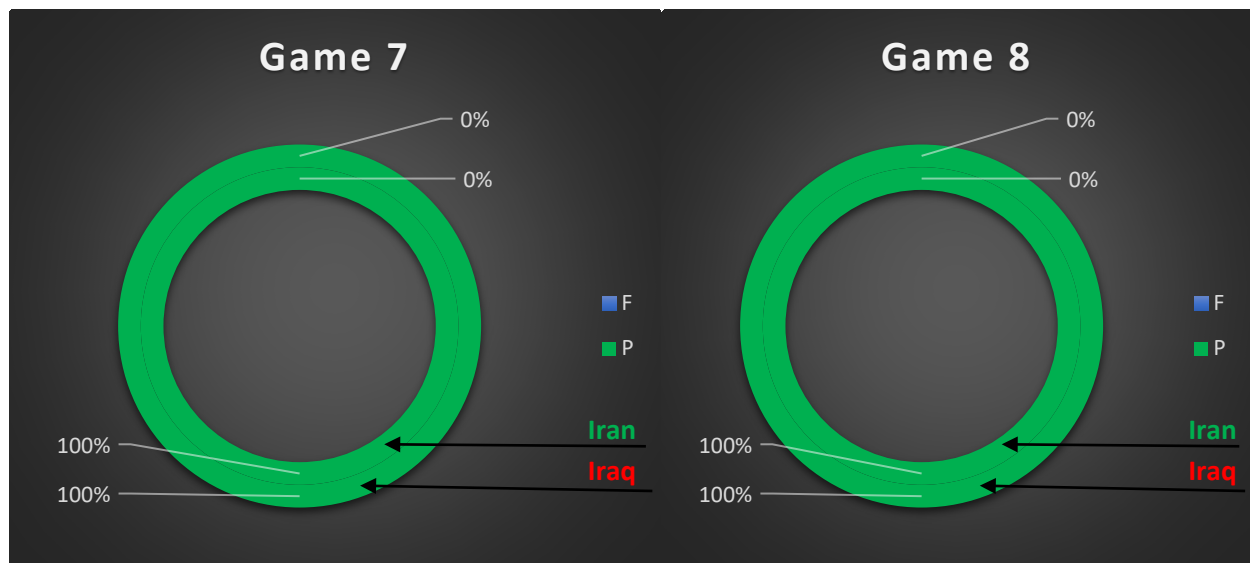
The above pie charts compare gameplay between game 3 and game 4. The green ring for Iran and Iraq denotes passing percentage rates for maneuver, logistics, and intelligence throughout the gameplay. The blue denotes failure percentage rates for maneuver, logistics, and intelligence. The takeaway from the comparison between game 3 and game 4 is interesting because the Iraq player from game three is inverse to all other Iraq game comparisons. The team's assessment through evaluation criteria was that the player was being overly aggressive and not applying the mechanics of the game appropriately. It was also the team's assessment that the Iraq player for game 3 was preoccupied with other thoughts and was not engaged.

Moreover, the Iran player in game 3 made an interesting choice in maneuver options and enveloped the Iraq player. This was the only game that the team observed an Iran player deviate from the historical maneuver. The team discussed the potential of the Iran player, effectively disrupting the OODA Loop of the Iraq player. Further analysis would be required to determine if this claim were true or false. Game 4 played remarkably like game 2. However, there was nothing significant from this game; it did confirm that positive learning outcomes were achieved. Last, neither the player from Iran nor Iraq achieved victory results.



The above pie charts compare gameplay between game 5 and game 6. The green ring for Iran and Iraq denotes passing percentage rates for maneuver, logistics, and intelligence throughout the entirety of gameplay. The blue denotes failure percentage rates for maneuver, logistics, and intelligence. The takeaway from the comparison between game 5 and game 6 had several outcomes:

1. The team's ability to administer the game continued to improve when compared to previous iterations.
2. Both games confirmed that positive learning outcomes were achieved.
3. Neither the player from Iran nor Iraq achieved victory results.



The above pie charts compare gameplay between game 7 and game 8. The green ring for Iran and Iraq denotes passing percentage rates for maneuver, logistics, and intelligence throughout the gameplay. The blue denotes failure percentage rates for maneuver, logistics, and intelligence. The takeaway from the comparison between game 7 and game 8 is two-fold:

1. The team's ability to administer the game continued to improve when compared to previous iterations.
2. Learning outcomes were achieved, but players reported no failures in learning outcomes during gameplay. Ultimately, the team's ability to adjust the game successfully and allowed players to execute gameplay without measurable failure percentage.

Neither the player from Iran nor Iraq achieved victory results.

VI. Conclusion

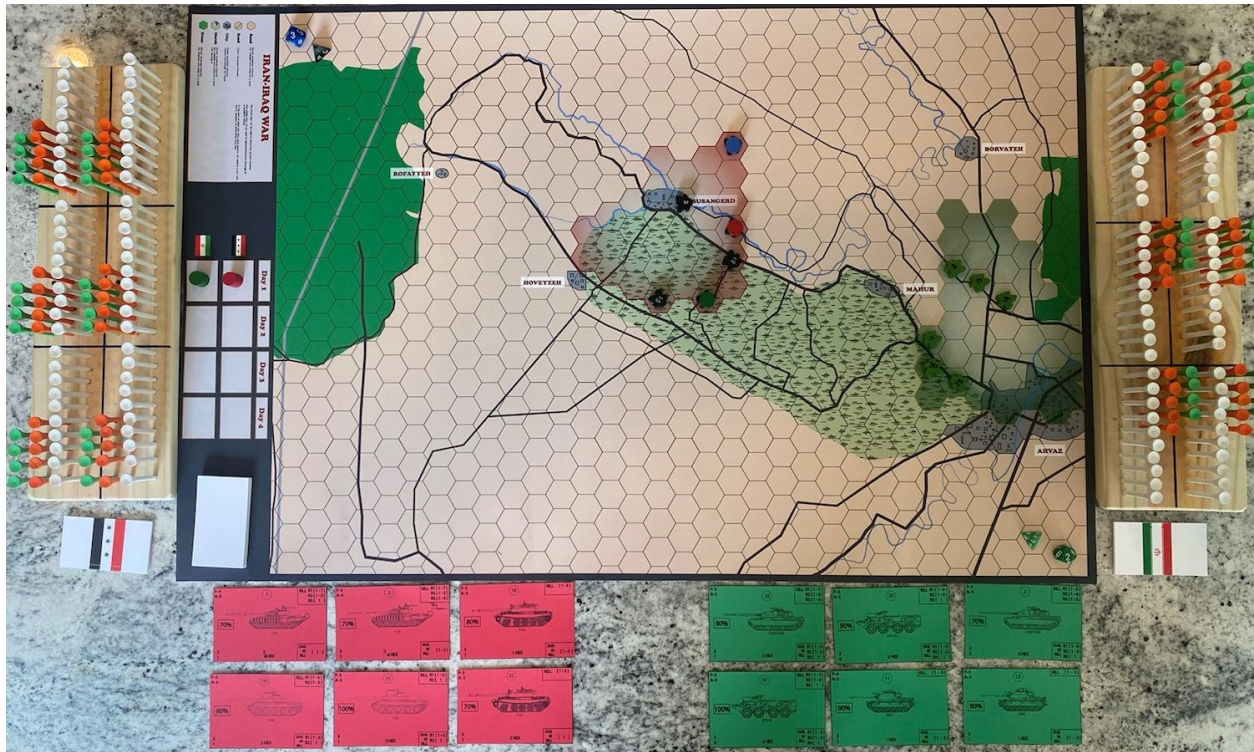
MCDP – 1 suggests that “We learn as much from mistakes as from things done well, so we must be willing to admit mistakes and discuss them.”⁵⁷ Learning from mistakes was how our team achieved positive results in meeting the Commandant’s Planning Guidance (CPG) intent. The CPG states that “To date, our wargaming has focused on a limited set of scenarios; thus, we will need to expand our analysis across more scenarios to better inform our force design efforts.”⁵⁸ Although mistakes are not specifically stated in the CPG, it is reasonable to assume that one mistake is the lack of wargaming. The CPG specifically tasked Marine Corps University with developing a wargaming program to correct that mistake.

Of the eight games that were administered and played, sixteen players were evaluated. These playtests allowed our team the ability to make changes to our wargame to achieve positive learning outcomes. The assessments of student wargames trend positively, indicating that the wargaming program successfully achieved the CMC’s intent.

Game Board Development (Prototype 1)



Appendix B
Game Board Development (Prototype 2)



Appendix C

Iran – Iraq War (Battle of Dezful): Game Rules

This game is intended to have players consider and account for maneuver, logistics, and intelligence while conducting combined arms. The game will be played over a period of four days. Days will end when neither team has moves left, or both teams have decided to pass on their remaining turns. Each team will start with three units on the board. On each subsequent day, players will be allowed to enter an additional unit. Players may enter units they have drawn in any order they choose.

Unit Cards:

Prior to the start of play, players will draw six game pieces from the bag; each game piece will have a number on it which matches a card in the stack. Each card will contain a battalion of varied capabilities and effective combat power. Players will set-up their tracking board to match the information contained on the card. For example, if the battalion is only at 70% strength, the player will only put in 7 of the white pegs. If the battalion only has two for fuel, they will only put two green pegs in the board.

Chance cards:

Chance cards will be utilized to represent events which can either slow your progress or offer players an advantage. Chance cards will be drawn at the start of each day and will provide instructions which will either allow you an extra turn, enable your units to move extra spaces, or will result in lost turns, lost combat effectiveness, or reduce the effects of your actions.

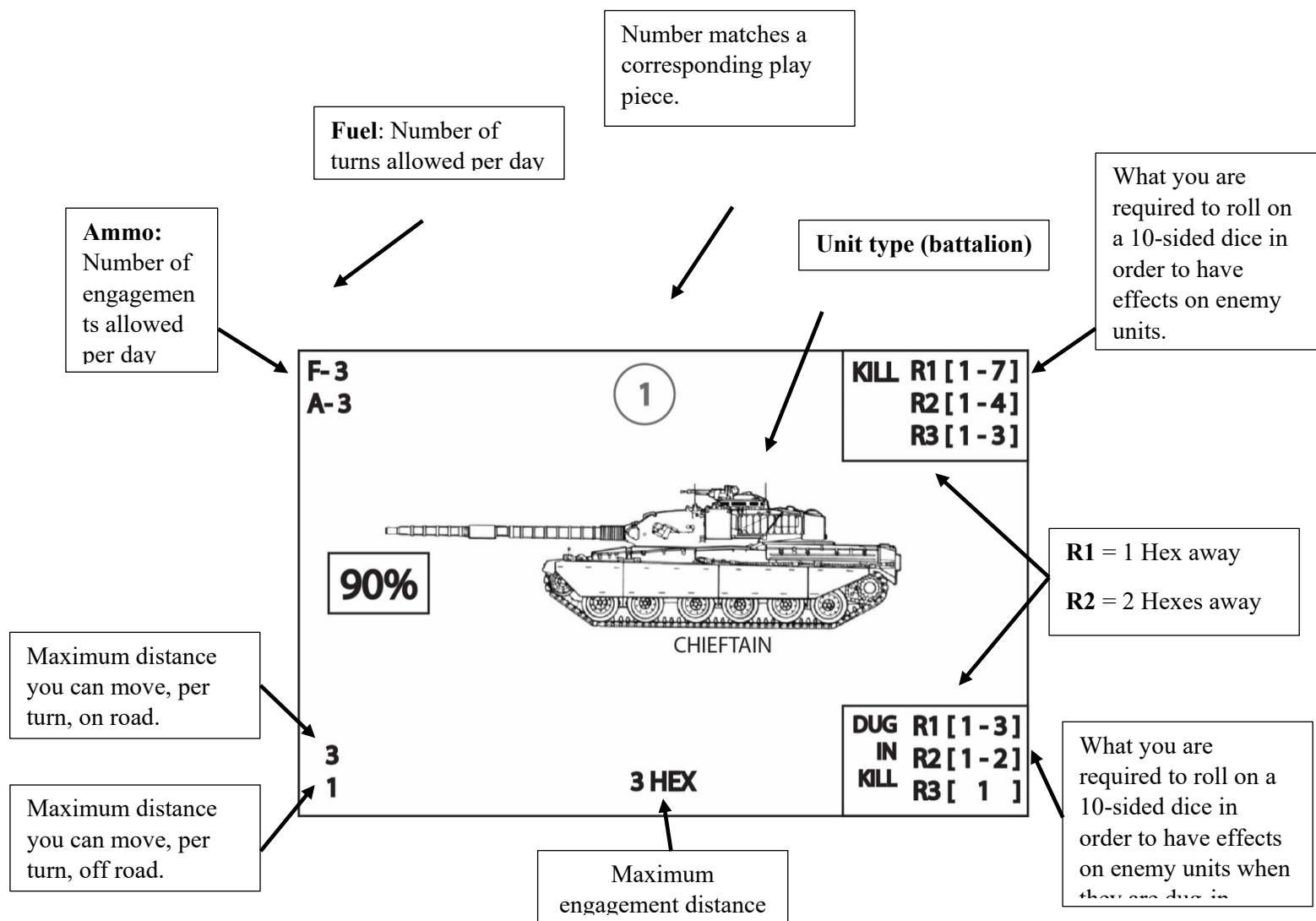
Special Assets:

Each player will draw three special assets. These cards will include aviation assets, artillery assets, and reconnaissance capabilities. Each card will include a list of capabilities and the advantage provided for employing that card. The advantages provided can include additional moves or greater effects when engaging the enemy. Players must state if they intend to utilize these cards before their move, or if in conjunction with an attack, before rolling the engagement dice. If the engagement fails, the player still loses that card, as the asset has been expended.

Battle:

Battle can be conducted anytime a player's piece is within range of a target. Battle may be conducted in addition to a move or may be conducted by a static unit. If a static unit initiates battle, it will count as a move. If a player engages in conjunction with a move, there is no additional move required (e.g., you can shoot and move or you can shoot, both cost one turn). Players may engage targets within a 360-degree fan. If a player is out of fuel, but still has ammunition, they may engage in battle. Once a player announces they want to initiate battle, the other play will not get a chance to move. Battle will be conducted by rolling a 10-sided dice to determine if any effects were achieved. If successful, a low number 4-sided dice will be rolled to

determine what percentage of success was achieved. Whatever number is rolled on the 4-sided dice will be multiplied by 10% (e.g., 4 = 40%). Each unit card will dictate what needs to be rolled in order to have effects on an enemy unit. Vehicles which are dug in will have a greater chance of success with combat and will also have a greater chance of survivability. However, for each unit which digs in, that will result in a loss of one turn for each day. Each unit card will indicate what is required to be rolled in order to have effects on a unit which is dug in. Digging-in will cost a player a turn for that unit. However, units may pullout of dug-in positions and move in one turn (e.g., there is not cost for pulling out of a dug-in position). Units which are dug-in will have a little wooden circle placed on top of them, indicating they are dug-in. If a unit is dug in, it will become more accurate. To account for this, when a unit is dug in, it's "kill" requirements will open by 1 number (e.g., if R1 is 1-7 on the card, it will not be 1-8 for a dug-in unit).



Appendix D
HRPP Applicability Review Worksheet

1. Title of Project / Study: Command & Staff College, Gray Scholars Program - Educational Wargaming Iran – Iraq War (Battle of Dezful)

2. Planned Inclusive Dates of Study: 01 Nov 2020 - 30 Apr 2021

3. Background: The purpose of the Gray Scholars - Education Wargaming course is to design a wargame based upon a specific historical incident. Our group (consisting of Major Keith Toucey, Major Jessica Wruck, and Major Kevin Stier) will design a wargame based upon the Iran – Iraq War (Battle of Dezful). The Iran – Iraq War was a tactical conflict between Iran and Iraq that started in 1980 and ended in 1988. The war started when the Iraq dictator Saddam Hussein ordered missile and chemical weapon attacks. Iraq failed to successfully plan for logistics and lacked precision strikes against Iran. This forced Iraq to take a defensive posture to protect their borders. Iran responded but failed to mass its military assets, preventing decisive results. The war ended in July 1988 with the acceptance UN resolution 598.

4. Objective:

- a. Our group intends to design a wargame based upon the Iran – Iraq War (Battle of Dezful) scenario to serve as an educational tool for Marine, and Joint service, officers.
- b. The risks of this project are low. The predominant method of acquiring data from human “subjects” will be consensual play testing. All play test data will be anonymous. Furthermore, the value of this project is potentially high, as an educational tool for Marine and Joint service officer Professional Military Education (PME).

5. Study Subjects:

- a. **Playtest Subjects:** During the Educational Wargaming class, other groups and students will playtest our wargame to identify strengths, weaknesses, and needed areas for improvement. Our group will coordinate with the professors of the Educational Wargaming program to solicit participants.

6. Methodology / Administration:

- a. **Data Acquisition:** There will be one primary method of data acquisition.
 - i. **Playtest Subjects:** One or more members of our design group will be present during playtests and will record results. Members from the design group will collect data using a pre-post-test, student observation checklist, post play survey, and after-action group discussion. No subject information (e.g., name, rank, etc.) will be retained during this evolution.

- b. The Group Members identified above (Major Keith Toucey, Major Jessica Wruck, and Major Kevin Stier) will conduct analysis of the data collected.

7. Security:

- a. All subjects (Playtest) will remain anonymous.
- b. **Data File Storage:**
 - i. Data files will be stored on each design group members' MCU associated Google Drive. Each such drive is accessible via Common Access Card (CAC) certificate. Additionally, access to the respective file locations may be shared with other design group members and Gray Scholars Program professors as needed.
 - ii. After submission of the wargame and research these to Gray Scholars program professors, Command & Staff student theses may be retained on the Marine Corps University (MCU) website. This location is on a publicly accessible web domain.

8. Dissemination:

- a. All data from Playtest sessions will be reported in the aggregate.
- b. The data will be used to support the wargame design/refinement, and accompanying research papers (M.M.S. theses). Our design group may seek publication of the wargame and accompanying research theses with approval from, and assistance of the Gray Scholars program professors.
- c. Playtest subjects will remain anonymous, and our design group does not intend to collect or retain personal information on these subjects.

9. Survey Questions: Specific questionnaire will be provided upon development and request.

10. Principal Investigator Contact Information: There are three “principal” researchers for this project.

- a. Major Keith Toucey: keith.toucey@usmcu.edu
- b. Major Jessica Wruck: jessica.wruck@usmcu.edu
- c. Major Kevin Stier: kevin.stier@usmcu.edu

11. Principal Investigator Research Acknowledgement. By signing this document, you acknowledge that you will not conduct research with human subjects until the Institutional Review Board (IRB) and the Institutional Official have approved your full research protocol. You further understand that your immediate resource for clarification of any issues related to the protection of research volunteers is the Marine Corps IRB. Further

information may be found in MCO 3900.18. Please contact the appropriate Marine Corps HRP POC to answer questions or assist in the completion of this form.

Please double-click on the signature line below to apply your electronic signature.

X

Principal Investigator

Privacy Act Statement

Authority: 5 U.S.C. 301, Department Regulations.

Purpose: Information is collected in support of academic research. Your name may be used in connection with citation and/or references in academic research papers, which may be publicly accessible on Marine Corps web domains.

Use to be made of your Name: Your name may be used in connection with citation and/or references in academic research papers, which may be publicly accessible on Marine Corps web domains. Should you desire, any written publications will be provided to you for review and consent prior to publication in professional journals or the Marine Corps University publicly accessible web domain.

Disclosure / Participation: Your participation in this playtest and or blind play will remain anonymous and is entirely voluntary.

Appendix E
Student Wargame Iran – Iraq War (Battle of Dezful): Pre/Post-Test

Learning Objectives

1. Utilizing the wargame, *Iran – Iraq War (Battle of Dezful)*, a military officer will identify maneuver, logistics, and intelligence to develop a defensive course of action to achieve victory conditions.

- a. Did the integration of maneuver and logistics shape your planning for defensive actions to achieve your objective?
- b. Did you change your defensive actions during gameplay due to allocated logistical resources?
- c. Did available intelligence of the adversary's maneuver and logistics shape your defensive objective?

Response:

2. Utilizing the wargame, *Iran – Iraq War (Battle of Dezful)*, a military officer will identify maneuver, logistics, and intelligence to devise an offensive course of action to achieve victory conditions.

- a. Did the integration of maneuver and logistics shape your planning for offensive actions to achieve your objective?
- b. Did you change your offensive actions during gameplay due to allocated logistical resources?
- c. Did available intelligence of the adversary's maneuver and logistics shape your offensive objective?

Response:

3. Utilizing the wargame, *Iran – Iraq War (Battle of Dezful)*, a military officer will recognize maneuver, logistics, and intelligence vulnerabilities to prioritize actions during each play turn.

- a. Did the available intelligence shape your maneuver and logistics support plan?
- b. Was this apparent to you before or during game play?
- c. Did your assumptions that were made prior to start change during game play?

Response:

6. Game Play:

a. **Prior to game play:** Knowledge of the Iran – Iraq War: (circle one)

Not at all Knowledgeable	Slightly Knowledgeable	Somewhat Knowledgeable	Moderately Knowledgeable	Very Knowledgeable
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b. **Post game play:** Knowledge of the Iran – Iraq War: (circle one)

Not at all Knowledgeable	Slightly Knowledgeable	Somewhat Knowledgeable	Moderately Knowledgeable	Very Knowledgeable
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c. Would you be interested in playing again? Y / N

d. Did you accomplish the learning objectives? (highlighted in yellow): Y / N

1. If **yes**, what aspect of the game was most effective?

2. If **no**, what aspects of the game were the least effective?

7. Please provide general feedback:

Appendix F

Student Wargame Iran – Iraq War (Battle of Dezful): Student Observation Checklist

<u>Preparatory</u>	<u>Iran</u>	<u>Frequency</u>	<u>Iraq</u>	<u>Frequency</u>
• Player reads / understands rules and learning objectives.				
• Player's selected action/actor cards to support actions.				
<u>Player Turns</u>				
• Player uses allocated resources to enable actions.				
• Player uses terrain to advantage.				
<u>Player Response to Opponent Turns</u>				
• Player identifies unanticipated effects on opponent.				
• Player adjusts gameplay based upon opponent actions.				
<u>Player Response to Game Injects / Events</u>				
• Player identifies changes to conditions/tactics from game injects.				
• Player adjusts gameplay based upon game injects.				
<u>Subsequent (or later) Gameplay</u>				
• Player understands how to play cards.				
• Player uses cards that support objective.				

Appendix G

Student Wargame Iran – Iraq War (Battle of Dezful): Group Discussion

Introduction (5 Min)	Thank you for agreeing to play our wargame, and for agreeing to meet with us. My name is _____, from Marine Corps University in Quantico, VA. With me are my fellow game designers/students, _____. We are speaking with students who have played our game to help us understand its potential utility as an educational tool. This is part of an academic course of instruction, specifically the Command & Staff College Gray Scholars Program on Educational Wargaming. This is also a focus of several recent Marine Corps efforts to reinvigorate wargaming as both a means to assess new warfighting concepts, and within Professional Military Education. As part of our program, we would like to speak with you about your impressions of our game, its utility as an educational tool to teach concepts related to maneuver, logistics, and intelligence. I expect that this will take about an hour. We will treat all your responses as confidential and will not include your names or any other personally identifiable information in our student research theses. We will destroy all notes and/or audio/video recordings after we complete and submit our theses. Are you all willing to participate in this discussion? Does anyone have any questions about the purpose of today's discussion?
Topic 1 (15 Min)	Topic 1: Maneuver 1. Please tell us how the terrain helped/hampered your maneuver options. a. PROBE: Did the terrain help/hamper your maneuver? b. PROBE: Did the terrain help/hamper your opponent's maneuver? c. PROBE: Did you prioritize resources maximize maneuver? d. PROBE: Did your early actions/turns help/hamper your ability to maneuver? 2. (If used during gameplay). Please tell us how your selected card and allocated resources helped/hampered your maneuver options. a. Did your allocated logistical resources help/hamper your maneuver options? b. PROBE: Did the action/actor cards you selected help/hamper you in maneuver? 3. Is there anything that you would do differently if playing in the future?

Topic 2 (15 Min)	Topic 2: Logistics 1. Please tell us how your allocated logistical resources. a. PROBE: Did you consume your allocated logistical resources appropriately? b. PROBE: Did you run out of any logistical resources unintentionally? c. PROBE: Did you prioritize logistical resources? d. PROBE: Did your early actions/turns help/hamper your allocated logistical resources? 2. (If used during gameplay). Please tell us how your selected card and allocated resources helped/hampered you. a. PROBE: Did the action/actor cards you selected help/hamper you allocated logistical resources? b. PROBE: Did your allocated logistical resources help/hamper you? 3. Is there anything that you would do differently if playing in the future?
Topic 3 (15 Min)	Topic 3: Intelligence 1. Please tell us how any available intelligence helped/hampered you? a. PROBE: Did you observe any available intelligence? b. PROBE: Was the available intelligence helpful? c. PROBE: Did your opponent use available intelligence against you? 2. Is there anything that you would do differently if playing in the future?
Final Thoughts (10 Min)	Do any of you have any final thoughts, or recommendations for improving the game that you would like to share? Thank you for your time.

Appendix H
Student Wargame Iran – Iraq War (Battle of Dezful): Post-Play Survey

Learning Objective Focused

Please indicate to what degree you agree or disagree with the following statements:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The activity had clear learning outcomes	☐	☐	☐	☐	☐
The activity supported learning outcome achievement	☐	☐	☐	☐	☐
Preparatory materials supported gameplay and learning	☐	☐	☐	☐	☐
Game products (e.g., briefs) reinforced the learning outcomes	☐	☐	☐	☐	☐
The game context and scenario contributed to the learning objectives	☐	☐	☐	☐	☐

Activity / Gameplay Focused

Please indicate whether you agree or disagree with the following statements:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The amount of time spent learning the rules was appropriate.	☐	☐	☐	☐	☐
Game complexity was sufficient to challenge my decision-making.	☐	☐	☐	☐	☐
The game was sufficiently intuitive or playable, so as not to get “bogged down.”	☐	☐	☐	☐	☐
Game play was intuitive once I was familiar with the rules.	☐	☐	☐	☐	☐
Game inputs encouraged me to adapt my strategy or style of play to achieve my goals.	☐	☐	☐	☐	☐
Game inputs encouraged the me to adapt my strategy or style of play to prevent my opponent from achieving his/her goals.	☐	☐	☐	☐	☐

After Action / Group Discussion Focused

Please indicate whether you agree or disagree with the following statements:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The group discussion/AAR contributed to a greater understanding of the learning objectives.	☐	☐	☐	☐	☐
The group discussion/AAR provided greater context to player moves and game events.	☐	☐	☐	☐	☐

Endnotes

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- ¹ Berger, D. (Gen), *Commandant's Planning Guidance: 38th Commandant of the Marine Corps*.
² *Id*
³ See Companion/Team Member papers.
⁴ Berger, D. (Gen), *Commandant's Planning Guidance: 38th Commandant of the Marine Corps*.
⁵ *Warfighting*. Washington D.C.: U.S. Marine Corps, 1997.
⁶ *Logistics*. Washington D.C.: U.S. Marine Corps, 1997.
⁷ *Intelligence*. Washington D.C.: U.S. Marine Corps, 1997.
⁸ *Learning*. Washington, D.C.: U.S. Marine Corps, 2020
⁹ See game rules/Friedrich
¹⁰ See game rules/Conflict of Heroes: Storms of Steel – Kursk 1943
¹¹ Iran–Iraq War, Wikipedia (Wikimedia Foundation, September 23, 2020),
https://simple.wikipedia.org/wiki/Iran%E2%80%93Iraq_War.
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¹⁵ Berger, D. (Gen), *Commandant's Planning Guidance: 38th Commandant of the Marine Corps*.
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¹⁷ *Id*
¹⁸ *Warfighting*, 72–72. Washington, D.C.: U.S. Marine Corps, 1997.
¹⁹ *Id* at 38
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²¹ *Id* at 34
²² *Id* at 95
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²⁴ *Id* at 85
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²⁶ *Intelligence*, 3–3. Washington, D.C.: U.S. Marine Corps, 1997.
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³⁰ Perla, P. P. (1990). *The art of wargaming: A guide for professionals and hobbyists*. Annapolis, MD: Naval Institute Press. (250)
³¹ *Id*
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³³ *Id* at 252
³⁴ *Id*
³⁵ *Id*
³⁶ *Id* at 252 - 253
³⁷ *Id* at 253
³⁸ *Id*
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⁴¹ *Id*

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https://www.academia.edu/21879101/Foundations_of_Game_Based_Learning. (268)
- ⁴³ *Id* at 262
- ⁴⁴ *Id* at 264
- ⁴⁵ Smith, Shamus P., Karen Blackmore, and Keith Nesbitt. "A Meta-Analysis of Data Collection in Serious Games Research." *Serious Games Analytics*, 2015, 31–55.
https://doi.org/10.1007/978-3-319-05834-4_2.
- ⁴⁶ *Id*
- ⁴⁷ Wu, W-H., H-C. Hsiao, P-L. Wu, C-H. Lin, and S-H. Huang. "Investigating the Learning-Theory Foundations of Game-Based Learning: a Meta-Analysis." *Journal of Computer Assisted Learning* 28, no. 3 (2011): 265–79. <https://doi.org/10.1111/j.1365-2729.2011.00437.x>.
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- ⁴⁹ Roger Mason. "Commercial Wargames and Experiential Learning " LEC Management." LEC Management, February 12, 2021. <https://www.lecmgt.com/blog/commercial-wargames-and-experiential-learning/>.
- ⁵⁰ *Id*.
- ⁵¹ *Id*.
- ⁵² *Id*.
- ⁵³ *Id*.
- ⁵⁴ *Learning*, 1-15. Washington, D.C.: U.S. Marine Corps, 2020
- ⁵⁵ *Id* at 1-15
- ⁵⁶ *Id* at 3-17
- ⁵⁷ *Warfighting*, 61–61. Washington, D.C.: U.S. Marine Corps, 1997.
- ⁵⁸ Berger, D. (Gen), *Commandant's Planning Guidance: 38th Commandant of the Marine Corps*.