

Comparing the Impact of Historical Narratives Versus Expository Texts on High School Students' Macroeconomic Understandings

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ABSTRACT

Despite the critical role of macroeconomic literacy in financial decision-making, high school students often struggle with “hyper-rational” economic lessons that feel disconnected from real-world contexts. While narratives, theoretically, are more engaging and thus more effective in helping students understand complex content, their specific efficacy in teaching macroeconomic concepts like inflation in secondary school populations remains under-researched. This study investigated the comparative impact of a historical narrative versus an expository text on 10th-grade students' knowledge acquisition, reasoning ability, confidence, and engagement regarding the effects of inflation as it relates to money supply. Utilizing a mixed-methods experimental between-subjects design, 141 students from a California public high school were randomly assigned to one of three groups: a historical narrative stimulus (Roman Empire hyperinflation), an expository text stimulus, or a no-stimulus control group. Participants completed a validated assessment measuring knowledge, reasoning, and confidence levels. Prior knowledge was also collected; a Welch's ANOVA test revealed that it did not differ significantly between groups. Results from Welch's ANOVA and Games-Howell post-hoc tests indicated that the historical narrative group achieved significantly higher overall scores and knowledge scores compared to the control group, while the expository group did not. Notably, the narrative group also demonstrated the highest level of engagement, with 84.9% of total possible participation in optional open-ended “explain your answer” questions, significantly outperforming the control group and the expository group ($p < .001$). While reasoning scores did not reach statistical significance, confidence analysis showed that for certain reasoning questions, the narrative stimulus significantly reduced student uncertainty in decision-making.

INTRODUCTION

In the United States, young adult financial literacy levels are low: only 14% of 18-24 year olds comprehend economic concepts. Many struggle especially with understanding inflation (sustained increase in prices), which affects financial planning (Lusardi & Streeter, 2023). The biggest gap in

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understanding was between high school graduates and those with a bachelor’s degree (Lusardi & Streeter, 2023), which may suggest that economics is not comprehensibly taught in high school. Compounding this issue is a structural delay in the education system of states like California, where required economic education is reserved for the 12th grade (California Department of Education, n.d.). However, many gain employment, purchase vehicles, or make financial commitments regarding higher education before their senior year (California Student Aid Commission, 2025; US Bureau of Labor Statistics, 2026; US Department of Transportation, 2021.). Even when students receive economic education, it tends to be “hyper-rational” (Tallgauer & Schank, 2023), or incomprehensible and, ultimately, detached from real-world situations. This reduces individual and collective financial literacy in high school graduates. Individual economic literacy, especially related to macroeconomic concepts such as inflation, is necessary for students to make financial decisions for personal expenses such as tuition, cars, and insurance (Lusardi & Mitchell, 2023). Collective economic literacy amongst secondary students is also necessary, as many can vote before, or soon after, their graduation; informed classes will make better decisions for their country (Davies, Syed, & Appleyard, 2016). To promote financial literacy, economics lesson material should be reformed to prioritize accessibility.

LITERATURE REVIEW

Search Strategies

Sources were located through online databases (Google Scholar, JSTOR, ProQuest) and limited to mostly peer-reviewed journal articles, book chapters, and content standard frameworks. Search keywords include: narrative, expository, adolescent cognition, macroeconomics, inflation, and teen financial literacy.

Cognitive Considerations for Student Learning of Economics

Under Bronfenbrenner’s Ecological Systems Theory, secondary students can be assumed to have a basic understanding of money, and its significance/use; economic systems are part of the “macrosystem” (overarching system that influences an individual’s development) (Crawford, 2020). This means that students likely understand references to “money” or “coins” without definition, but may not understand complex economic concepts or make responsible financial decisions. For this to occur, students must understand multiple aspects of economic systems that make up the “big picture.” A test comparing UK college students and their lecturers’ ability to model economic analysis found that, usually, students’ answers were more one-dimensional than their lecturers’ (Davies & Mangan, 2007). When asked to describe their analysis visualization, students who answered that they attempt “to look at the big picture” were most likely to report a capability to model non-linear economic analysis in their minds (Davies & Mangan, 2007), highlighting both a heightened understanding of the economy and confidence in that understanding, contributing to a better ability to make decisions accounting for multiple factors.

Adolescents, however, pose a different challenge: it is especially difficult for them to responsibly make decisions compared to older students. Adolescents may prioritize immediate gratification over delayed reward (Huang, Hu, & Li, 2017). This may have consequences for economic decision-making, which often involves high-stakes choices that require one to account for more factors. Huang, Hu, & Li (2017) highlight that multifactorial reasoning is one of the more complex aspects of decision-making that usually develops later than reward-based reasoning. Yet, the adolescent phase of development (as teenagers age, their rostral prefrontal cortex, which supports abstract and relational reasoning activates more specifically) may be an optimal time for economic education; training multifactorial thinking (encouraging “fluid intelligence”) in adolescents can sharpen brain development, improving decision-making and comprehension skills as students enter adulthood (Dumontheil, 2014).

However, educators must be cautious of adolescents' cognitive load capacity. This can be measured in terms of working memory (the cognitive ability to hold/utilize information necessary to complex cognitive undertakings) which predicts levels of fluid intelligence. Working memory also enables individuals to synthesize and evaluate complex information confidently (Li, Wang, & Sun, 2024). Working memory capacity is rapidly developing during adolescence, but is still not at par with adult cognitive load capacities until around 19 years of age (Ahmed, Ellis, Ward, & David-Kean, 2022). This suggests that limits in working memory when students are in high school may constrain their ability to process complex information about macroeconomic systems with confidence. Thus, content presentation aimed at training multifactorial thinking must be done in a way that places a low cognitive load on adolescents but allows them to understand the concepts necessary to economic decision-making

Narrative vs. Expository Learning

Narratives emerge as a promising method for effective content presentation in economics education, which has traditionally been expository. Narratives entertain, while focusing on actions, interactions, development, cause-and-effect relationships, temporal sequences, setting, theme, plot, resolution, and a central goal. Expository methods communicate information and inform rather than entertain; they usually have explanations supported by evidence or arguments. Prior knowledge aids in conceptual understanding; more inferences are generated when interacting with narratives versus expository material. Expository methods often introduce concepts in a way that readers cannot always draw on prior knowledge to understand (Mar et al., 2021). Still, drawing on prior knowledge can have positive or negative consequences; it may improve comprehension but, if misinterpreted/incorrect, could introduce misconceptions (Busom, Lopez-Mayan, & Panades, 2017). At the same time, content removed from prior knowledge can be difficult if the cognitive load is too high (Li, Wang, & Sun, 2024). Since it is not immediately clear whether expository methods or narratives help students become better and more confident economic decision-makers, various studies have attempted to determine the superior option.

Applications in Education

One study developed a teaching framework that would offer digital storytelling, through audiovisual methods, to secondary school students in the Czech Republic. Both experimental groups were given a

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pretest on supply, demand, and price elasticity. The experimental group watched a video narrative of a businessman’s decisions related to pre-test content, while the control group watched a PowerPoint presentation on pretest content. A post-test was administered; there was a slight increase in scores for students exposed to the digital storytelling method. Still, the study had limitations; it was conducted through online classes (so conditions were not controlled for), the pre-test scores significantly differed (suggesting unequal starting ground), and the variables of video and presentation are not perfectly comparable (Nunvarova et al., 2023).

Another potential form of content presentation is historical texts. Historical texts taught in classrooms, chosen in particular because of the idea that historical examples are removed enough from the present to be more objectively perceived, were tested in a study analyzing the potential of historical fiction novel *The Lost Painting* to assist college students in learning microeconomic concepts. Discussions, interest surveys, and pre-post exams were used to evaluate effectiveness. Students in the group who read *The Lost Painting* gained more interest in the subject than the control group, and performed 2.6% better on exams. However, differences between groups in age/GPA, as well as factors such as discussion differences between sections, are limitations to such findings (Cotti & Johnson, 2012).

Despite such studies having been conducted, a major gap in the literature is prevalent. For one, both Nunvarova et al. (2023) and Cotti & Johnson (2012) both utilized teacher-guidance: Nunvarova et al. (2023) included a teacher-based lecture to compare to the PowerPoint, while Cotti & Johnson (2012) included teacher-administered discussions and exams, integrated into the class, for both groups. Teacher involvement, since it may cause students to attempt to impress or obtain a better grade, dilutes objectivity; excluding teacher involvement may better isolate material effectiveness.

Another gap in the literature is the way that outcomes are measured; both aforementioned studies measure just knowledge scores, and Cotti & Johnson (2012) also measured interest. However, relational understanding can better be measured through assessing reasoning (Busom, Lopez-Mayan, & Panades, 2017) by asking students to make scenario-based economic decisions. Also, confidence can be assessed by how students report their answers; as mentioned previously, Davies & Mangan (2007) attempted to discover confidence by asking students whether they felt they could successfully model economic systems, but a more accurate measure of confidence, which has been used by mathematics educators (Susanti, Waluya, & Rosyida, 2020) may be found in analyzing open-ended responses asking students to elaborate multiple choice answers. Finally, both studies used pre-post tests, which may have priming effects, as students may gain an understanding of what they need to get out of the educational materials before they are post-tested; a between-groups study may reduce the impact of such variables (Kim & Willson, 2010).

Evidently, no between-groups study has been conducted on a high school population using historical text-based presentations of economic concepts removed from teacher involvement and including reasoning questions. Additionally, no studies have examined the effect of text-based historical stimuli, isolated from teacher influence, on student engagement with the material or student answer confidence.

This paper aims to contribute towards filling this gap with a case study comparing the impact of a historical narrative versus an expository text, relative to no stimulus, on secondary students' macroeconomic understandings and decision-making capabilities, as well as engagement and confidence.

Based on the literature, the following hypotheses were tested:

1. Students who receive the narrative stimulus will perform significantly better than both other groups on all questions (both knowledge-assessing and reasoning-assessing)
2. Students who receive the narrative stimulus will be significantly more likely to explain their answer, showing a higher level of engagement, than the students in the other two groups.
3. Students who receive the narrative stimulus will report significantly higher levels of confidence for a correct answer than those who receive the expository stimulus; both will be significantly more confident than the no-stimulus group.

METHODS

Research Design

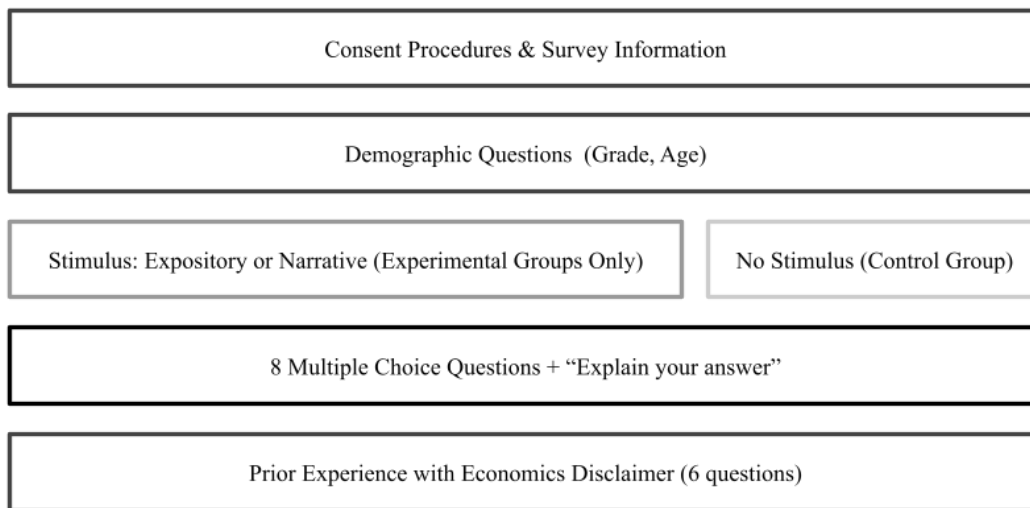
This study employed a mixed-methods experimental between-subjects design with randomized assignment to three conditions. Experimental designs test hypothesized relationships between independent and dependent variables (Jhangiani et al., 2019); in this study, the independent variable was the stimulus type (narrative, expository, or no stimulus) and the dependent variables were student scores and open-ended responses. The relationship was tested between subjects (comparing standalone groups) rather than within subjects to isolate the effect of each passage without carryover. Mixed methods analysis (Creswell, 2009) was employed; qualitative and quantitative data revealed different aspects of the new understanding. The study was Institutional Review Board (IRB) approved by the school where it was set prior to data collection.

Instruments

Participation occurred through Google Forms, where consent forms, demographic questions, stimuli (if present), evaluation questions, open-ended questions, and prior knowledge questions were published.

Figure 1

Google Form Evaluation Design



Consent Procedures, Survey Information, & Demographics

First, students were asked to provide participation assent; parent consent was also asked of participants 14 years old or under (as per IRB requirement), however, no participants were in that range. Participation was voluntary, and students could withdraw at any time by closing the form or contacting the researcher to remove their data. The second page asked students to disclose their age/grade in school. All participants were 15-16 year old 10th graders.

Historical Narrative

The historical narrative stimulus (181 words) (Appendix A), written by the researcher and reviewed by an AP Macroeconomics teacher at the school, detailed the effects of 3rd century coin debasement associated with economic instability during the late Western Roman Empire. This specific situation was chosen because it was aligned with economics standards: information was derived from Heckel (2018)'s lesson plan for 8-12th grades: "Inflation and the Fall of the Roman Empire," which referenced the Voluntary National Content Standards (VNCS) in Economics, a widely used K-12 economics standards set by the Council for Economic Education (CEE)¹. The text received a Flesch Reading Ease score of 68 (eighth-grade level) (Kincaid, 1975) as calculated by Hemingway Editor (Long, 2024). After reading the stimulus, students were asked to confirm that they had read/understood the passage.

Expository Text

The expository text (183 words) (Appendix A) was adopted from Carmen (2015)'s lesson plan for 6-12th graders: "One is Silver and the Other's Gold," which was written based on the CEE's National Content

¹ Note: A new version of the standards was released in October 2025 as the National Content Standards (NCS), but relevant updates were organizational rather than content-based
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Standards (NCS) in Economics (Council for Economic Education, 2025), and specifically used in their recommended curriculum. Using Hemingway Editor (Long, 2024), this text's Flesch Reading Ease score was also calculated to be 68. After reading the stimulus, students were asked to confirm that they had read/understood the passage.

Multiple Choice Questions

Knowledge questions were compiled from the CEE's "ReadyAssessments" question bank, Heckel (2018), and Marginal Revolution University's "Principles of Economics: Macroeconomics" lesson questions (MRU, n.d.), then reviewed by the high school's AP Macroeconomics teacher for accuracy and relevance. Questions were selected because they matched the NCS for inflation (Council for Economic Education, 2025). There were a total of 5 knowledge questions, all testing student understandings of the relationship between money supply, value of money, and inflation. Reasoning questions, assessing application of concepts, were based on the NCS (Council for Economic Education, 2025), created by the researcher, and reviewed by the AP Macroeconomics teacher. There were 3 reasoning questions, testing participants' ability to grasp the value of money in a real situation, determine pricing, and choose optimal purchase time. All participants, regardless of whether they received a stimulus, answered these questions. Each question had 3 answer choices and a fourth "Unsure" option (included to discourage external Internet lookup if confused on an answer). See Appendix B for questions.

Open-Ended Questions

Optional "explain your answer" open-ended questions (Appendix B) were included after each question so that students could express their thinking about their answer, and the researcher could analyze confidence/engagement. There were 8 open-ended questions. Questions were made optional to increase participant yield.

Prior Experience Disclaimer

Students were then asked to disclose prior experience with economics-related coursework, competitions, money management, payments, work experience, and investments. All 6 questions were created by the researcher and reviewed by the school's AP Macroeconomics teacher (Appendix C). Each question was multiple choice, with 4 options ranging from no experience to high levels of experience. These questions were placed after evaluation questions to minimize priming effects. This data was necessary to check whether students' prior knowledge levels between groups differed significantly. After assessment completion, students were directed to the sources of both stimuli (regardless of group assignment) to learn more about economics (Appendix D).

Participants & Assignment

Participants (n=141) were sourced from one public high school in Northern California. All participants were enrolled in AP Seminar, the school's advanced 10th grade English option. Throughout the course of

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a day, the data collection link (Google Site) was posted to each of 5 AP Seminar sections' Google Classroom stream when class started, and present students who wished to participate were given 10 minutes to individually complete the evaluation. The researcher, another student at the school, was not present so that personal relationships with participants would not inadvertently influence the data. An English course was chosen because of minimal overlap with economic knowledge (participants wouldn't immediately refer to class-specific knowledge). Participants were randomly directed to one of three Google Forms (containing either a narrative, expository text, or no stimulus) by a JavaScript algorithm (1:1:1 probability ratio established through a random number generator) embedded in a Google Site. 49 students ended up receiving the narrative stimulus, 50 received the expository stimulus, and 42 received no stimulus. Responses were anonymous to protect privacy.

Data Analysis

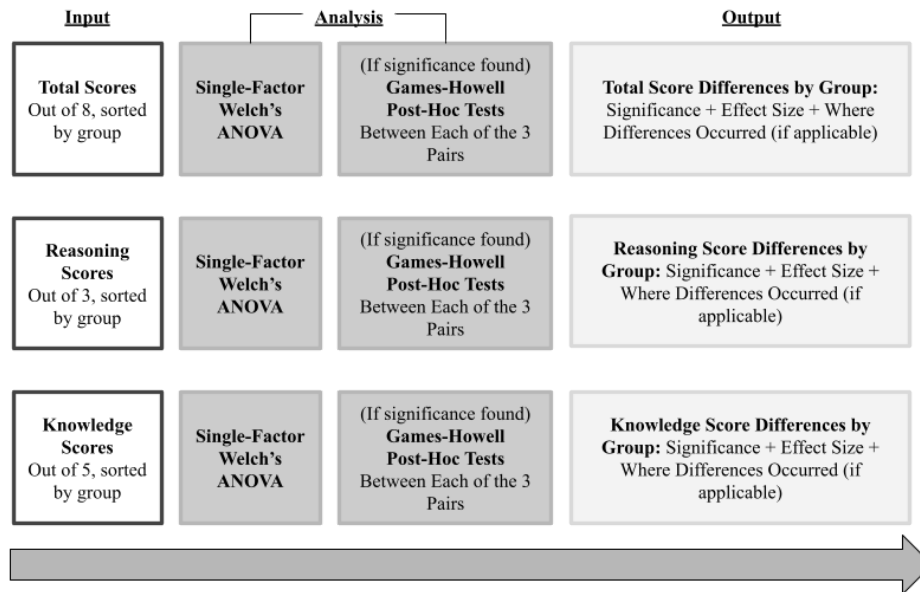
Prior Knowledge Analysis

Each prior knowledge multiple choice option was assigned a score from 0-3 depending on the level of experience with economics it represented (0 = none, 1 = little, 2 = some, and 3 = high). Total scores were calculated for each participant, sorted by group (narrative, expository, no stimulus) and a one-way Welch's ANOVA test (which compares group scores but controls for unequal variance, and acts as a precautionary control for significance inflation) was run on the scores using jamovi to determine whether differences between groups were statistically significant (Zhou, Zhu, & Wong, 2023). Effect sizes (ω^2) were manually calculated using Carroll & Nordholm (1975)'s formula for ω^2 (where F = F-statistic, J = number of groups and N = sample size): $\omega^2 = \frac{F-1}{F + \frac{N-J+1}{J-1}}$.

Score Analysis

Figure 2

Flowchart of Score Analysis



Score analysis followed a multi-step procedure (Figure 2). Multiple choice scores were calculated by assigning a score of 1 to a correct answer and a score of 0 to an incorrect/“Unsure” answer. Total scores (out of 8 points) were calculated for each participant and sorted by group (narrative, expository, no stimulus), before a one-way Welch’s ANOVA (Zhou, Zhu, & Wong, 2023) was run on the scores using jamovi (Version 2.6) due to its capability to perform Welch and post-comparison (post-hoc) tests. Next, “knowledge scores” (out of 5 points) were calculated for each participant using their scores for the first five multiple choice questions, sorted by group, and a one-way Welch’s ANOVA was run on those scores using jamovi. “Reasoning scores” (out of 3 points) were calculated for each participant using their scores for the last three multiple choice questions, sorted by group, and a one-way Welch’s ANOVA was run on those scores, too, using jamovi. Effect sizes (ω^2) were manually calculated.

If significant differences were detected in any of the aforementioned Welch’s ANOVA tests, Games-Howell post-hoc tests were conducted (Agbangba et al., 2024), in jamovi for each group pair (narrative/no-stimulus, expository/no-stimulus, and narrative/expository) to determine where significant differences occurred. Effect sizes were reported by Hedges g , a small-sample-size version of Cohen’s d , using the formula: $g = d \times j$, where $d = (\bar{x}_1 - \bar{x}_2)/sd_{pooled}$, and $j = 1 - \frac{3}{4(n_1+n_2-2)-1}$, $\bar{x}$ = mean, n = sample size, and sd = standard deviation (Wilson, 2000).

Engagement Analysis

The number of open-ended responses per group were considered; a 3 x 2 chi-square test of independence comparing group participants (narrative, expository, no-stimulus) with the presence of an open-ended

response (yes/no) was conducted for each question (and for all questions in total) to determine whether there were statistically significant differences in engagement between groups.

Confidence Analysis

For each question, student open-ended responses were coded deductively into one of the following categories: unsure (U), confident correct (CC), confident incorrect (CI), unconfident incorrect (UI), and unconfident correct (UC) (Grazziotin-Soares et al., 2021). “Unsure” multiple-choice responses were placed in a separate category of “Unsure,” whether they had an explanation or not. For other categories, only responses with an explanation were coded. When coding, hedges used in student responses indicated unconfidence, and boosters or a lack of hedges indicated confidence.

Table 1

Hedges and Boosters

Category	Hedges	Boosters
Epistemic Modal Verbs	May Might Can*	Will Must
Epistemic Lexical Verbs	Could Would Should Suggest Assume Believe Think Guess Estimate Feel Appear Seem Indicate Imply Doubt/(?)*	Demonstrate Know Prove Result* Understand* Equals (=)*
Epistemic Adverbs	Perhaps Possibly Probably Likely Often* Usually* Typically*	Certainly Obviously Clearly Undoubtedly Definitely* Always*

	Kind of/Kinda* Pretty much* Maybe* Potentially*	
Epistemic Adjectives	Possible Probable (Un)likely Most*	Certain Obvious Clear
Epistemic Nouns	Assumption Possibility Suggestion	The fact Claim As stated*

*Words added by the researcher related to/deemed similar to the words already present in the table from Lopez et al. (2025)

Table 1 details the hedges and boosters that were used, based on Lopez et al. (2025). A second student researcher coded a sample of 40 responses, and it was determined that both researchers agreed 100% on categorization, providing a level of inter-rater reliability. Then, a 3 x 5 Fisher's exact test (an smaller-sample-size alternative to a chi-square test, which would have been invalid due to expected counts of under 5 in 20%+ of cells) (Kim, 2017) was conducted for each question in jamovi to determine whether confidence and group type had a significant relationship. If significance was found, then post-hoc analysis of adjusted standard residuals was conducted (in jamovi) to determine where significant differences were found (Ahad et al., 2023). Effect sizes (Cramér's V) (Akoglu, 2018) were calculated in jamovi.

RESULTS

Score Analysis Findings

Table 2

Prior Knowledge Test for Differences: One-Way Welch's ANOVA

Group	n	Mean	SD	SE	p	df ₁	df ₂	F	ω ²
Narrative	49	4.71	2.47	0.35	0.43	2	90.3	0.861	0.000
Expository	50	4.26	2.41	0.34					
No-Stimulus	42	4.05	2.54	0.39					

Table 2 presents the results of a one-way ANOVA run on prior knowledge scores between the three stimulus groups (narrative, expository, and no-stimulus). It indicates that there was a miniscule ($\omega^2 = 0$), non-significant difference in prior knowledge scores between groups ($p = .43$, $p > .05$).

Table 3

Total Score Analysis, Between Groups: One-Way Welch's ANOVA

Group	n	Mean	SD	SE	p	df ₁	df ₂	F	ω^2
Narrative	49	6.86	1.27	0.18	0.01	2	85.5	4.82	0.051
Expository	50	6.32	1.62	0.23					
No-Stimulus	42	5.79	2.02	0.31					

A one-way Welch's ANOVA test on total scores between all three stimulus groups revealed significant differences in scores ($p = .01$, $p < .05$), with an effect size of $\omega^2 = .051$ (small-to-medium effect) (Watson, 2021). Since significance was found during this test, Games-Howell post-hoc tests could be conducted to determine where differences appear.

Table 4

Total Score Analysis, Between Groups: Games-Howell Post-Hoc Tests

Comparison	Mean Difference	p	<i>g</i>
Narrative vs. No-Stimulus	1.07	0.01	0.64
Narrative vs. Expository	0.54	0.16	0.37
No-Stimulus vs. Expository	-0.53	0.36	0.29

Table 4 details the Games-Howell post-hoc tests run on the total scores between groups. Narrative stimulus recipients ($M = 6.86$, $SD = 1.27$) seemingly scored significantly better, with a medium effect size calculated using Hedges' *g* (Brydges, 2019) ($p = .01$, $p < .05$, $g = .64$) than those who received no stimulus ($M = 5.79$, $SD = 2.02$); however, outcomes did not significantly differ, and only small effect sizes were found, between narrative and expository ($M = 6.32$, $SD = 1.62$) groups ($p = .16$, $p > .05$, $g = .37$) or no-stimulus and expository groups ($p = .36$, $p > .05$, $g = .29$).

Table 5

Knowledge Score Analysis, Between Groups: One-Way Welch's ANOVA

Group	n	Mean	SD	SE	p	df ₁	df ₂	F	ω^2
Narrative	49	4.16	1.07	0.15	0.03	2	87.8	3.83	0.039
Expository	50	3.82	1.22	0.17					
No-Stimulus	42	3.43	1.43	0.22					

Table 5 presents the results of a one-way Welch's ANOVA run on the scores for the first five questions (composite knowledge scores). Between groups, significant differences were found ($p = .03$, $p < .05$), with an effect size of $\omega^2 = .039$ (small to medium effect) (Watson, 2021). Games-Howell post hoc tests could then be used to determine where significant differences occurred.

Table 6

Knowledge Score Analysis, Between Groups: Games-Howell Post-Hoc Tests

Comparison	Mean Difference	p	g
Narrative vs. No-Stimulus	0.74	0.02	0.58
Narrative vs. Expository	0.34	0.30	0.29
No-Stimulus vs. Expository	-0.39	0.35	0.29

The Games-Howell post-hoc tests on knowledge scores indicated that narrative stimulus recipients ($M = 4.16$, $SD = 1.07$) performed significantly better with a medium effect size ($p = .02$, $p < .05$, $g = .58$) (Brydges, 2019) than students who received no stimulus ($M = 3.43$, $SD = 1.43$), however, there were no significant differences, and only small effect sizes, associated with knowledge scores between narrative and expository ($M = 3.82$, $SD = 1.22$) groups ($p = .30$, $p > .05$, $g = .29$) or no-stimulus and expository groups ($p = .34$, $p > .05$, $g = .29$) (Brydges, 2019).

Table 7

Reasoning Score Analysis, Between Groups: One-Way Welch's ANOVA

Group	n	Mean	SD	SE	p	df ₁	df ₂	F	ω^2
Narrative	49	2.59	0.55	0.08	0.07	2	85.9	2.81	0.025
Expository	50	2.50	0.68	0.13					
No-Stimulus	42	2.36	0.85	0.10					

Table 7 details the results of a one-way Welch's ANOVA test run on reasoning scores (out of 3 points, the last three multiple choice questions) between all three stimulus groups. Differences were not significant ($p = .07$, $p > .05$) and the effect size ($\omega^2 = .025$) was small (Watson, 2021). As such, no Games-Howell post-hoc tests were conducted on reasoning scores. However, the effect size between narrative and no-stimulus ($g = .47$) was small-to-medium, while the effect sizes between narrative and expository ($g = .31$) and between no-stimulus and expository ($g = .18$) remained small (Brydges, 2019).

Engagement Analysis Findings

Table 8

Open-Ended Response Rate by Group and Question

Question	Narrative (n=49)	Expository (n=50)	No-Stimulus (n=42)	χ^2	p
Q1	44 (89.8%)	43 (86.0%)	35 (83.3%)	0.83	0.66
Q2	45 (91.8%)	41 (82.0%)	32 (76.2%)	4.22	0.12
Q3	40 (81.6%)	39 (78.0%)	32 (76.2%)	0.42	0.81
Q4	42 (85.7%)	40 (80.0%)	31 (73.8%)	2.01	0.37
Q5	39 (79.6%)	35 (70.0%)	25 (59.5%)	4.36	0.11
Q6	43 (87.8%)	37 (74.0%)	32 (76.2%)	3.25	0.20
Q7	37 (75.5%)	35 (70.0%)	28 (66.7%)	0.89	0.64
Q8	38 (77.6%)	33 (66.0%)	22 (52.4%)	6.38	0.04
Total	333 (84.9%)	303 (75.8%)	237 (70.5%)	18.11	<.001

The percent of open-ended respondents out of total participants in each group did not significantly differ between groups for all questions except Question 8, where the no-stimulus group had much fewer open-ended question respondents than the other two. The total number of open-ended question respondents did significantly differ by groups when combined, however, with the narrative group having the most participation (84.9%) compared to expository (75.8%) and no-stimulus (70.5%) groups.

Confidence Analysis Findings

Table 9

Fisher's Exact Tests: All Questions

Question	Interpretation	Category	p	V
Q1	Scale of Inflation	Knowledge	0.01	0.29
Q2	Decrease in Supply	Knowledge	0.11	0.22
Q3	Increase in Supply	Knowledge	0.10	0.22
Q4	Value of Money	Knowledge	0.33	0.20
Q5	Value Over Time	Knowledge	0.18	0.23
Q6	Intertemporal Choice	Reasoning	0.59	0.18
Q7	Value Over Time	Reasoning	0.12	0.26
Q8	Pricing	Reasoning	0.02	0.28

A 3 x 5 Fisher’s exact test on open-ended and “Unsure” responses for each of the 8 questions indicated that, except for Questions 1 and 8, the relationship between stimulus type and confidence did not differ significantly. While not statistically significant, the stimulus did have a medium effect on the confidence distribution for Questions 2, 3, 4, 5, and 6 and a large effect on the confidence outcomes of Question 7 ($V = .26$). Questions 1 ($p = .01$, $V = .29$) and 8 ($p = .02$, $V = .28$) (Amaral & Line, 2021) did see significant differences in confidence levels by group, with stimulus having a large effect size on outcome. Thus, post-hoc tests on adjusted standard residuals for those two questions were conducted.

Table 10

Post-Hoc Adjusted Standard Residuals Test: Question 1

Group	CC	UC	CI	UI	U
Narrative	0.81	-1.51	1.25	-0.95	-1.68
No Stimulus	-1.36	1.58	-0.61	-0.09	2.02
Expository	0.35	-0.23	-0.91	0.91	-1.67

The post-hoc test on adjusted standard residuals for Question 1 indicated that the no-stimulus group had a significantly higher amount of Unsure responses compared to the other two groups ($z = 2.02$, $z > 1.96$) (Naioti & Mudrak, 2018). All other relationships were not statistically significant.

Table 11

Post-Hoc Adjusted Standard Residuals Test: Question 8

Group	CC	UC	CI	U	UI
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Narrative	0.39	0.887	0.848	-1.885	-1.495
No-Stimulus	-1.157	-0.294	-0.754	2.203	0.155
Expository	0.579	-0.748	-0.828	-0.669	0.846

A post-hoc adjusted standard residuals test on Question 8’s open-ended/”Unsure” responses indicates that the point of most significance in the relationship between stimulus type and confidence is the difference between the no-stimulus group and the experimental groups in terms of “Unsure” answers; the no-stimulus group had significantly more ($z = 2.203$, $z > 1.96$) “Unsure” answers for Question 8.

DISCUSSION

Interpretation of Findings

Since no significant difference in prior knowledge was found between groups, it can be assumed that differences between group outcomes can primarily be explained by the differences in stimulus type received.

Performance and Stimulus Efficacy

An analysis of the differences by group in total scores revealed statistically significant differences in scores based on stimulus type that was received. Specifically, the group that received the narrative stimulus performed significantly better overall than the group that received the no-stimulus material; this only partially supports Hypothesis 1 since the narrative stimulus group did not perform significantly better than the expository stimulus group. Analysis of knowledge scores reveals the same conclusion: the narrative group outperformed the no-stimulus group, but did not significantly outperform the expository group. This suggests that both texts, since they covered the same material with a similar structure, perhaps allowed students to understand systems better compared to no instruction (Davies & Mangan, 2007). Yet, because the expository groups and no-stimulus groups, for both total and knowledge scores, did not differ significantly, it can be assumed that the way that the expository group conveyed knowledge wasn’t as effective, a finding that may be explained by Mar et al. (2021): expository content often presents concepts as if they are completely new, which hinders students’ ability to draw on prior knowledge to help them understand the material, while historical narratives, by outlining realistic scenarios, have references to prior knowledge. This addresses the research gap by showing that the effectiveness of expository material, isolated from teacher influence or audiovisual cues (Cotti & Johnson, 2012; Nunvarova et al., 2023) is not high, while showing that the effectiveness of narrative material, also isolated from influence, can be very high, improving student understandings of inflation.

Reasoning scores were the only subset of scores that did not differ to a statistically significant degree based on student stimulus exposure. However, the effect size of the narrative stimulus compared to no stimulus was a medium effect size (the rest were small) suggesting a trend of narrative stimulus

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effectiveness. This trend is aligned with the idea that narratives, because they focus heavily on interactions and cause-and-effect relationships, may lead to better relational understandings (Mar et al., 2021), which manifests in higher reasoning capabilities (Busom, Lopez-Mayan, & Panades, 2017). A larger sample size may help more accurately reveal whether the relationship is truly significant or not.

The Power of Engagement

Perhaps the most clear conclusion that can be drawn from this study is that the narrative group showed the highest engagement in the form of elaboration on responses; 84.9% of answers were supported by an explanation in the narrative group, compared to 75.8% in the expository group and 70.5% in the no-stimulus group, a significant difference that supports Hypothesis 2: *Students who receive the narrative stimulus will be significantly more likely to explain their answer, showing a higher level of engagement, than the students in the other two groups.* This finding is related to the conclusion reached by Cotti & Johnson (2012); students who read *The Lost Painting* gained more interest in the subject of microeconomics (student engagement is often driven by interest; a higher level of engagement may equate to higher levels of interest) (Kahu, Nelson, & Picton, 2017). However, in Cotti & Johnson (2012)'s study, it was not clear whether the stimulus itself was what raised interest, or if the teacher-guided discussions had an impact as well. This study reveals that, even in isolation, historical narratives may increase interest/engagement with economics.

Levels of Confidence

This study finds that, except for two cases, stimulus type did not significantly affect the spread of student confidence and correctness in answers. The exceptions were found in Questions 1 and 8. Question 1 ("Inflation is characterized by the...") aims to test whether students understand the scale of inflation: the correct answer was "sustained increase in the general level of prices" rather than just a "sharp rise in the price of a major product" or a "rapid movement in the economy toward full employment". For Question 1, there was a significant difference in confidence particularly between the no-stimulus group and the other two groups-- the no-stimulus group had more uncertain answers (with a large effect size). This suggests that the scale of inflation is not well understood by secondary students, even those who are advanced, without an explanation, which is aligned with Lusardi & Streeter (2023)'s implication that high school does not sufficiently teach economics. The nonexistence of "Unsure" responses for Question 1 in the other two groups suggests that students felt more confident about their answer (which may have been incorrect or correct). Especially for the narrative group, drawing on prior knowledge to understand the text may have introduced misconceptions, which would result in a more confident, yet incorrect, answer. At the same time, the expository group read a stimulus that was difficult to comprehend (due to the lack of cues telling students to draw on prior knowledge), which could have introduced misconceptions of its own, also resulting in a more confident, yet incorrect answer (Mar et al., 2021). Still, "correct confident" was the highest represented category for the responses between groups (narrative, no-stimulus, and expository), suggesting that most "confident" answers for all groups were "correct" ones. Question 8, on the other hand, tested student price-setting reasoning: "You run a chocolate shop. Suddenly, customers are willing to pay more for the same chocolates. What does this likely tell you about what's happening in the

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economy?” Answer choices required students to also make a recommendation for what they should do as a shopowner in this situation (the correct answer was “money supply likely increased, so you should raise prices because people’s dollars don’t go as far”). Again, the significant relationship between stimulus type and outcome can be traced back to the no-stimulus group having the most “Unsure” answers-- this suggests that confidence in relational understanding was supported by both stimuli, which, again, can be supported by Davies & Mangan (2007)’s idea that both texts, in supporting “big picture” understandings, promote better/more confident economic modeling.

Although “Unsure” was one of many categories, the findings in this confidence analysis partially support Hypothesis 3 (it was found that both narrative/expository stimuli groups were significantly less unsure than the no-stimulus group). This finding, which was significant for reasoning in setting prices, suggests that stimulus-driven reasoning may have a positive effect on student confidence in decision-making, which helps fill the gap created by a lack of studies testing whether stimuli can help students not just become more economically literate, but also more confident in their reasoning skills.

Notably, most non-statistically significant relationships had medium-to-large effect sizes, suggesting that there still were trending differences in confidence by stimulus type. A larger sample size might be needed to explain/identify this discrepancy thoroughly.

LIMITATIONS AND FUTURE RESEARCH

One limitation of this paper is its lack of generalizability due to its population: advanced 10th grade English (AP Seminar) students. This population may have different outcomes than normal 10th graders because more exposure to difficult readings may have made them more open to reading the stimuli or helped them comprehend it faster. This makes the study’s conclusions conditional: the narrative stimulus was more engaging than the expository stimulus provided that students could comprehend it. Theoretically, since both texts were at the eighth-grade level, the average 10th grader should be able to comprehend them, but this wasn’t tested/confirmed by the study. Future research should expand the population to incorporate 10th graders from all levels of advancement.

Another limitation of this study is its pertinence to one topic at one moment in time, which, again, makes it a case study. While this has its own advantages, such as being able to provide recommendations for one unit in the school’s economics curriculum, this case study is also limited in its generalizability to an entire statewide curriculum. Future research could blend economics topics for a broader understanding, or conduct separate studies on multiple different concepts to compare outcomes. Students also only had 10 minutes to complete the assessment; no follow-ups were conducted on students to check for retention. Further research could also test stimuli for their long-term effectiveness, which could provide insight on potentially effective/ineffective methods of increasing financial literacy that continues through adulthood, when students can vote or make personal decisions.

PRACTICAL RECOMMENDATIONS

High school economics materials may be able to incorporate historical narratives as an introductory method of presenting macroeconomics. Specifically, CEE curriculum designers should consider replacing expository materials for inflation in their lesson database with narrative-based ones. California educators may also benefit from the methods used in this study to assess student confidence (hedges/boosters), and they could also use narratives to spark interest/engagement in their students, potentially including them as an introduction to economics before 12th grade.

CONCLUSION

While both narrative and expository materials increase scores, the narrative stimulus used in this study shows the potential effectiveness of narratives as the comparatively superior presentation of economic concepts. Although confidence did not significantly differ between the two experimental material groups and scores only slightly differed, engagement being significantly higher from the narrative group is a key indicator that the narrative stimulus can deal with a difficult challenge of the adolescent mind -- keeping cognitive load low and attention high.

DECLARATIONS AND ETHICAL APPROVAL

Ethical approval for this study was obtained from the Monte Vista High School Institutional Review Board (IRB). The approved protocol dictated that formal parental consent was required only for participants under the age of 14. Because the final sample consisted entirely of students aged 15 and 16, parental consent was not required per the approved protocol. All participants provided written informed assent prior to participation. The author declares no conflict of interest. This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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APPENDICES

Appendix A

Expository Text

Excerpt adapted from Carmack (2015), "One is Silver and the Other's Gold." Council for Economic Education:

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“Your money supply is the total of your coins, paper money, money you have in the bank, and any checks someone has written to you, like a birthday check. Our country’s money supply is the total of everyone’s coins, paper money, money in the bank, and checks.

The total of our country’s money supply is important. If the money supply increases [or the government prints more money], people have more money, and they can spend more money. Store owners notice this and can charge higher prices for the things that they sell. When prices increase over a period of time, it is called INFLATION.

“...The second idea we’ll discuss is the STORE OF VALUE function of money. Money is something that we can keep when we want to buy something in the future. When we expect the value of money to be stable over time, we expect that it will buy a similar amount today and in the future...When inflation happens, prices go up and the money you have [saved] is not worth as much, because you can’t buy as much with it.”

Narrative Text

Excerpt based on Heckel (2018), “Inflation and the Fall of the Roman Empire.” Federal Reserve Bank of St. Louis:

In the 3rd century CE, the once-peaceful Roman Empire faced a period of crisis. Wars, invasions, and diseases made it hard for the government to collect taxes and fund itself. Soldiers still needed to be paid to keep order, so the emperors found a solution: they reduced the silver in each coin, allowing more coins to be minted with less precious metal per coin. They could pay their soldiers more coins, but this also allowed more coins to enter the entire empire’s economy.

Since they now had more coins, soldiers and citizens had more money to spend. Shops noticed this and raised prices for their goods and services, even for everyday items such as wheat. This rise in prices is called INFLATION.

Some people spent their money quickly to buy things before prices rose more. Other people, who tried to save their coins, found that their money could buy less than before. The STORE OF VALUE of money had weakened. These financial issues, as well as other problems in the land, eventually led to the collapse of the great Roman Empire.

Appendix B

Economic Understanding Assessment Questions

1. Inflation is characterized by the

- Sharp rise in the price of a major product
- Sustained increase in the general level of prices

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- Rapid movement in the economy toward full employment
- Unsure

Explain your answer.

2. If the money supply decreases, what would you expect to happen to prices?

- Prices will increase
- Prices will decrease
- Nothing will change
- Unsure

Explain your answer.

3. What is most likely to happen when a government repeatedly boosts the economy by printing more money?

- People come to expect the increases so they prepare for higher prices.
- The economy grows faster and becomes more stable.
- The banks have too much money on hand and lend it at much cheaper interest rates.
- Unsure

Explain your answer.

4. When there is high inflation:

- Money loses value.
- Money gains value.
- People want to hold on to money.
- Unsure

Explain your answer

5. In an inflated economy, what would happen if people just kept, or saved, their money over time?

- It would lose value, because each dollar can buy less over time
- It would gain value, because there is more money in circulation
- Its value would stay the same
- Unsure

Explain your answer.

6. You need a computer in 3 months, but have recently learned that prices will rise next week. What is your best option?

- Buy the computer now
- Buy the computer in 3 months
- Wait for the computer to go on sale
- Unsure

Explain your answer.

7. You find \$20 that you had saved a year ago under your bed. Since then, inflation has gone up. What does this mean for your \$20?

- It is worth more, because inflation makes prices go up.
- It has lost value, because inflation weakens the store of value of money.
- It can still buy the same amount of goods, because businesses never change their prices
- Unsure

Explain your answer.

8. You run a chocolate shop. Suddenly, customers are willing to pay more for the same chocolates. What does this likely tell you about what's happening in the economy?

- Customers' preferences suddenly changed, so you should keep prices the same.
- Inflation must have fallen, so you should lower prices.
- Money supply likely increased, so you should raise prices because people's dollars don't go as far.
- Unsure

Explain your answer.

Appendix C

Prior Knowledge Questions

Which of the following best describes your exposure to economics in school?

- None
- A few lessons or a unit in another subject
- High school economics course (semester or year)

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- AP/IB or college-level economics course

Have you participated in any economics competitions (e.g. National Economics Challenge, DECA)?

- Never
- No, but I have been a non-active member in a competition organization
- Yes, once
- Yes, multiple times

Do you manage your own money (allowance, paycheck, etc.)?

- I do not have my own money
- No, someone/something does it for me
- Yes, with guidance
- Yes, alone

Have you ever had to pay bills (utilities, rent, subscriptions, etc.)?

- Never
- Rarely
- Sometimes
- Regularly/mostly on my own

Have you ever held a job or internship that required you to handle money?

- No
- Yes, briefly or informally
- Yes, formal part-time job
- Yes, formal long-term job or multiple roles

Have you ever made an investment decision (stocks, cryptocurrency, savings account, etc.)?

- Never/I don't know what an investment decision is
- Once or twice
- Occasionally
- Regularly

Appendix D

Closing Message and Resources

Thank you for your participation! Your time and thoughtful responses are valued and will contribute to the field of educational psychology.

Here are some resources for you to learn more about money supply as it relates to inflation

- <https://econedlink.org/resources/one-is-silver-and-the-others-gold/?view=teacher>

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Comparing the Impact of Historical Narratives Versus Expository Texts on High School Students' Macroeconomic Understandings

- <https://www.federalreserveeducation.org/resources/lessons/lesson--inflation-and-the-fall-of-the-roman-empire.pdf>