*Figure 3: Movie scenes and instructional prompts aligned with NOS themes and high school learning outcomes (NGSS Lead States 2013)*

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| ***Ant-Man* (2015)** |
| Disc Chapter: 1 *(The Pym Particle)* | Start: Hank Pym enters. (0:00:00)End: Hank: “As long as I’m alive, no one will ever get that formula,” leaves room. (00:01:40) |
| Key quote | Hank Pym: “I’m a scientist.”Howard Stark: “Then act like one. The Pym Particle is the most revolutionary science ever developed. Help us put it to good use.” |
| Discussion prompts and assessment questions | 1. What does it mean to “act like a scientist?” (According to the movie? How does this compare with notions in our real world?)
2. To what extent should scientists be required to share their work?
3. What are some examples from history? Now?
4. What would you say is the “most revolutionary science ever developed” in our real world?
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| Targeted NOS themes and learning outcomes | Human Endeavor: Scientific knowledge is a result of human endeavor, imagination, and creativity.Questions about the Natural/Material World: Science and technology may raise ethical issues for which science, by itself, does not provide answers and solutions.  |
| ***Captain America: Civil War* (2016)** |
| Disc Chapter: 5 *(We need to be put into check)* | Start: Rhodey: “Secretary Ross has a Congressional Medal of Honor, which is one more than you have.” (0:27:53)End: Rhodey: “Boom.” (0:28:53) |
| Key quote | Vision: “I have an equation . . . I’m saying there may be a causality . . .”  |
| Discussion prompts and assessment questions | 1. What does Vision mean by having an “equation?”
2. Where does this “equation” align with respect to theory, law, and hypothesis?
3. How else are the terms “theory,” “law,” and “hypothesis” used in other aspects of life?
4. How could we test or investigate Vision’s equation? What data would we need?
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| Targeted NOS themes and learning outcomes | Models, Laws, Mechanisms, and Theories: Theories ~~and laws~~ provide explanations in science, but theories do not with time become laws ~~or facts.~~Models, Laws, Mechanisms, and Theories: Models, mechanisms, and explanations collectively serve as tools in the development of a scientific theory.Models, Laws, Mechanisms, and Theories: Scientists often use hypotheses to develop and test theories and explanations. |
| ***Captain America: Civil War* (2016)** |
| Disc Chapter: 14*(We fight)* | Start: Falcon: “We need a diversion. Something big.” (1:38:37)End: Iron Man: “Okay, anybody on our side hiding any shocking and fantastic abilities they’d like to disclose? I’m open to suggestions.” (1:40:06) |
| Key quote | Ant-Man: “I do it all the time. I mean once. In a lab. Then I passed out.” |
| Discussion prompts and assessment questions | 1. How certain and durable is Ant-Man’s method for becoming Giant-Man?
2. What sorts of methods and tools are needed to do scientific investigations?
3. What is the value of doing science investigations inside a laboratory? What are potential limitations?
4. On what occasions must science investigations occur outside of a lab setting?
5. How can safety considerations be addressed for scientific investigations in indoor and outdoor lab settings?
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| Targeted NOS themes and learning outcomes | Investigations Use a Variety of Methods: Science investigations use diverse methods and do not always use the same set of procedures to obtain data.Investigations Use a Variety of Methods: Scientific investigations use a variety of methods, tools, and techniques to revise and produce new knowledge.Open to Revision: Most scientific knowledge is quite durable but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence.A Way of Knowing: Science is both a body of knowledge that represents a current understanding of natural systems and the processes used to refine, elaborate, revise, and extend this knowledge. |
| ***Captain America: The First Avenger* (2011)** |
| Disc Chapter: 4 | Start: Dr. Erskine enters. (0:24:19)End: Erskine: “Stay who you are. Not a perfect soldier, but a good man.” (0:27:32) |
| Key quote | Dr. Erskine: “So many people forget that the first country the Nazis invaded was their own. After the last war my people struggled. They felt weak. They felt small. And then Hitler comes along with the marching and the big show and the flags. And he hears of me and my work. And he finds me. And he says, ‘You will make us strong.’ Well, I am not interested.” |
| Discussion prompts and assessment questions | 1. What do you think about scientists working for their country’s military forces?
2. What are some potential ethical issues with performing tests on human subjects?
3. For both questions above, research and discuss similar examples from history or current events.
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| Targeted NOS themes and learning outcomes | Human Endeavor: Scientists’ backgrounds, theoretical commitments, and fields of endeavor influence the nature of their findings.Questions about the Natural/Material World: Not all questions can be answered by science.  |
| ***Doctor Strange* (2016)** |
| Disc Chapter: 5 *(Open your eye)* | Start: Mordo: “The sanctuary of our teacher, the Ancient One.” (0:24:37)End: Ancient One: “It’s just tea. With a little honey.” (0:28:48) |
| Key quote | Stephen Strange: “There is no such thing as spirit. We are made of matter and nothing more. You’re just another tiny, momentary speck within an indifferent universe.” |
| Discussion prompts and assessment questions | 1. Based on what Stephen Strange says to the Ancient One, what does he value? What is not valued?
2. How do these values compare to scientific endeavors?
3. How is science different from other ways of knowing?
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| Targeted NOS themes and learning outcomes | Investigations Use a Variety of Methods: Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results.Based on Empirical Evidence: Science disciplines share common rules of evidence used to evaluate explanations about natural systems.A Way of Knowing: Science distinguishes itself from other ways of knowledge through use of empirical standards, logical arguments, and skeptical review. Assumes an Order and Consistency in Natural Systems: Science assumes the universe is a vast single system in which basic laws are consistent. |
| ***Iron Man 2* (2010)** |
| Disc Chapter: 13 | Start: Tony looks at digital diagram of atom; “Dead for almost 20 years. Still taking me to school.” Jarvis: “The proposed element should serve as a viable replacement for palladium.” (1:23:02)End: Jarvis: “Sir, the reactor has accepted the modified core. I will begin running diagnostics.” (1:27:28) |
| Key quote | Tony: “That was easy.”Jarvis: “Congratulations, sir. You have created a new element.” |
| Discussion prompts and assessment questions | 1. How does Tony know he has created a new element?
2. How could this new information be verified or established in the scientific community?
3. What responsibility might Tony have with this new information?
4. In what ways is scientific knowledge a product of both discovery and creativity?
5. Compare the process of synthesizing element in *Iron Man 2* with how it occurs in the real world, including scale of time, amount, etc.
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| Targeted NOS themes and learning outcomes | Investigations Use a Variety of Methods: The discourse practices of science are organized around disciplinary domains that share exemplars for making decisions regarding the values instruments, methods, models, and evidence to adopt and use.Based on Empirical Evidence: Science arguments are strengthened by multiple lines of evidence supporting a single explanation.Open to Revision: Most scientific knowledge is quite durable but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence. |
| ***Thor* (2011)** |
| Disc Chapter: 10 | Start: Fire pit on roof; Jane: “I come up here when I can’t sleep. Or when I’m trying to reconcile particle data.” (1:12:40)End: Thor: “And Asgard. And that’s where I come from.” (1:15:14) |
| Key quote | Thor: “Your ancestors called it magic. And you call it science. Well, I come from a place where they’re one and the same thing.” |
| Discussion prompts and assessment questions | 1. What are some ways Dr. Jane Foster deals with problems?
2. How do scientists address inconsistent events or objects? (anomalies)
3. What are some examples from history? Current events?
4. How would you explain the difference between science and magic?
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| Targeted NOS themes and learning outcomes | Investigations Use a Variety of Methods: New technologies advance scientific knowledge.Assumes an Order and Consistency in Natural Systems: Scientific knowledge is based on the assumption that natural laws operate today as they did in the past and they will continue to do so in the future.Human Endeavor: Technological advances have influenced the progress of science and science has influenced advances in technology. |