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Decrypting enigma: utilizing "The Imitation Game" to analyze the impact of abstraction order on team development comprehension

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Abstract

Purpose – Leadership is considered a complex topic in education, but the implementation of film as a vicarious experience can facilitate a connection between abstract concepts and real-world scenarios. This study sought to investigate leadership learners' intent to model team leadership behaviors portrayed in the film, *The Imitation Game*.
Design/methodology/approach – The qualitative multiple case study design examined the similarities and differences between two sections of a team leadership course using film; one that applied an inductive approach and the other applying a deductive approach.
Findings – Results indicated that learners in the inductive section focused on modeling leadership behaviors from characters in the film, while deductive learners tended to focus on the behaviors exhibited from specific scenes in the film. No significant differences were found between sections regarding learners' satisfaction learning with film or their perceptions of themselves or their peers modeling behaviors from the film.
Originality/value – Limited empirical research has investigated the efficacy of using visual media in leadership education. Our research suggests that utilizing film in a team leadership classroom provides a meaningful vicarious experience, regardless of abstraction order, to support experiential learning. Moreover, our learners indicated satisfaction with learning through visual media. Therefore, we recommend educators consider incorporating visual media as a teaching tool, when appropriate. Future research should investigate the impact of different movie variables on learner outcomes, such as the impact of genre on knowledge retention and application.

Keywords Team leadership, Film, Abstraction, Modeling, Experiential learning
Paper type Research paper

Introduction

Employers expect job applicants to possess leadership skills and teamwork competency (NACE, 2022; Wilson, Niewoehner-Green, & Rodriguez, 2019). Thus, leadership educators play an imperative role in preparing learners with skills necessary for workplace success. One way leadership educators prepare learners is by incorporating visual media, such as movies and television (Hilby, Stephens, & Stripling, 2016; Kuri & Kaufman, 2020). It has been suggested that film provides a vicarious learning experience that can help contextualize and illustrate complex concepts (Callahan, Whitener, & Sandlin, 2007; Williams & McClure, 2010). Learners can retain and apply leadership concepts they learn through traditional teaching approaches (Williams, Townsend, & Linder, 2005), and incorporating a vicarious experience may further enhance learners' ability to model effective behaviors they see demonstrated in film. In this study, modeling, as discussed by Schunk (2020), is understood as an aspect of vicarious learning where learners observe behaviors of others to gain knowledge and potentially modify their own behaviors.

Educators cannot assume learners will make critical educational connections between film and leadership theories and concepts (Masters, 2005). Although scholars have recommended

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incorporating films or visual media in leadership education (Buchanan & Hällgren, 2018; Cenkci, 2020; Hilby *et al.*, 2016), little empirical evidence exists regarding the efficacy of these recommendations beyond connecting scenes to potential real-life scenarios (Wimmer, Meyers, Porter, & Shaw, 2012). This study sought to expand the knowledge base by investigating differences in applying inductive and deductive approaches to learning with film. This qualitative study explored the extent to which learners can identify and model leadership behaviors from film. Specifically, we were interested in what teamwork skills students learned vicariously and were able to emulate in a team project-based learning experience. Our research questions included:

(1) In what ways do learners intend to model leadership behaviors they observe in a team-oriented film?

(2) What similarities and differences exist between learners applying an inductive approach and those applying a deductive approach?

Literature review

Teamwork as a needed competency

Employers nationwide require various competencies that can support success in the workplace (Cole & Thompson, 2002; Graham, 2001; Wilson *et al.*, 2019). Although many students leave college thinking that their technical skills are enough to be successful, demand has shifted toward job candidates with strong interpersonal skills (Wilson *et al.*, 2019). Since technical skills can be learned on the job, developing interpersonal competencies in college is necessary to succeed post-graduation (Berle, 2007; Robinson, Garton, & Vaughn, 2007; Wilson *et al.*, 2019). The National Association of Colleges and Employers (NACE) 2023 job outlook found that 61% of employers are looking for candidates who can work in a team, which is one of the most important competencies (NACE, 2022). As each generation enters college classrooms to prepare for the workforce, we must strive to prepare them to meet the needs and expectations of employers.

Intersection of generation Z learners, popular culture and leadership pedagogy

Generation Z, born between 1997 and 2012 (Dimock, 2021), represented most learners on college campuses in 2024 (Seemiller & Grace, 2017). Growing up immersed in technology with globalized information at their fingertips has directly impacted their learning. Previous generations succeeded with traditional "chalk and talk" teaching styles; however, Generation Z needs innovative, engaging pedagogical approaches (Burke, Robak, & Stumph, 2018). Burke *et al.* (2018) also posited that since many university educators have become well-adjusted to traditional lectures, implementing technology into the classroom has posed a challenge.

Leadership pedagogy has changed in recent years with Generation Z becoming the primary students on college campuses (Burke *et al.*, 2018; Seemiller & Grace, 2017). Guthrie and Jenkins (2018) assert it is vital that current leadership education include diverse and frequent experiences that offer new outlooks on real-world problems. Since Generation Z has been described as visual learners (Shorey, Chan, Rajendram, & Ang, 2021), utilizing film and videos in leadership education may provide a bridge for this generation to connect concepts with potential applications (Champoux, 2005). Moreover, Champoux (2005) explained that learners who are not as familiar with the topics in their courses may benefit the most from incorporating film in education because of the direct link to real-world experiences.

Using film in education has occurred since the 1970s (Culkin, 1970; Maynard, 1969, 1971, 1977; Wegner, 1977). While early researchers did not advocate for film in leadership education specifically, subsequent researchers have made their case for using film in this discipline (Buchanan & Hällgren, 2018; Harrington & Griffin, 1990; Harrison & Akinc, 2000). An early

researcher on film theory, Kracauer (1973), discussed how film can allow the audience to view and understand things only film can portray. However, Jenkins (2012, 2013) found less than half of leadership educators incorporate media clips into a small portion (0–33%) of their class sessions, just over a quarter use them in a moderate portion (34–65%) and less than a quarter use them in a significant portion (66–100%). Given Generation Z's general preference for visual learning, and the less-than-pervasive use of visual media in leadership education, our research poses important questions regarding the use of movies to teach leadership, specifically teamwork.

Albert Bandura introduced the notion of "vicarious learning" in the 1960s, which emphasizes that learners can understand topics by seeing what others are doing (Bandura, Ross, & Ross, 1963; Mayes, 2015). Films provide one approach to vicarious learning in leadership education because they are good vessels for showing abstract concepts (Williams & McClure, 2010). Sweet and Bruce (2016) utilized the television show Glee to illustrate the quadrants of Blake and Mouton's (1964) Managerial Grid and Kuri and Kaufman (2020) examined the leadership styles and theories that leaders embodied in a war movie. Buchanan and Hilby *et al.* (2016) provided recommendations for how and when to use the films Miracle, Rocky IV and Lincoln, to teach concepts related to leading teams, leading change, and transformational leadership. Wimmer *et al.* (2012), as cited in Guthrie and Jenkins (2018), used the television show *The Office* to show how students could connect leadership components from the show to experiences they may have using reflective journals. More recent literature in leadership education (Gold & Greenhaw, 2024b) focused on using the pure fiction movie, *Harry Potter and the Sorcerer's Stone*, to describe how this film can be used to teach team leadership. In addition to what topics or concepts can be taught through film, it is important to consider the process used to teach with film.

Inductive and deductive abstraction

This study investigated two processes of learning, inductive and deductive. Traditionally understood as the two types of reasoning in advanced cognition (Evans & Stanovich, 2013; Melnikoff & Bargh, 2018), inductive reasoning focuses on the process of determining if the information received is plausible based on past experiences, and deductive reasoning is the process of gathering information first and then deciding if the information makes sense based on the outcome (Stephens, Dunn, Hayes, & Kalish, 2020). In the academic sphere, the deductive approach to learning is seen when instructors teach lessons and concepts, and then students use specific situations to better understand what they are learning (Whetten & Clark, 1996). According to Lee and Lo (2014), the inductive approach, in academia, focuses more on learners determining the connections that exist based on a given situation first and then learning the theories or concepts later.

Lee and Lo (2014) researched inductive and deductive approaches to teaching management content through film. Their experimental-design study utilized Whetten and Clark's (1996) integrated teaching model to follow the process of *thinking*, *doing*, *learning* and *applying* the learning. Additionally, Lee and Lo (2014) aimed to test whether it was empirically true that both methods are effective for student learning, as suggested by Lott (1983). Overall, Lee and Lo (2014) found learners in an inductive section had a higher retention of knowledge (82%) compared to the deductive section (78%). Alternatively, the deductive section of their study reported more satisfaction with learning and higher perceived learning. While Lee and Lo's (2014) study examined management theories, no studies of this kind were identified investigating leadership theories.

In- and on-action reflection

Reflection is an important way to understand whether learners grasp the concepts they are learning, especially in experiential learning (Baker, Robinson, & Kolb, 2012). This includes learning through vicarious experiences such as movies. Researchers have reiterated providing

learners with an experience does not mean it is always a learning experience (Dewey, 1938; Kolb, 1984; Knobloch, 2003). This study and previous research utilized two types of reflection: reflection-in-action and reflection-on-action (Baker, Brown, Blackburn, & Robinson, 2014; Coleman, Bunch, Thoron, & Roberts, 2020; DiBenedetto, Blythe, & Myers, 2017). Reflection-in-action is when learners take experiences they are currently in and evaluate them, while reflection-on-action guides learners to reflect on experiences after they have already happened (Schön, 1983). Schön (1983) associated reflection-in-action with knowledge-in-action because reflecting as the experience occurs, like pausing a movie to discuss what was seen and how it relates to what was previously learned, can help to translate that experience into knowledge. Conversely, reflection-on-action relies on learners to use their past experiences, such as prior participation on a team, to derive knowledge and learning (Schön, 1983). Research exploring which form of reflection is most effective has been inconclusive (Baker *et al.*, 2014; DiBenedetto *et al.*, 2017), therefore both forms of reflection were used in this study.

Theoretical/conceptual framework

The theoretical framework for this study is based on constructivism, social cognitive theory and experiential learning theory. In a broad view, constructivism, specifically dialectical constructivism, emphasizes our understanding of the world is shaped by those around us (Moshman, 1982; Schunk, 2020). Social cognitive theory (SCT), first known as social learning theory (SLT), was developed by Bandura (1986), and focuses on the connection between personal (beliefs, attitudes, cognitive abilities), environmental (resources, physical setting) and behavioral (choices, physical actions, verbal statements) determinants and how they interact to influence each other through triadic reciprocal causation. SCT illustrates how individuals are not separate from the environment but also not fully reliant on its influences (LaRose, 2009). Personal experiences can be actual experiences (enactive learning) and/or observational experiences (vicarious learning) (LaRose, 2009). This research aims to understand whether the timing of an environmental determinant, a film at the beginning or end of a team leadership course, impacts the personal and behavioral determinants of individual learners and their teams in the course. Embedded in SCT is the concept of cognitive schema. Schemas are cognitive internal structures that organize information on a specific concept (Fiske & Taylor, 1991). These schemas continuously change in response to different interactions individuals have with various factors (Nabi & Clark, 2008). In this study, we used a single film as a shared experience at the beginning of the inductive section of the course to shape learners' cognitive schemas to have the same information about teams and successful teamwork.

Finally, experiential learning theory (ELT), proposed by Kolb (1984), is a widely recognized framework in education. ELT is built upon the idea that individuals learn best when they actively participate in experiences and reflect on those experiences to construct their own understanding of the world (Kolb, 1984; Roberts, 2006). Coleman's (2022) holistic model of experiential learning (Figure 1) serves as an overarching framework for incorporating the key components from Roberts's (2006) model, and the cyclical facet of experiential learning. Additionally, the holistic model builds off of Dale's (1946) Cone of Experience that illustrates the progression of experiences from symbolic verbal symbols, to observational experiences, to purposeful concrete experiences. The incorporation of constructivism and SCT into this model are particularly notable, as they play multifaceted roles in enhancing its comprehensiveness. Specifically, the aspect of learner autonomy and the influence by educators and other learners (Coleman, 2022; Coleman, Bunch, Roberts, Israel, & Wysocki, 2024) emerges as a crucial point for constructivism and SCT. Learner autonomy, an essential constructivist concept, allows students to take charge of their learning experiences, aligning with the idea that they actively construct knowledge (Doolittle & Camp, 1999). Simultaneously, Bandura (1986) discussed that SCT recognizes learners are influenced by their interactions with educators and peers, emphasizing the social dimension.

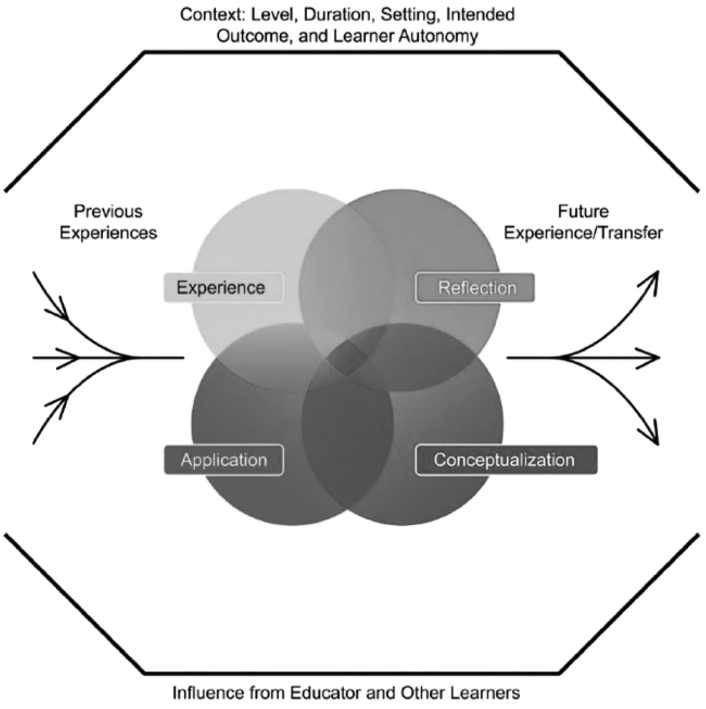

Figure 1. Holistic model of experiential learning. Source: Figure from Coleman (2022)

Methods

This study employed a qualitative multiple-case study design with cross-case comparison. Case studies are an empirical method researchers use to develop a comprehensive analysis of a case or phenomenon (Yin, 2018). Case studies are confined by time and place, and data is collected from a variety of sources and occurs over time (Stake, 1995; Yin, 2018). The multiple-case study design (Herriott & Firestone, 1983; Yin, 2018) is considered more robust and the information gained from the data is seen as more compelling research.

The cases studied in this research were two sections of a course on team leadership, taught during the fall semester of 2023. Film was utilized in both sections, with an inductive teaching approach utilized in one section and a deductive approach employed in the other section. Both the inductive and deductive sections watched *The Imitation Game* (Tyldum, 2014). The inductive section watched the film in week three of the 16-week semester. Alternatively, the deductive section watched the film in week ten after most of the course content had been delivered. Both sections submitted their written assignments during week 12 of the semester. Additionally, clips from the movie were replayed during various lessons for the inductive section. For example, a clip from the beginning of the movie where Alan Turing was brought on to the team by Commander Denniston (approximately 9:00 to 12:01) was shown to discuss team formation and how this technique was similar to or different from the ones being discussed in the lesson. Another clip of Alan Turing's team coming to his defense when the government attempted to turn off the decryption machine and fire him (approximately 54:38 to 57:06) was shown to reflect on aspects from the team goals and stages of development lesson. Beyond assisting with recall, the clips were utilized as a method for the inductive learners to connect the content they were learning to the shared experience of the movie team.

The population for this study was all students enrolled in an agricultural communication and leadership course at a large R1 institution in the southeast, during the Fall 2023 semester. Two sections of the course were offered, with 39 students enrolled in one section and 18 students enrolled in the other section. Per IRB-approved protocol, all students were provided informed consent forms and asked to indicate their consent. Fifty-six of 57 students consented to participate. All participants in this study presented as traditionally-aged college students, approximately 18–22 years old. The deductive section had 30 seniors, eight juniors and one sophomore, while the inductive section had 12 seniors, two juniors, one sophomore and two unclassified/exchange students. The course used in this study focuses on leadership and communication in teams and includes topics such as characteristics of effective teams, team development processes, decision-making and conflict management. Additionally, the instructor assigns learners to teams for the whole semester to complete a project.

Four data points were collected to gain a deeper understanding of the extent to which learners could accurately identify team leadership behaviors seen in the film and whether learners intended to model behaviors viewed in the film. The data sources were two team progress reports, a film analysis paper with a learner satisfaction survey and a single question on the final exam asking learners to "describe 1–3 specific team leadership behaviors from the film, *The Imitation Game*, and how you intend to model them in the future".

The team progress reports were completed by the teams of learners at two points in the semester. These reports were completed and submitted by the entire team, but also required each member of the team to include an individual statement indicating where they may have disagreed with the consensus of their team. The first report was completed in week nine of the semester after the teams were organized, and various stages of small group development (Tuckman & Jensen, 1977) were evident. In the inductive section, teams were asked to explain and analyze their team's progress, provide specific examples of behaviors and/or interactions of their teams' development, and compare their team to the one in the film. In contrast, the deductive section was asked to explain and analyze their teams' development and identify specific stage(s) of development their team had exhibited with illustrative examples. The second team progress report was completed in week 13. In this report, both sections received identical instructions to analyze their team by identifying the stage(s) of development their team had experienced up to that point in the semester. Additionally, all teams were expected to include specific examples from their team to support their analysis and compare their team to the team in the film, since both sections had watched the film at that point. These progress reports were intentionally structured to include both team consensus and individual perspectives to better understand where individual perceptions and experiences might have diverged from the team perspective.

In the film analysis paper, learners were expected to analyze the development of the team in the film and include a comparison to the development of their own team during the course, based on Tuckman and Jensen's (1977) stages of small group development model. Learners were asked to explain the model and provide a description of each stage with specific examples from the film. Learners were also required to compare their team's development to the team in the film and analyze the effectiveness of both teams. Additionally, learners responded to a survey regarding their perceptions. The survey included seven items measuring satisfaction with the assignment, adapted from Herron, Powers, Mullen, and Burkhart (2019), and two additional items assessed whether they or their peers had modeled behaviors they saw in the film (Table 1). Independent samples *t*-tests were used to identify any differences between sections.

Identifying information was removed from data prior to analysis. Participants were assigned a number (1–56) and each team was assigned a Greek alphabet letter (Table 2). Thus, we were able to analyze data at both the individual and team levels.

Two main types of coding were utilized for the analysis: process coding and metaphor coding. The qualitative coding software, NVivo, was used to organize all data. Before process coding or metaphor coding was conducted, the researchers used *a priori* coding, creating a list

Table 1. Student survey items

Item number	Statement
1	Analyzing a team in film to learn about stages of group development was helpful and effective
2	The team in film analysis provided a unique activity to promote my learning of the stages of group development
3	I enjoyed learning the stages of group development through analyzing a team in film
4	Analyzing a team in film was motivating and helped me learn
5	Analyzing a team in film is suitable to the way I learn
6	I would have preferred freedom to choose the film to analyze*
7	I would have preferred a different assignment to assess my understanding of the stages of group development*
8	I have modeled teamwork and/or team leadership behaviors I saw in the film in my own team this semester
9	My teammates modeled teamwork and/or team leadership behaviors I saw in the film

Note(s): *Items were reverse-coded for analysis
Source(s): Items in the table were adapted from Herron *et al.* (2019)

Table 2. Participant and team designation example

Name	Numerical designation	Team letter
Kira	Student 1	Alpha
Josh	Student 2	Beta
Lacey	Student 3	Alpha
. . .		
Ryan	Student 56	Gamma

Source(s): Table by authors

of codes that we anticipated seeing in the data (Saldaña, 2021). Since this research focused on the stages of small group development (Tuckman & Jensen, 1977), the initial predetermined codes were the stages of small group development: forming, storming, norming, performing and adjourning. During the coding process, two new codes were added, film connection and modeling. Data was analyzed separately by case using the pre-determined codes and then a cross-case analysis was conducted to compare findings from the two cases.

Trustworthiness for this study was established through triangulation, using multiple data points. The lead researcher, a graduate student with no instructional responsibilities for the course, observed the final course project presentations to corroborate and verify data from the team progress reports. Additionally, the lead researcher kept a reflexive journal and participated in weekly meetings with the course instructor and teaching assistants throughout the semester which served as peer debriefings and member checking during data collection and analysis.

Findings

Fifty-six learners consented to participate in the research. Seventeen participants experienced an inductive approach to teaching with film, while 39 participants experienced a deductive approach. Findings revealed learners in both inductive and deductive approaches exhibited the intent to model behaviors in distinct ways and learners were overall satisfied with using film to supplement their learning.

Research question 1

Learners in both the inductive and deductive sections described specific leadership behaviors portrayed by characters in the film and explained how they might model these behaviors in the future.

Inductive section

Learners described behaviors exhibited by characters in the film they could model. For example, Student 49 shared:

> I feel that I most resonated with Peter's character from the film, and found that the leadership behavior he employed was that of a mediator, and one that promotes harmony within the team. There were many instances (particularly towards the beginning of the film) where we saw Peter intervene when Alan and Hugh would start arguing. He always attempted to alleviate the tension and bring the two characters together through communication, and I feel that this is a leadership behavior that resonates most with who I am as a person, and therefore one I would like to use in the future.

Alternatively, student 43 presented the concept of anti-modeling:

> As a leader, I think the delegation of roles and responsibilities and expressing a clear goal that those are to work towards, as the commander did, is essential in evaluation and team progression. Denniston was clear in conveying what the ultimate objective was, however, what I would do differently is allow the team decided how those roles/responsibilities were to be divided.

While many learners concentrated on the behaviors of specific characters in the film they would model, some used a more general reference to scenes in the film. Student 51, for example, described the impact adding a new team member had on the team's development.

> From my point of view, a leader must encourage and facilitate communication as well as a safe environment so that the team members feel comfortable and the team can progress. This is hard to find in the film as neither Hugh nor Alan (the first two leaders) encourage them. In the film we can observe that these two aspects are enhanced after the incorporation of Joan. In the future, I intend to evaluate the position and feelings of each member of the team to make sure that I create a psychologically safe environment.

A few learners described behaviors they saw in the film, but did not explain how they intended to model them, such as Student 52:

> I loved watching how the team stood up for each other, when the commander was about to fire Alan, and his teammates were willing to get fired too. The message I got from that scene is that if you touch one of the team members, you touch the whole team, and the work will not be as effective anymore. This is the case because the team was starting to get along and were working towards a common goal. Team cohesion is crucial for the well-functioning of the team.

Deductive section

Learners focused their intent to model on specific scenes from the film, as opposed to behaviors of specific characters. Student 5, for example, described decision making behaviors:

> In addition, Alan and the team used majority rules as a decision-making technique in order to decide how to proceed after they had cracked Enigma. I hope to imitate this behavior in my future teams by emphasizing the importance of establishing and utilizing team decision-making techniques so that the team avoids groupthink and is able to facilitate the process in a constructive manner.

Similarly, Student 28 discussed the conflict management strategies:

> Originally, there was competing approaches because everyone was doing their own thing and then the other team realized the value of Alan's machine and then compromised and self-sacrificed their own idea to follow Turing's. After this, they compromised and collaborated on the machine by using everyones' talents to build the machine that successfully accomplished the goal of defeating enigma. I

> intend to use this a lot in the future when it comes to my future involvements in leadership because having the right knowledge that showcases the correct direction in when dealing with conflict, outlining team roles and responsibilities within team contracts, and the value of interpersonal relationships and group cohesion.

While these learners more frequently described scenes with leadership behaviors they would model, some learners identified behaviors exhibited by specific characters. Student 7 described the empathetic capabilities Joan possessed:

> Joan was great at fostering teamwork and create a good environment in order to get the group out of the storming stage. Using my empathy like she did and reaching out to other team members I can also help move us out of the storming stage.

While many learners were able to describe behaviors from the film, whether from a scene or specific character, some learners did not address their intent to model behaviors. Student 12 identified leadership behaviors exhibited, or not, by Alan Turing, but did not describe how they might emulate these behaviors.

> In the film, *The Imitation Game*, Alan Turing led his team by example. This was his leadership behavior. Quite frankly, Alan had no real leadership qualities, or really any interpersonal skills. So this would obviously make it hard to lead a team of people toward a goal. However, once Alan's team of cryptanalysts identified his intellectual ability, they bought into it. They came together collectively to crack the Enigma code, and followed Alan's lead because they trusted him. He was that capable.

Research question 2

Findings in the cross-case comparison indicated few differences in learners' ability to identify the stages of small group development (Tuckman & Jensen, 1977) and no significant difference in learners' satisfaction regarding using a film in a team leadership course. A difference between sections was noted in the intent to model leadership behaviors seen in the movie.

Identification of the stages of development

No differences in learners' identification of the stages of development were identified based on abstraction order. Learners in both sections were, overall, able to accurately identify the stages of forming, storming, norming, performing and adjourning. In both sections, teams and individuals used similar examples from the film to illustrate of the stages of development. Some learners in both sections lacked clarity on where one stage ended and the next began; however, this was a small number of learners and occurred in both sections. Teams in both sections made meaningful comparisons between themselves and the team in the film.

Modeling comparison

Regarding learners' modeling behaviors, a key difference between the form of abstraction was learners in the inductive section tended to focus on behaviors of specific characters while the deductive learners tended to focus more broadly on behaviors exemplified in scenes from the film, rather than specific characters. This was seen throughout the team-level submissions as well as the individual submissions. Student 49, an inductive learner, discussed their intent to model specific behaviors from Alan Turing.

> I would like to model is Alan's pure commitment and passion to his project. Although Alan might not always have employed this behavior in the most productive way, I feel that showing your team members that you have a strong idea that you are passionate about, and relentlessly working towards its success is crucial for a team leader.

In comparison, Student 5, a deductive learner, described a scene depicting team decision-making.

> In addition, Alan and the team used majority rules as a decision-making technique in order to decide how to proceed after they had cracked Enigma. I hope to imitate this behavior in my future teams by emphasizing the importance of establishing and utilizing team decision-making techniques so that the team avoids groupthink and is able to facilitate the process in a constructive manner.

It should be noted not all participants adhered to the general approach of their particular section, such that some participants in the deductive did identify behaviors from characters in the film, while some learners in the inductive section identified scenes.

Satisfaction survey

The survey component of the film analysis paper included seven satisfaction items adapted from Herron *et al.* (2019), and two items on perceived modeling of behaviors. Three learners in the deductive section and three inductive learners did not complete the survey. Tables 3 and 4 report the results of the independent samples *t*-tests for student satisfaction and perceived behavior modeling, respectively. No statistically significant differences ($p = 0.75$ and $p = 0.97$) were found between the two sections.

Discussion/conclusions

This study aimed to contribute empirical research on learning leadership with film. We sought to understand learners' intent to model behaviors they learned vicariously through a movie and explore differences between inductive and deductive approaches to learning with film. Overall, learners were able to identify behaviors from the film they would model. Moreover, some learners made comparisons to behaviors they had modeled in their project teams during the course and behaviors their teammates had modeled. Furthermore, some learners distinguished between behaviors from the film they would model and those they would not. According to SCT, personal, behavioral and environmental factors interact and influence one another. Our study suggests learners were impacted by the vicarious experience of the movie and their personal experience with their teammates. Moreover, as we consider the cycle of experiential learning, our learners were guided through intentional reflection on their experiences and were able to extend their learning to abstract conceptualization (Kolb, 1984), considering how they might apply their learning in future scenarios. This finding provides meaningful, albeit not surprising, support for experiential learning, but more importantly for the potential value of well-chosen vicarious learning experiences.

The cross-case comparison between the two sections of the course revealed no notable differences in learners' ability to identify the stages of group development of a team in a film. Perhaps this is an indication that either approach can be successful if planned and executed effectively (Lee & Lo, 2014). Additionally, this finding is reflective of Wimmer *et al.*'s conclusion (2012) that learners can identify leadership themes from visual media. However, we noted minor differences in how deductive and inductive learners tended to identify teamwork and leadership behaviors in the movie. Inductive learners tended to identify behaviors and behavioral patterns of specific characters, while deductive learners tended to identify multiple characters' interactions through various scenes when associating behaviors

Table 3. Satisfaction of participants

Abstraction order	*n*	Mean[1]	*SD*	*t*	*p*
Inductive	14	4.35	0.36	−1.58	0.75
Deductive	36	4.52	0.33		

Note(s): [1]Scale: 1 = Strongly disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree
Source(s): Table by authors

Table 4. Perceived behavior modeling of self and teammates

Abstraction order	*n*	Mean[1]	*SD*	*t*	*p*
Inductive	14	3.14	1.08	−1.87	0.97
Deductive	36	3.75	1.01		

Note(s): [1]Scale: 1 = Strongly disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree
Source(s): Table by authors

they might model. Though slight, this difference is notable and may be attributed to the inductive learners' prolonged and repetitive exposure to the film and the characters. Following recommendations from previous literature when applying an inductive approach using film (Gold & Greenhaw, 2024a), clips from the movie were incorporated throughout the course after the initial viewing. Perhaps the inductive learners were better able to dissociate from the drama of the plot over time and more clearly extract individual teamwork and leadership behaviors transferable to their own real-life context. It may be plausible that deductive learners had less opportunity to do so, given their single exposure to the film and its characters, and instead relied on their recall of memorable scenes in the film. SCT suggests reinforcement from one's social environment is an important part of learning. Given the inductive section's repeated exposure to the movie scenes throughout the semester, perhaps it is unsurprising those learners tended to focus more specifically on individual characters' behaviors and the associated results of those behaviors.

Learners in both sections of the course indicated satisfaction with the vicarious approach of learning through film which aligns with the notion Generation Z, the generation of learners in this study and current majority in higher education, are visual learners (Shorey *et al.*, 2021; Seemiller & Grace, 2017), and desire engaging teaching methods (Burke *et al.* (2018). This highlights the wide variety of possible learning experiences, some of which require few resources. Given the breadth of experiences depicted in films, this method provides an opportunity for educators in diverse settings to identify films applicable to their specific context. For example, if learners are racially and ethnically diverse, carefully choosing a film that reflects similar diversity might help learners better "see" themselves in the experience. This could be particularly useful when applying an inductive approach where learners could identify more readily with behaviors of specific characters.

Finally, our data was inconclusive regarding whether learners perceived themselves or their teammates to have modeled teamwork and/or team leadership behaviors they saw in the film. This is interesting, given the written assignment asked learners to draw comparisons between the team in the movie and their team, albeit from a development perspective. Even more intriguing was, on the final exam, nearly all learners identified behaviors from the film they would model in the future. Perhaps this speaks to the limitations of providing real-life teamwork experiences within the confines of a college course. Since the class is designed as an experiential learning course where students learn teamwork and leadership through the application of working in teams on a semester-long project, this may suggest a disconnect between learners' ability or opportunity to model behaviors in a class project versus their perceived ability to model behaviors in a different context. However, learners did demonstrate an ability to transfer their learning to a new and different context, which is crucial in terms of experiential learning (Kolb, 1984).

Recommendations

Recommendations for both practice and research have been derived from this study. First, when applying an inductive approach to teaching with film, we reiterate the recommendation from Gold and Greenhaw (2024a) to incorporate clips from the movie throughout the course as appropriate,

after the initial showing. In this way, the movie continued to be a source of "shared experience" from which to scaffold learning throughout the semester, as well as reinforcement according to SCT. Importantly, learners did not indicate difficulty writing the analysis paper weeks after the initial showing of the movie, a concern Gold and Greenhaw (2024a) had previously identified.

Additionally, we recommend incorporating reflection-in-action and not just reflection-on-action (Schön, 1983) by pausing the film at specific and predetermined points. Intentional discussion as guided reflection may help learners consider what they are learning from the film and how they might transfer learning to their own context and experience. This could also assist learners to dissociate from the inherent drama of movie plots and consider the actions and behaviors of the characters more objectively.

An underlying assumption of vicarious learning is learners will choose to emulate, or not, behaviors they see based on the consequences of the associated outcomes from the behaviors that are viewed (Bandura *et al.*, 1963; Mayes, 2015). Regardless of the order of abstraction used, explaining the concept of vicarious learning may help learners better situate a film as a learning experience rather than an entertainment experience. Moreover, providing examples of modeling behaviors may help learners more accurately identify when modeling, and thus application of learning, is occurring, something our learners seemed to have less clarity on. It may be prudent to utilize multiple films, or parts of multiple films, if time is available, to give learners various perspectives and examples of behavior to model. Some learners may not connect to a specific film or certain characters so, providing additional options may further promote vicarious learning for a diverse group of learners. Regardless of the film or media chosen, choices should be intentional with respect to the content and context of the desired learning outcomes as well as the learners.

We recommend practitioners integrate vicarious learning experience of watching a team in film with experiential learning of a team-based project, when possible. We found overall, learners made connections between the development of the team in the film and their own team's development throughout their team-based project. As educators, we may be able to strengthen our students' learning by providing immediate opportunities to apply the learning through experiential team-based projects.

Given the dearth of empirical evidence regarding the use of film to teach leadership, we encourage the consideration of experimental or quasi-experimental design to better understand and compare the efficacy of inductive and deductive approaches. One limitation of this study is sample size, and difference in sample sizes. While we did conduct a statistical comparison using independent *t*-tests, no significance was found. Increasing the sample size and creating matched pairs would provide an opportunity for more direct comparison and further quantitative tests. In addition to a larger sample size, having a more diverse sample in terms of ages, races, non-students, etc., could broaden the applicability of the findings in this study.

Finally, additional research could also investigate the impact of different movie variables on learner outcomes. For example, does genre impact learners' ability to accurately identify leadership and teamwork concepts, their ability to transfer learning or their intent to model behaviors from the film? Although some literature has recommended against the use of animated films (Champoux, 2001a, b, c; Rockler, 2002), it would be prudent to consider the learning style preferences of the current generation of students.

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