From Fear to Flow in an Undergraduate Environmental and Sustainability Course

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Abstract

In a time when natural disasters and health crisis afflict the world, understanding the relationship between flow and fear provides an opportunity to better shape learner experiences in difficult times. The use of film as a pedagogical approach provides a unique perspective to better understand flow and fear in learners. Previous research suggested that incorporation of film as an instructional approach has the potential to create flow experiences for students as a way to be transported into the narrative of learning while elicitation of fear may have the potential to optimize flow experiences in learning. Flow in a learning setting occurs when a student engaged in an activity has correspondingly high levels of both perceived skill and challenge in that same activity. The purpose of this research was to determine if there were relationships between flow and fear based on movie content in an undergraduate film course. Highest levels of flow occurred when students created their own films. Increased frequencies of fear occurred in climate and energy themes and domestic themed movies. The authors recommend further research to support instructional practices and opportunities that increase flow or "being in the zone" while decreasing fear in undergraduate learning experiences with film.

Keywords: flow, fear, film, environmental, sustainability

Classroom instruction and understanding how learning occurs is a constantly evolving process. Use of film is one instructional approach that can elicit a wide range of emotional responses from students including "being in the zone" or being in flow (Everett et al., 2020). Flow is defined by Csikszentmihalyi (1997) as effortless action an individual feels when "being in the zone." Embedding film into course curriculum is designed to heighten students' sensitivity toward course themes while stimulating discussion about content (Galbraith & Rodriguez, 2018). According to Zupan and Eskritt (2020), eliciting fear-related experiences during a film's message may be another approach to achieve flow as part of a students' "being in the zone." Maslow (1963) indicates that cognitive needs can be satisfied through peak experience during moments of fear, a precursor to flow and flow theory (Csikszentmihalyi, 1975).

The National Research Council (2009) indicated that unique curricular approaches such as film supports undergraduate learning goals. This unique instructional approach has the potential to create flow experiences where students are more likely to be "in the zone" (Everett et al., 2021). Furthermore, the use of film has the potential to create fear through the eliciting of reactional fears (Jang et al., 2020) based on current worldwide challenges associated with climate change, food insecurity, and creation of sustainable energy systems (Everett et al., 2021). The socio-psychological concepts of flow (Csikszentmihalyi, 1975) and theory of fear (Leventhal, 1970) together has the potential to leverage film as an instructional pedagogy to better identify the motivation of learners and times during which flow as well as fear occur in different movie genres. These same experiences also have the potential to develop problem-solving skills in students that will in turn create learners and leaders who are successful in their future careers (National Research Council, 2009).

The purpose of this study was to utilize flow theory and fear in communication theory to determine relationships between students who have flow experiences and feel a level of fear based on films explored during an undergraduate course. The following research questions were used to guide this study.

1. What movies elicited flow and fear in students?
2. What movie themes elicited flow and fear in students?
3. What movie locales elicited flow and fear in students?
4. What relationships exist between student flow and fear in a course Exploring Environmental and Sustainability Issues and Policy Using Film?

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Flow Theory

Flow theory in the context of learning is defined as individuals being in flow or having optimal learning experiences (e.g., "being in the zone") when: (a) a balance exists between perceived skills and perceived task demands; (b) there are clear proximal goals; and (c) there is immediate feedback associated with the task (Nakamura & Csikszentmihalyi, 2009). Flow theory's methodological inception occurred when developed the Experience Sampling Method (ESM) to measure participant flow experiences in various activities (Csikszentmihalyi, 1975). Recent research has indicated that the use of film and themes of film as a central focus of learning in an undergraduate setting provided students with flow or optimal experiences in the context of learning (Everett et al., 2020, Everett et al., 2021).

Recent flow research has been the subject of much discussion in the context of undergraduate teaching and learning (Everett & Raven, 2015; Everett & Raven, 2016, Everett & Raven, 2018; Everett et al., 2020; Everett et al., 2021). In one study, students were more likely to have flow experiences while watching specific genres of film in an undergraduate course (Everett et al., 2020). These students were likely to be in flow (or have optimal experiences) while being transported into the narrative of various films throughout the course (Everett et al., 2020). Another study during the initial COVID-19 infections in the US, indicated that when comparing in-person and online experiences of students, in-person class sessions were more likely to be having flow experiences while viewing specific films as opposed to online learning and film experiences outside of the traditional classroom setting (Everett et al., 2021). Levey (2015) suggested that film and the use of movie clips in college instructional settings were more engaging, thereby increased the potential for flow occurrences by students. Levey's research was supported by Everett et al. (2021) and complements the use of film to increase flow and the overall learning experience sought by students.

In early flow research, survey items included motivation (Csikszentmihalyi & Csikszentmihalyi, 1988) and engagement (Shernoff et al., 2003) were incorporated into ESM instrumentation (Hektner et al., 2007). However, there exists a lack of research and literature related to the negative constructs of flow (e.g., anxiety) that are consistent with fear. Only recently has research been published that utilized film as an approach to teaching and learning to better understand flow and flow theory in an undergraduate setting (Everett et al., 2020).

Fear in Communication Theory

Fear in communication has never been more pronounced than what it is in society today (Ahorsu et al., 2020; Lin et al., 2020; Montano & Carr, 2021). The threat of fear is evident from COVID-19 social media posts (Lin et al., 2020) and fear associated with the virus (Ahorsu et al., 2020). More recent research highlights fear associated with feature length movies with a natural disaster narrative (Montano & Carr, 2021). As such, film narratives and communication have the potential to educate (Everett et al., 2020) while eliciting fear messaging and associated stressors for viewers (Leventhal, 1970).

Utilizing fear to complement instructional methods may be an underutilized and misunderstood opportunity. According to Sprinkle et al. (2006), fear-inducing messages can be successfully used in instruction when supported with material that provides problem-solutions or efficacy statements to the fear. Sprinkle et al. (2006) suggested that if instructors use fear in instruction, they should be trained properly in the use of efficacy statements to positively reinforce instructional approaches on the specific fear (e.g., films based on sea level rise and corresponding mitigation approaches). Further, instructors must carefully consider the desired behavioral change to be considered prior to instruction (Sprinkle et al., 2006). Sprinkle et al. (2006) also indicated that inappropriate employment of fear communication in instruction can place educational success at risk.

As a form of narrative, Leventhal (1970) suggested that fear-arousing communication may increase persuasion, increase incapacity to cope with the fear-inducing situation, and promulgate external factors associated with a specific fear-related context. Additionally, Leventhal indicated that most fear communication research is associated with dangers to the body including (a) information describing the danger and (b) avoidance recommendations related to the danger (Leventhal, 1970). Leventhal (1970) suggested that attitudinal items measure belief of the danger (e.g., high CO2 levels causing climate change), evaluation of its magnitude (e.g., increased frequency of unstable weather events), and personal relevance (e.g., hurricane destruction of low-lying populated areas) to support the effects of the information.

This research drew from previous flow theory research and empirical literature on fear in communication by studying undergraduate experiences in a College of Agriculture and Natural Resources environmental and sustainability film course. This study utilized undergraduate film students' self-reported flow and fear levels during class sessions in an effort to better understand learning and opportunities that create flow experiences and elevated fear as a function of environmental and sustainability films and film themes. Previous research in film courses suggested that flow theory may be applicable to a variety of post-secondary settings outside of film as a primary instructional approach (Everett et al., 2021). A body of literature is beginning to emerge based on socio-psychological research of understanding student learning as it relates to film-based curricula. Non-film instructional research by Everett and Raven (2015, 2016, 2018) indicated that flow theory has the potential to support dynamic approaches to learning as indicated by the National Research Council (2009). Furthermore, use of the Experience Sampling Method (ESM) to determine students' flow experiences in a classroom setting (Everett et al., 2020) in conjunction with an adapted fear scale (FCV-19S, Ahorsu et al., 2020) provided a unique approach to determine student attitudes about flow and fear toward film genres in an environmental and sustainability undergraduate course. In each study highlighted, flow occurred in the

classroom and measures of fear were validated during COVID-19, however little is known about the relationship and intersection of these two constructs.

Materials and Methods

Data were collected at Michigan State University in the fall semester of 2020 in a 200-level course offered within the Department of Community Sustainability. Due to University protocol on COVID-19, the course was taught online in an asynchronous format. The course is also a selective (one of several courses in a group that students must select to take) within the Environmental Studies and Sustainability major where students can select from classes with energy systems and sustainable parks and tourism themes. There were 122 undergraduates enrolled in the course and students voluntarily participated in the research study. The flow and fear research instrument for this study used modified versions of the ESM (Hektner et al., 2007) and FCV-19S (Ahorsu et al., 2020) to meet the needs of the research. The resulting survey instrument combined ESM criteria specific to measuring flow (Csikszentmihalyi, 1975) and fear constructs adapted from FCV-19S (Ahorsu et al., 2020). Table 1 includes the flow and fear survey instrument in the research study. Michigan State University's Institutional Review Board deemed this study exempt.

This study used an electronic event-contingent sampling approach (i.e., taking an emailed survey at the conclusion of a specific activity over the course of the semester). Student participants were provided with instructions at the first course session by the researcher prior to taking the first flow and fear survey. At the first course session, students were shown an example of the survey and provided an explanation of all instrument questions. At the conclusion of the first film, student participants were sent an electronic consent form, flow and fear survey and asked to fill out the items at the conclusion of each movie. Each successive week of class, students were sent the same email and corresponding Qualtrics survey (Qualtrics^{XM}, Provo, UT) hyperlink. Email surveys were set up at the beginning of the semester, therefore students received the same email at the same time over the course of the online class. All data collected through the Qualtrics survey was anonymous.

For this study, 122 undergraduates completed a total of 377 flow and fear surveys, which amounts to a response rate of 20.6% (15 measured class sessions x 122 = 1,830 total potential responses). On average, there were 25.1 responses per class session over the course of the semester. By comparison, Everett et al. (2021) had a response rate of 13.7% for a sample of students from a previous research study where the course was taught in person until COVID-19 disrupted in-person instruction and the class was moved to an online instructional format. Based on these previous research findings, this methodological approach and derived data were deemed appropriate. Due to the voluntary nature of the study, respondents were encouraged, but not required to participate in this study. Moderate voluntary ESM response rates in the study are comparable to previous research without incentivizing participation (Csikszentmihalyi & Larson, 2014; Hektner et al., 2007). The flow and fear instrument consisted of 9 items and the value for Chronbach's Alpha for the survey was $\alpha = 0.90$. These levels of internal consistency are consistent with the previous online instrument and data collection as conducted by Everett et al. (2021).

Films from the course were categorized into one of four film themes for the purposes of this research. The four themes included: (1) climate systems (*The Island President*, *Racing Extinction*, *Chasing Coral*), (2) food systems (*Rotten-Bitter Chocolate*, *More Than Honey*, *Just Eat It: A Food Waste*), (3) energy systems (*The Last Mountain*, *The Boy Who Harnessed the Wind*, *Foreign Correspondent: How to Save the World*, *The True Cost*), and (4) sustainability movies (*Broken-Makeup Mayhem*, *A Plastic Ocean*,

Table 1.

Fear and Flow Instrument

Item #	Flow and Fear Item Questions
	While watching the movie(s) today I…
1	I am most afraid of this movie topic.
2	It makes me uncomfortable to think about this movie topic.
3	My hands become clammy when I think about this movie topic.
4	I am afraid of losing my life because of this movie topic.
5	When I watch stories about this movie topic on social media, I become nervous or anxious.
6	I cannot sleep because I'm worrying about this movie topic.
7	My heart races or palpitates when I think about this movie topic.
8	I feel challenged by the content of the movie.
9	I feel as though I am skilled or competent in the content of the movie.

Note. Items 1-7 measure the construct of fear in film and items 8-9 measure flow.

Minimalism, *Living the Change: Inspiring Stories for a Sustainable Future*). One class session was independent of other categorized themes. The last class session was devoted to peer evaluation of their own student produced movies. During this time, students were asked to view ten student-created movies highlighted by the instructor and asked to vote on their favorite movies.

Variables. Data were categorized three ways for this study. The first category references data by unit segment (e.g., individual movies). The second category of data was based on movie theme. The class was developed to consider four themes of environment and sustainability. The first theme included movies that had a food systems centric focus (class sessions 1-3). The second theme included movies focused on climate-related topics (class sessions 4-6). The third theme of movies had an energy system perspective (class sessions 7-10) and the final movies had a general sustainability theme (class sessions 11-14). The third category was based on the locale where the filming of the movie primarily occurred. Finally, the last category was devoted to student-produced videos that could have been in any of the four course themes. Examples included a student-produced film about home recycling habits and another about bird watching in a state wildlife refuge.

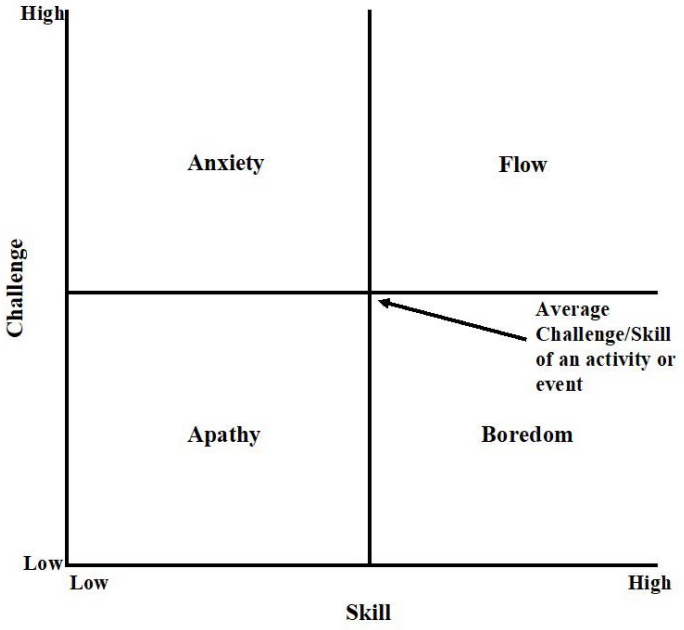
Films were also categorized as either having a filming location that was either domestic (North America), from an international perspective, or combined both domestic and international footage. Class sessions 1, 2, 5, 11, and 12 had both domestic and international footage perspectives. Class sessions 3, 7, 10, 13, and 15 were central to a North American perspective and class sessions with an international perspective included 4, 6, 8, 9, and 14.

A 5-Point Likert-type scale interval was utilized for this study to simplify options for filling out instrument questions (1 – *Not Agree* to 5 – *Very Much Agree*) using Qualtrics online software and the adapted ESM instrument for flow (Hektner et al., 2007) and fear (Ahorsu et al., 2020). Two faculty from the Department of Community Sustainability reviewed categories to ensure that themes were categorized correctly based on the course subject matter.

Data were analyzed using the SPSS 26.0 statistical software package. Descriptive statistics were used to determine fear and flow construct measures of central tendency. The variable of fear was calculated by the summation of appropriate scale items in Table 1 (Items 1-7) and scores ranged from 7 to 35. The variable of flow was categorized into the measures of challenge and skill using the Figure 1 model to determine the socio-psychological channel of respondents (e.g., anxiety, apathy, boredom, and flow). Flow was calculated by the comparison of individual challenge to skill (Items 8-9) levels perceived by respondents in the surveys with respect to the average challenge and skill levels by film or class session. Using the individual and average challenge and skill ratings for each film session: (a) anxiety was observed when individual challenge was greater than or equal to average challenge and individual skill was less than average skill; (b) apathy was observed when individual challenge was less than average challenge and skill ratings were greater than or equal to average skill during a film or class; (c) boredom was observed when perceived individual challenge and skill was less than both average challenge and skill; and (d) flow was observed when both individual challenge and skill were greater than or equal to both average challenge and skill at the film or class session. Appropriate channels for individual experiences (i.e., anxiety, apathy, boredom, and flow) were determined by the above criteria and as cited in the four-channel model (Csikszentmihalyi & Csikszentmihalyi, 1988, Figure 1). A chi-square test of association was used to determine relationships between flow constructs by film theme and primary location of the film.

Figure 1.

The four-channel flow model applied to Experience Sampling Method. The intersection of all channels is the average of the challenge and skill for a specific activity or event. (Adapted from Csikszentmihalyi and Csikszentmihalyi, 1988; Massimini and Carli, 1988)



Results

This study included students in an environmental and sustainability course entitled Exploring Environmental and Sustainability Issues and Policy Using Film (*n* = 122). Students in the class included 44 different majors across six Colleges at Michigan State University. Twenty-three percent of students in the course were majoring in one of the three Department of Community Sustainability majors (Agriculture, Food and, Natural Resource Education, Environmental Studies and Sustainability, and Sustainable Parks, Recreation, and Tourism). Additionally, forty-one percent of the students were majors in the College of Agriculture and Natural Resources.

Based on individual class sessions, descriptive statistics indicated that flow occurred most often in class sessions 8 (*The Boy Who Harnessed the Wind*, 40.7%), 14 (*Living the Change: Inspiring Stories for a Sustainable Future*, 53.3%), and 15 (*Student Produced Films*, 46.4%). Flow occurrences by students outnumbered instances of anxiety, apathy, or boredom (Table 2). Levels of fear were highest in class sessions 6 (M = 16.8, SD = 7.07),

Table 2.

Relationship between "flow" channels and fear by class sessions during an Experience Sampling Method (ESM) study (n = 377)

Class Session and Movie	Anxiety	Apathy	Boredom	Flow	Fear (M/SD)
#1 – Rotten (Bitter Chocolate)	3 (15.8%)	5 (26.3%)	7 (36.8%)	4 (21.1%)	10.2 (4.08)
#2 – More Than Honey	4 (12.5%)	8 (25.0%)	8 (25.0%)	12 (37.5%)	10.6 (3.97)
#3 – Just Eat It	7 (16.3%)	15 (34.9%)	7 (16.3%)	14 (32.6%)	11.3 (4.14)
#4 – The Island President	5 (12.8%)	10 (25.6%)	9 (23.1%)	15 (38.5%)	12.6 (5.69)
#5 – Racing Extinction	8 (21.6%)	7 (18.9%)	12 (32.4%)	10 (27.0%)	15.8 (7.50)
#6 – Chasing Coral	5 (23.8%)	4 (19.0%)	4 (19.0%)	8 (38.1%)	16.8 (7.07)
#7 – The Last Mountain	7 (23.3%)	4 (13.3%)	12 (40.0%)	7 (23.3%)	18.6 (8.21)
#8 – The Boy Who Harnessed the Wind	3 (11.1%)	7 (25.9%)	6 (22.2%)	11 (40.7%)	14.7 (8.11)
#9 – Foreign Correspondent: How to Save the World	2 (10.0%)	2 (10.0%)	8 (40.0%)	8 (40.0%)	12.0 (5.35)
#10 – The True Cost	4 (19.0%)	4 (19.0%)	5 (23.8%)	8 (38.1%)	14.8 (8.03)
#11 – Broken (Makeup Mayhem)	3 (15.8%)	3 (15.8%)	7 (36.8%)	6 (31.6%)	11.8 (5.52)
#12 – The Plastic Ocean	2 (15.4%)	4 (30.8%)	5 (38.5%)	2 (15.4%)	9.2 (2.73)
#13 – Minimalism	4 (30.8%)	1 (7.7%)	4 (30.8%)	4 (30.8%)	16.8 (7.28)
#14 – Living the Change: Inspiring Stories for a Sustainable Future	2 (13.3%)	2 (13.3%)	3 (20.0%)	8 (53.3%)	9.9 (5.26)
#15 – Student produced film	4 (14.3%)	5 (17.9%)	6 (21.4%)	13 (46.4%)	12.0 (5.93)
Total Frequency	63	81	103	130	13.3 (6.65)

Note. Data is from Exploring Environmental and Sustainability Issues and Policy Using Film a 200-level course with 122 students taught in the 2020 fall semester at Michigan State University.

8 (*M* = 14.7, *SD* = 8.11) and 10 (*M* = 14.8, *SD* = 8.03). As indicated above, class session 8 (*The Boy Who Harnessed the Wind*) had a high level of both student perceived flow and fear (Table 2). *Chasing Coral* (class session 6) was a film about coral degradation and corresponding climate change, *The Boy Who Harnessed the Wind* (class session 8) was the only fictional film centered around water access, equity, and climate change in Sub-Saharan Africa. *The True Cost* (class session 10) focused on purchasing habits of humans and associated environmental, economic, and social challenges associated with these behaviors. Given the direct relationship between fear and anxiety (Figure 1), it is important to mention that *Chasing Coral* (class session 6) and *The Last Mountain* (class session 7) had a higher frequency of student anxiety experiences of 23.8% and 23.3%, respectively, than other films and correspondingly high fear levels (*M* = 16.8, *SD* = 7.07) and (*M* = 18.6, *SD* = 8.21) with respect to the aforementioned movies. *Minimalism* (class session 14) had the highest overall percentage of anxiety (30.8%). However, this was the same value as both boredom and flow. Similarly, fear levels were also consistent with previously highlighted movies (*M* = 16.8, *SD* = 7.28).

Class theme descriptive statistics indicated that movie themes of Energy Systems had the highest student levels of flow (34.7%) and fear (*M* = 15.4, *SD* = 7.91) with Climate Systems having similarly high student levels of flow (34.0%) and fear (*M* = 14.7, *SD* = 6.89). These results may indicate that films and corresponding discussion centered around energy and climate were more likely to elicit flow in students while also creating an associated increase in fear based on current societal challenges. Additionally, it should be noted that student-produced movies had the highest student flow levels (46.4%) with lower fear levels (*M* = 12.0, *SD* = 5.93) than most other themes of movie. A chi-square test of independence yielded no significant relationship between

flow channels and student fear (χ^2 (12, N = 377) = 8.62) by film themes (Table 3).

Filming location descriptive statistics indicated that films, whether domestic (34.1%) or international (41.0%), were more likely to elicit flow experiences than those films that had both domestic and international (28.3%) locations and storylines (Table 4). Students' levels of fear during domestic theme films (M = 14.1, SD = 7.09) were slightly higher than international theme films eliciting similar fear ratings (M = 13.3, SD = 6.68). Interestingly, films that focused on an international perspective also elicited high levels of flow. This may indicate that students found the subject matter challenging while having the needed skill but were not as fearful or uncomfortable due to students not having a clear understanding of the major international issues associated with the movie location. A chi-square test of independence yielded no significant relationship between flow channels and student fear (χ^2 (6, N = 377) = 5.76) by film locale (Table 4).

Discussion

Classroom instruction and understanding how learning occurs is a constantly evolving process. The advent of continued increased frequencies of natural disasters and health care crisis provides opportunities for educators to utilize related stories and content to provide meaningful classroom instruction. Eliciting fear during classroom instruction has proven to be a valuable approach to student learning (Ahorsu et al., 2020; Lin et al., 2020; Montano & Carr, 2021). Purposefully inducing fear when learning about worldwide challenges may be an approach underutilized

Table 3.

Relationship between "flow" channels and fear by film theme during an Experience Sampling Method (ESM) study (n = 377)

Film Theme	Anxiety	Apathy	Boredom	Flow	Fear (M/SD)
Food Systems	14 (14.9%)	28 (29.8%)	22 (23.4%)	30 (31.9%)	10.8 (4.05)
Climate Systems	18 (18.6%)	21 (21.6%)	25 (25.8%)	33 (34.0%)	14.7 (6.89)
Energy Systems	16 (16.3%)	17 (17.3%)	31 (31.6%)	34 (34.7%)	15.4 (7.91)
Environmental/Sustainability	11 (18.3%)	10 (16.7%)	19 (31.7%)	20 (33.3%)	11.9 (6.02)
Student-Produced Films	4 (14.3%)	5 (17.9%)	6 (21.4%)	13 (46.4%)	12.0 (5.93)
χ^2 (12, N = 377) = 8.62					
Total Frequency	63	81	103	130	13.3 (6.65)

Note. **p < .05. **p < .01. Note. Data is from Exploring Environmental and Sustainability Issues and Policy Using Film a 200-level course with 122 students taught in the 2020 fall semester at Michigan State University.*

Table 4.

Relationship between "flow" channels and fear by film locale during an Experience Sampling Method (ESM) study (n = 377)

Film Locale	Anxiety	Apathy	Boredom	Flow	Fear (M/SD)
Domestic & International	20 (16.7%)	27 (22.5%)	39 (32.5%)	34 (28.3%)	12.2 (5.96)
Domestic	26 (19.3%)	29 (21.5%)	34 (25.2%)	46 (34.1%)	14.1 (7.09)
International	17 (13.9%)	25 (20.5%)	30 (24.6%)	50 (41.0%)	13.3 (6.68)
χ^2 (6, N = 377) = 5.76					
Total Frequency	63	81	103	130	13.3 (6.65)

Note. **p < .05. **p < .01. Note. Data is from Exploring Environmental and Sustainability Issues and Policy Using Film a 200-level course with 122 students taught in the 2020 fall semester at Michigan State University.*

in instructional settings. Classrooms should be locations where student learning occurs at the intersection where perceived levels of skill and challenge occur at optimal levels of learning (e.g., flow experiences) and elicitation of fear may optimize flow experiences in students. This study sought to understand the relationships between student socio-psychological measurements of flow and fear as a function of film, film themes, and film location as a means to better improve content and instruction.

Flow and anxiety frequency and corresponding student fear levels in specific movies indicated that certain films impacted students more than others. Previous research by Montano and Carr (2021) indicated that fear communication films tended to align with frequencies of anxiety of individuals and concerns related to current risks. However, the results of this study did not reflect high frequencies of anxiety and correspondingly high levels of perceived fear. Therefore, in this study fear communication did not appear to impact students' flow.

In regard to the different movie themes, climate and energy-themed movies appeared to be most concerning to students from an anxiety and fear perspective. Other film themes were more likely to amplify flow (Csikszentmihalyi, 1975) and fear (Leventhal, 1970). The authors suggest that further consideration be given to different themes of movies as a comparison study of flow and fear.

When aggregated by theme, climate and energy movies were more likely to increase student incidence of flow while also having similarly high fear levels. Results indicate that if increased frequencies of flow complementary to fear were desired outcomes of the course, then additional climate and energy movie opportunities should be incorporated into course content. Results indicating that flow and fear are attributes to student learning was encouraging and may be another opportunity to incorporate curriculum with a fear message that is applicable to the current generation of students. Additionally, results by movie and theme indicated that student produced films provided high frequencies of flow with low levels of fear. The authors contend that when students produce content in the form of movies, they were more likely to be in flow, however, did not likely feel fear during these learning opportunities. This may be due to student-produced videos not being related to fear-inducing topics. This research supports a previous study by Everett et al. (2020) which indicated that activities such as creation of films by students should be integrated into course objectives and outcomes.

Summary

This research supported previous research that flow, and the flow channel were related to positive aspects including happiness, interest, enjoyment, and success. Interestingly, levels of fear were more strongly aligned with the flow channel continuum (Csikszentmihalyi, 1975). This context for learning provided valuable information about the use of fear in communication (Leventhal, 1970) as a teaching technique and potential for relationships with flow theory (Csikszentmihalyi, 1975) that have not been seen in previous research. Film as a form of instructional content provides an interesting and unique approach to learning (National Research Council, 2009).

Based on this research, if the goal is to increase moments of flow while decreasing fear in students, then curriculum should include student-developed assessments and experiences (e.g., student-developed films). If the goal is to increase fear communication and flow in students as a learning approach, the authors encourage incorporation of more films where the central topic is climate or energy systems-related themes. Maslow (1963) indicated that seeking (as well as avoiding) can be a form of stimuli that can motivate learners. This research supported fear in communication theory This research supported Leventhal's (1970) fear in communication theory where fear-based instruction needs to be complemented with efficacy statement reinforcement (Sprinkle et al., 2006) as a positive instructional approach. Students were more likely to learn using fear-based approaches when instruction included films based on current global challenges that arouse fear followed by supporting problem-solutions that addressed the challenge.

Future research should include measuring flow and fear constructs during a course with increased "learning by doing" experiences associated with the fear-inducing film. Limitations of this study included the potential for recall bias as related to students filling out flow and fear survey at the conclusion of each class session. This study supported similar research that flow (Everett et al., 2021) and fear in communication (Montano & Carr, 2021) were important indicators for understanding student learning. As teaching and learning in the 21st century continue to evolve, incorporating fear communication theory where appropriate has the potential to create more flow-like experiences where students are "in the zone" during learning.

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