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,the free encyclopedia that anyone can edit.117,937 active editors 7,001,591 articles in EnglishThe English-language Wikipedia thanks its contributors for creating more than seven million articles! Learn how you can take part in the encyclopedia's continued improvement.Members of the victorious Blondie crewThe Boat Race 2018 took place on 24March. Held annually, The Boat Race is a side-by-side rowing race between crews from the universities of Oxford and Cambridge along a 4.2-mile (6.8km) tidal stretch of the River Thames in south-west London, England. For the third time in the history of the event, the men's, the women's and both reserves' races were all held on the Tideway on the same day. The women's race saw Cambridge lead from the start, eventually winning by a considerable margin to take the overall record to 4330 in their favour. In the women's reserve race, Cambridge's Blondie (crew pictured) defeated Oxford's Osiris by nine lengths. The men's reserve race was won by Cambridge's Goldie, who defeated Oxford's Isis by a margin of four lengths. The men's race was the final event of the day and completed a whitewash as Cambridge won, taking the overall record to 8380 in their favour. The races were watched by around 250,000 spectators live, and broadcast around the world. (Fullarticle...)Recently featured: Radar, Gun Laying, Mk.I and Mk.IIAndrea NavageroNosy KombaArchiveBy emailMore featured articlesAboutKitty Marion… that Kitty Marion (pictured) was force-fed over 200 times during a hunger strike?… that the North Korean destroyer Choe Hyon is the largest ship constructed for the Korean People's Navy?… that after the release of High and Low, director Akira Kurosawa received telephone calls imitating his film that threatened to kidnap his daughter?… that May Bradford Shockley is why Silicon Valley is where it is?… that the conservation of a goat might endanger the survival of Aquilegia paui?… that Joy Laking predicted in a school writing assignment that within ten years she would be making a living as an artist?… that the Taiwanese restaurant chain Formosa Chang drew inspiration from McDonald's for its non-greasy atmosphere and corporate practices?… that Haridas Mitra had his death sentence commuted after the intervention of Mahatma Gandhi?… that "Steve's Lava Chicken" recently became the shortest song to enter the UK Top 40?ArchiveStart a new articleNominate an articleNgg wa Thiong'oKenyan writer and activist Ngg wa Thiong'o (pictured) dies at the age of 87.In sumo, nosato Daiki is promoted to yokozuna.In association football, Liverpool win the Premier League title.In motor racing, lex Palou wins the Indianapolis 500.In basketball, the EuroLeague concludes with Fenerbahe winning the Final Four Playoff.Ongoing: Gaza warM23 campaignRussian invasion of UkrainetimelineSudanese civil wartimelineRecent deaths: Harrison Ruffin TylerPhil RobertsonMary K. GaillardPeter DavidAlan YentobGerry ConnollyNominate an articleMay 31: Dragon Boat Festival in China and Taiwan (2025); World No Tobacco DayBessarion455 Petronius Maximus, the ruler of the Western Roman Empire, was stoned to death by a mob as he fled Rome ahead of the arrival of a Vandal force that sacked the city.1223 Mongol invasion of Kievan Rus': Mongol forces defeated a Kievan Rus' army at the Battle of the Kalka River in present-day Ukraine.1468 Cardinal Bessarion (pictured) announced his donation of 746 Greek and Latin codices to the Republic of Venice, forming the Biblioteca Marciana.1935 A magnitude-7.7 earthquake struck Balochistan in British India, now part of Pakistan, killing between 30,000 and 60,000 people.2013 A tornado struck Central Oklahoma, killing eight people and injuring more than 150 others.Albertino Mussato (d.1329)Joseph Grimaldi (d.1837)Dina Boluarte (b.1962)Mbaye Diagne (d.1994)More anniversaries: May 30May 31June 1ArchiveBy emailList of days of the yearAboutCucumis metuliferus, the African horned cucumber, is an annual vine in the cucumber and melon family, Cucurbitaceae. Its fruit has horn-like spines, hence the name "horned melon". The ripe fruit has orange skin and lime-green, jelly-like flesh. It is native to Southern Africa, where it is a traditional food. Along with the gemsbok cucumber and the citron melon, it is one of the few sources of water during the dry season in the Kalahari Desert. This photograph, which was focus-stacked from 25 separate images, shows two C.metuliferus fruits, one whole and the other in cross-section.Photograph credit: Ivar LeidusRecently featured: Ignace TonenAustralian white ibisHell Gate BridgeArchiveMore featured picturesCommunity portal The central hub for editors, with resources, links, tasks, and announcements.Village pump Forum for discussions about Wikipedia itself, including policies and technical issues.Site news Sources of news about Wikipedia and the broader Wikimedia movement.Teahouse Ask basic questions about using or editing Wikipedia.Help desk Ask questions about using or editing Wikipedia.Reference desk Ask research questions about encyclopedic topics.Content portals A unique way to navigate the encyclopedia.Wikipedia is written by volunteer editors and hosted by the Wikimedia Foundation, a non-profit organization that also hosts a range of other volunteer projects: CommonsFree media repository MediaWikiWiki software development Meta-WikiWikimedia project coordination WikibooksFree textbooks and manuals WikidataFree knowledge base WikinewsFree-content news WikiquoteCollection of quotations WikisourceFree-content library WikispeciesDirectory of species WikiversityFree learning tools WikivoyageFree travel guide WiktionaryDictionary and thesaurusThis Wikipedia is written in English. Many other Wikipedias are available; some of the largest are listed below. 1,000,000+ articles DeutschEspaolFranaisItalianoNederlandsPolskiPortugusSvenskaTing Vit 250,000+ articles Bahasa IndonesiaBahasa MelayuBn-lm-gCataletinaDanskEestiEsperantoEuskaraMagyarNorsk bokmlRomnSimple EnglishSloveninaSrpskiSrpskohrvatskiSuomiTrkeOzbekcha 50,000+ articles AsturianuAzrbaycancaBosanskiFryskGaeilgeGalegoHrvatskiKurdLatvieuLietuviNorsk nynorskShqipSlovenina Retrieved from " 2This article is about the year 455. For other uses, see 455 (disambiguation).This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.Find sources:"455"news newspapers books scholar JSTOR (April 2019) (Learn how and when to remove this message)Calendar yearYearsMillennium1stmillenniumCenturies4thcentury5thcentury 6thcenturyDecades430s440s450s 460s470sYears452453454455 456457458vte455 by topicLeadersPolitical entitiesState leadersReligious leadersCategoriesBirthsDeathsDisestablishmentsvte455 in various calendarsGregorian calendar455CDLVAb urbe condita1208Assyrian calendar5205Balinese saka calendar376377Bengali calendar139 138Berber calendar1405Buddhist calendar999Burmese calendar183Byzantine calendar59635964Chinese calendar (WoodHorse)3152 or 2945to (WoodGoat)3153 or 2946Coptic calendar171172Discordian calendar1621Ethiopian calendar447448Hebrew calendar42154216Hindu calendars- Vikram Samvat511512- Shaka Samvat376377- Kali Yuga35553556Holocene calendar10455Iranian calendar167 BP 166 BPIslamic calendar172 BH 171 BHJavanese calendar340341Julian calendar455CDLVKorean calendar2788Minguo calendar1457 before ROC1457Nanakshahi calendar1013Seleucid era766/767 AGThai solar calendar997998Tibetan calendar(male Wood-Horse)581 or 200 or 572to(female Wood-Goat)582 or 201 or 571King Genseric sacks Rome (455)Year 455 (CDLV) was a common year starting on Saturday of the Julian calendar. At the time, it was known as the Year of the Consulship of Valentinianus and Anthemius (or, less frequently, year 1208 Ab urbe condita). The denomination 455 for this year has been used since the early medieval period, when the Anno Domini calendar era became the prevalent method in Europe for naming years.March 16 Emperor Valentinian III, age 35, is assassinated by two Hunnic retainers of the late Flavius Aetius, while training with the bow on the Campus Martius (Rome), ending the Theodosian dynasty. His primicerius sacri cubiculi, Heraclius, is also murdered.March 17 Petronius Maximus, former domesticus ("elite bodyguard") of Aetius, becomes (with support of the Roman Senate) emperor of the Western Roman Empire. He secures the throne by bribing officials of the imperial palace. Maximus consolidates his power by a forced marriage with Licinia Eudoxia, widow of Valentinian III.Maximus appoints Avitus, most trusted general, to the rank of magister militum and sends him on an embassy to Toulouse, to gain the support of the Visigoths. He elevates his son Palladius to Caesar and has him marry Eudocia, eldest daughter of Valentinian III.May 31 Maximus is stoned to death by an angry mob while fleeing Rome. A widespread panic occurs when many citizens hear the news that the Vandals are plundering the Italian mainland.June 2 Sack of Rome: King Genseric leads the Vandals into Rome, after he has promised Pope Leo I not to burn and plunder the city. Genseric sacks the city for a period of two weeks. Eudoxia and her daughters, Eudocia and Placidia, are taken hostage. The loot is sent to the harbour of Ostia and loaded into ships, from whence the Vandals depart and return to Carthage.July 9 Avitus is proclaimed Roman emperor at Toulouse, and later recognised by the Gallic chiefs in Viernum (near Arles).September 21 Avitus enters Rome with a Gallic army. He restores the imperial authority in Noricum (modern Austria) and leaves a Gothic force under Remistus, Visigoth general (magister militum), at Ravenna.The Ostrogoths conquer Pannonia and Dalmatia.Battle of Aylesford: Prince Vortimer rebels against the pro-Anglo-Saxon policies of his father, Vortigern. He is defeated in the battle at Aylesford (Kent). Hengist and his son Oisc become king of Kent. Horsa and Catigern, brother of Vortimer, are killed. The Britons withdraw to London (according to the Anglo-Saxon Chronicle).Skandagupta succeeds Kumaragupta I as ruler of the Gupta Empire (India). During his reign he crushes the Hun invasion; however, the expense of the wars drains the empire's resources and contributes to its decline.Gaero becomes king of the Korean kingdom of Baekje.[1]Earliest recorded date at Chichen Itza on the Yucatn Peninsula (Mexico) (approximate date).Barter economy replaces organized trade as Romans and other citizens desert their towns for the countryside, where they will be less vulnerable to barbarian raids (approximate date).The city of Vindobona (Vienna) is struck by an epidemic that spreads through the Roman provinces. The disease is probably streptococcus or a form of scarlet fever with streptococcus pneumoniae (approximate date).Rusticus, archbishop of Lyon (approximate date)Wang Baoming, empress of the Southern Qi (d. 512)March 16Valentinian III, emperor of the Western Roman Empire (b. 419)Heraclius, Roman courtier (primicerius sacri cubiculi)May 31 Petronius Maximus, emperor of the Western Roman EmpireBiyu of Baekje, king of Baekje[1]Catigern, prince and son of Vortigern (approximate date)Horsa, leader of the Anglo-Saxons (approximate date)Kumaragupta I, ruler of the Gupta Empire (India)Niall Noigiallach, High King of Ireland (approximate date)Palladius, son of Petronius Maximus (approximate date)Prosper of Aquitaine, disciple and Christian writer (approximate date)^ a b "List of Rulers of Korea". www.metmuseum.org. Retrieved April 20, 2019.Retrieved from " 3One hundred years, from 301 to 400Millennia1stmillenniumCenturies3rdcentury4thcentury5thcenturyTimelines3rdcentury4thcentury5thcenturyState leaders3rdcentury4thcentury5thcenturyDecades300s310s320s330s340s350s360s370s380s390sCategories:Births Deaths Establishments DisestablishmentsvteEastern Hemisphere at the beginning of the 4th century CE.Eastern Hemisphere at the end of the 4th century CE.The 4th century was the time period from 301 CE (represented by the Roman numerals CCCI) to 400 CE (CD) in accordance with the Julian calendar. In the West, the early part of the century was shaped by Constantine the Great, who became the first Roman emperor to adopt Christianity. Gaining sole reign of the empire, he is also noted for re-establishing a single imperial capital, choosing the site of ancient Byzantium in 330 (over the current capitals, which had effectively been changed by Diocletian's reforms to Milan in the West, and Nicomedeia in the East) to build the city soon called Nova Roma (New Rome); it was later renamed Constantinople in his honor.The last emperor to control both the eastern and western halves of the empire was Theodosius I. As the century progressed after his death, it became increasingly apparent that the empire had changed in many ways since the time of Augustus. The two-emperor system originally established by Diocletian in the previous century fell into regular practice, and the east continued to grow in importance as a centre of trade and imperial power, while Rome itself diminished greatly in importance due to its location far from potential trouble spots, like Central Europe and the East. Late in the century Christianity became the official state religion, and the empire's old pagan culture began to disappear.[citation needed] General prosperity was felt throughout this period, but recurring invasions by Germanic tribes plagued the empire from 376[1][2] CE onward. These early invasions marked the beginning of the end for the Western Roman Empire.In China, the Jin dynasty, which had united the nation prior in 280, began rapidly facing trouble by the start of the century due to political infighting, which led to the insurrections of the northern barbarian tribes (starting the Sixteen Kingdoms period), which quickly overwhelmed the empire, forcing the Jin court to retreat and entrench itself in the south past the Yangtze river, starting what is known as the Eastern Jin dynasty around 317. Towards the end of the century, Emperor of the Former Qin, Fu Jin, united the north under his banner, and planned to conquer the Jin dynasty in the south, so as to finally reunite the land, but was decisively defeated at the Battle of Fei River in 383, causing massive unrest and civil war in his empire, thereby leading to the fall of the Former Qin, and the continued existence of the Eastern Jin dynasty.According to archaeologists, sufficient archaeological evidence correlates of state-level societies coalesced in the 4th century to show the existence in Korea of the Three Kingdoms (300/400668 CE) of Baekje, Goguryeo, and Silla.Historians of the Roman Empire refer to the "Long Fourth Century" to the period spanning the fourth century proper but starting earlier with the accession of the Emperor Diocletian in 284 and ending later with the death of Honorius in 423 or of Theodosius II in 450.[3]See also: Christianity in the 4th centuryGregory the Illuminator mosaic, converted Armenia from Zoroastrianism to ChristianityContemporary bronze head of Constantine I (r. 306337 AD)Early 4th century Former audience hall now known as the Basilica, Trier, Germany, is built.Early 4th century The Gupta Empire is established.301: Armenia first to adopt Christianity as state religion.304439: The Sixteen Kingdoms in China begins.306337: Constantine the Great, ends persecution of Christians in the Roman Empire (see also Constantinian shift) and Constantinople becomes new seat of government (New Rome).Tikal had a population of about 100,000 when it was conquered by Teotihuacan, less than a fourth of its peak population[4]320: Butuan Boat One, the oldest known Balangay, a multi-purpose ship native to the Philippines is built.325328: The Kingdom of Aksum adopts Christianity.325: Constantine the Great calls the First Council of Nicaea to pacify Christianity in the grip of the Arian controversy.335380: Samudragupta expands the Gupta Empire.337: Constantine the Great is baptized a Christian on his death bed.350: About this time the Kingdom of Aksum conquers the Kingdom of Kush.350400: At some time during this period, the Huns began to attack the Sassanid Empire.[2]350: The Kutai Martadipura kingdom in eastern Borneo produced the earliest known stone inscriptions in Indonesia known as the Mulavarman inscription written in the Sanskrit language using Pallava scripture.[5]Mid-4th century Dish, from Mildenhall, England, is made. It is now kept at the British Museum, London.Mid-4th century Wang Xizhi makes a portion of a letter from the Feng Ju album. Six Dynasties period. It is now kept at National Palace Museum, Taipei, Taiwan, Republic of China.365: An earthquake with a magnitude of at least eight strikes the Eastern Mediterranean. The following tsunami causes widespread destruction in Crete, Greece, Libya, Egypt, Cyprus, and Sicily.376: Visigoths appear on the Danube and are allowed entry into the Roman Empire in their flight from the Huns.378: Battle of Adrianople: Roman army is defeated by the Visigoth cavalry. Emperor Valens is killed.378395: Theodosius I, Roman emperor, bans pagan worship, Christianity is made the official religion of the Empire.378: Siyaj K'ak' conquers Waka on (January 8), Tikal (January 16) and Uaxactun.Wall painting of the Council of Constantinople (381) in the Stavropoleos monastery, Romania381: First Council of Constantinople reaffirms the Christian doctrine of the Trinity by adding to the creed of Nicaea.383: Battle of Fei River in China.395: The Battle of Canhe Slope occurs.395: Roman emperor Theodosius I dies, causing the Roman Empire to split permanently.Late 4th century: Cubiculum of Leonis, Catacomb of Commodilla, near Rome, is made.Late 4th century: Atrium added in the Old St. Peter's Basilica, Rome.For a more comprehensive list, see Timeline of historic inventions 4th century.The Stirrup was invented in China, no later than 322.[6][1]Kama Sutra, dated between c.400 BC to c. 300 AD.[7][8]Iron pillar of Delhi, India is the world's first Iron Pillar.[citation needed]Trigonometric functions: The trigonometric functions sine and versine originated in Indian astronomy.[9]Codex Sinaiticus and the Codex Vaticanus Graecus 1209, are the earliest Christian bibles.[10][11]Book of Steps, Syriac religious discourses.[citation needed]^ a b "The invention and influences of stirrup". Archived from the original on December 3, 2008.^ a b Roberts, J: "History of the World". Penguin, 1994.^ The Long Fourth Century 284450: Continuity and Change in the Later Roman Empire ed. S. McGill, C. Sogno and E. Watts (Cambridge 2008).^ "The Maya: Glory and Ruin". National Geographic Magazine. Archived from the original on April 9, 2008.^ "The Austronesians: Historical and Comparative Perspectives". ANU Press. Archived from the original on 2013-12-25. Retrieved 2013-04-29.^ Lee, Adela C.Y. "The stirrup and its effect on chinese military history". Silkroad Foundation.^ Sengupta, J. (2006). Refractions of Desire, Feminist Perspectives in the Novels of Toni Morrison, Michle Roberts, and Anita Desai. Atlantic Publishers & Distributors. p.21. ISBN978-81-269-0629-1. Archived from the original on 4 May 2016. Retrieved 7 December 2014.^ Kakar, Sudhir; Doniger, Wendy (2003). Kamasutra. Oxford; Toronto: Oxford University Press. pp.xi. ISBN978-0-19-283982-4.^ Bag, A.K. (1979). 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Retrieved 16 March 2013.Retrieved from " 4The following pages link to 4th century External tools(link counttransclusion countsorted list) See help page for transcluding these entriesShowing 50 items.View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)List of decades, centuries, and millennia (links | edit)Religion in pre-Islamic Arabia (links | edit)Rosetta Stone (links | edit)20th century (links | edit)15th century (links | edit)16th century (links | edit)17th century (links | edit)18th century (links | edit)14th century (links | edit)1st century (links | edit)13th century (links | edit)397 (links | edit)12th century (links | edit)11th century (links | edit)7th century (links | edit)10th century (links | edit)9th century (links | edit)8th century (links | edit)6th century (links | edit)5th century (links | edit)3rd century (links | edit)2nd century (links | edit)405 (links | edit)4th century BC (links | edit)432 (links | edit)200s (decade) (links | edit)300s (decade) (links | edit)1st century BC (links | edit)2nd century BC (links | edit)3rd century BC (links | edit)5th century BC (links | edit)6th century BC (links | edit)400s (decade) (links | edit)310s (links | edit)320s (links | edit)321 (links | edit)21st century BC (links | edit)11th century BC (links | edit)286 (links | edit)476 (links | edit)385 (links | edit)7th century BC (links | edit)410 (links | edit)325 (links | edit)380s (links | edit)381 (links | edit)470s (links | edit)430s (links | edit)430 (links | edit)510s (links | edit)View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)Retrieved from " WhatLinksHere/4th_century" As a library, NLM provides access to scientific literature. Inclusion in an NLM database does not imply endorsement of, or agreement with, the contents by NLM or the National Institutes of Health. Learn more: PMC Disclaimer | PMC Copyright Notice . 2022 Fall;21(3):rm33. doi: 10.1187/cbe.21-05-0134To frame their work, biology education researchers need to consider the role of literature reviews, theoretical frameworks, and conceptual frameworks as critical elements of the research and writing process. However, these elements can be confusing for scholars new to education research. This Research Methods article is designed to provide an overview of each of these elements and delineate the purpose of each in the educational research process. We describe what biology education researchers should consider as they conduct literature reviews, identify theoretical frameworks, and construct conceptual frameworks. Clarifying these different components of educational research studies can be helpful to new biology education researchers and the biology education research community at large in situating their work in the broader scholarly literature.Discipline-based education research (DBER) involves the purposeful and situated study of teaching and learning in specific disciplinary areas (Singer etal., 2012). Studies in DBER are guided by research questions that reflect disciplines priorities and worldviews. Researchers can use quantitative data, qualitative data, or both to answer these research questions through a variety of methodological traditions. Across all methodologies, there are different methods associated with planning and conducting educational research studies that include the use of surveys, interviews, observations, artifacts, or instruments. Ensuring the coherence of these elements to the disciplines perspective also involves situating the work in the broader scholarly literature. The tools for doing this include literature reviews, theoretical frameworks, and conceptual frameworks. However, the purpose and function of each of these elements is often confusing to new education researchers. The goal of this article is to introduce new biology education researchers to these three important elements important in DBER scholarship and the broader educational literature.The first element we discuss is a review of research (literature reviews), which highlights the need for a specific research question, study problem, or topic of investigation. Literature reviews situate the relevance of the study within a topic and a field. The process may seem familiar to science researchers entering DBER fields, but new researchers may still struggle in conducting the review. Booth etal. (2016b) highlight some of the challenges novice education researchers face when conducting a review of literature. They point out that novice researchers struggle in deciding how to focus the review, determining the scope of articles needed in the review, and knowing how to be critical of the articles in the review. Overcoming these challenges (and others) can help novice researchers construct a sound literature review that can inform the design of the study and help ensure the work makes a contribution to the field.The second and third highlighted elements are theoretical and conceptual frameworks. These guide biology education research (BER) studies, and may be less familiar to science researchers. These elements are important in shaping the construction of new knowledge. Theoretical frameworks offer a way to explain and interpret the studied phenomenon, while conceptual frameworks clarify assumptions about the studied phenomenon. Despite the importance of these constructs in educational research, biology educational researchers have noted the limited use of theoretical or conceptual frameworks in published work (DeHaan, 2011; Dirks, 2011; Lo etal., 2019). In reviewing articles published in CBELife Sciences Education (LSE) between 2015 and 2019, we found that fewer than 25% of the research articles had a theoretical or conceptual framework (see the Supplemental Information), and at times there was an inconsistent use of theoretical and conceptual frameworks. Clearly, these frameworks are challenging for published biology education researchers, which suggests the importance of providing some initial guidance to new biology education researchers.Fortunately, educational researchers have increased their explicit use of these frameworks over time, and this is influencing educational research in science, technology, engineering, and mathematics (STEM) fields. For instance, a quick search for theoretical or conceptual frameworks in the abstracts of articles in Educational Research Complete (a common database for educational research) in STEM fields demonstrates a dramatic change over the last 20 years: from only 778 articles published between 2000 and 2010 to 5703 articles published between 2010 and 2020, a more than sevenfold increase. Greater recognition of the importance of these frameworks is contributing to DBER authors being more explicit about such frameworks in their studies.Collectively, literature reviews, theoretical frameworks, and conceptual frameworks work to guide methodological decisions and the elucidation of important findings. Each offers a different perspective on the problem of study and is an essential element in all forms of educational research. As new researchers seek to learn about these elements, they will find different resources, a variety of perspectives, and many suggestions about the construction and use of these elements. The wide range of available information can overwhelm the new researcher who just wants to learn the distinction between these elements or how to craft them adequately.Our goal in writing this paper is not to offer specific advice about how to write these sections in scholarly work. Instead, we wanted to introduce these elements to those who are new to BER and who are interested in better distinguishing one from the other. In this paper, we share the purpose of each element in BER scholarship, along with important points on its construction. We also provide references for additional resources that may be beneficial to better understanding each element. Table 1 summarizes the key distinctions among these elements.Comparison of literature reviews, theoretical frameworks, and conceptual reviewsLiterature reviewsTheoretical frameworksConceptual frameworksPurposeTo point out the need for the study in BER and connection to the field.To state the assumptions and orientations of the researcher regarding the topic of studyTo describe the researchers understanding of the main concepts under investigationAimsA literature review examines current and relevant research associated with the study question. It is comprehensive, critical, and purposeful.A theoretical framework illuminates the phenomenon of study and the corresponding assumptions adopted by the researcher. Frameworks can take on different orientations.The conceptual framework is created by the researcher(s), includes the presumed relationships among concepts, and addresses needed areas of study discovered in literature reviews.Connection to the manuscriptA literature review should connect to the study question, guide the study methodology, and be central in the discussion by indicating how the analyzed data advances what is known in the field.A theoretical framework drives the question, guides the types of methods for data collection and analysis, informs the discussion of the findings, and reveals the subjectivities of the researcher.The conceptual framework is informed by literature reviews, experiences, or experiments. It may include emergent ideas that are not yet grounded in the literature. It should be coherent with the papers theoretical framing.Additional pointsA literature review may reach beyond BER and include other education research fields.A theoretical framework does not rationalize the need for the study, and a theoretical framework can come from different fields.A conceptual framework articulates the phenomenon under study through written descriptions and/or visual representations.This article is written for the new biology education researcher who is just learning about these different elements or for scientists looking to become more involved in BER. It is a result of our own work as science education and biology education researchers, whether as graduate students and postdoctoral scholars or newly hired and established faculty members. This is the article we wish had been available as we started to learn about these elements or discussed them with new educational researchers in biology.A literature review is foundational to any research study in education or science. In education, a well-conceptualized and well-executed review provides a summary of the research that has already been done on a specific topic and identifies questions that remain to be answered, thus illustrating the current research projects potential contribution to the field and the reasoning behind the methodological approach selected for the study (Maxwell, 2012). BER is an evolving disciplinary area that is redefining areas of conceptual emphasis as well as orientations toward teaching and learning (e.g., Labov etal., 2010; American Association for the Advancement of Science, 2011; Nehm, 2019). As a result, building comprehensive, critical, purposeful, and concise literature reviews can be a challenge for new biology education researchers.There are different ways to approach and construct a literature review. Booth etal. (2016a) provide an overview that includes, for example, scoping reviews, which are focused only on notable studies and use a basic method of analysis, and integrative reviews, which are the result of exhaustive literature searches across different genres. Underlying each of these different review processes are attention to the search process, appraisal of articles, synthesis of the literature, and analysis: SALSA (Booth etal., 2016a). This useful acronym can help the researcher focus on the process while building a specific type of review.However, new educational researchers often have questions about literature reviews that are foundational to SALSA or other approaches. Common questions concern determining which literature pertains to the topic of study or the role of the literature review in the design of the study. This section addresses such questions broadly while providing general guidance for writing a narrative literature review that evaluates the most pertinent studies.The literature review process should begin before the research is conducted. As Boote and Beile (2005, p. 3) suggested, researchers should be scholars before researchers. They point out that having a good working knowledge of the proposed topic helps illuminate avenues of study. Some subject areas have a deep body of work to read and reflect upon, providing a strong foundation for developing the research question(s). For instance, the teaching and learning of evolution is an area of long-standing interest in the BER community, generating many studies (e.g., Perry etal., 2008; Barnes and Brownell, 2016) and reviews of research (e.g., Sickel and Friedrichsen, 2013; Ziadie and Andrews, 2018). Emerging areas of BER include the affective domain, issues of transfer, and metacognition (Singer etal., 2012). Many studies in these areas are transdisciplinary and not always specific to biology education (e.g., Rodrigo-Peiris etal., 2018; Kolpikova etal., 2019). These newer areas may require reading outside BER; fortunately, summaries of some of these topics can be found in the Current Insights section of the LSE website.In focusing on a specific problem within a broader research strand, a new researcher will likely need to examine research outside BER. Depending upon the area of study, the expanded reading list might involve a mix of BER, DBER, and educational research studies. Determining the scope of the reading is not always straightforward. A simple way to focus ones reading is to create a summary phrase or research nugget, which is a very brief descriptive statement about the study. It should focus on the essence of the study, for example, first-year nonmajor students understanding of evolution, metacognitive prompts to enhance learning during biochemistry, or instructors inquiry-based instructional practices after professional development programming. This type of phrase should help a new researcher identify two or more areas to review that pertain to the study. Focusing on recent research in the last 5 years is a good first step. Additional studies can be identified by reading relevant works referenced in those articles. It is also important to read seminal studies that are more than 5 years old. Reading a range of studies should give the researcher the necessary command of the subject in order to suggest a research question.Given that the research question(s) arise from the literature review, the review should also substantiate the selected methodological approach. The review and research question(s) guide the researcher in determining how to collect and analyze data. Often the methodological approach used in a study is selected to contribute knowledge that expands upon what has been published previously about the topic (see Institute of Education Sciences and National Science Foundation, 2013). An emerging topic of study may need an exploratory approach that allows for a description of the phenomenon and development of a potential theory. This could, but not necessarily, require a methodological approach that uses interviews, observations, surveys, or other instruments. An extensively studied topic may call for the additional understanding of specific factors or variables; this type of study would be well suited to a verification or a causal research design. These could entail a methodological approach that uses valid and reliable instruments, observations, or interviews to determine an effect in the studied event. In either of these examples, the researcher(s) may use a qualitative, quantitative, or mixed methods methodological approach.Even with a good research question, there is still more reading to be done. The complexity and focus of the research question dictates the depth and breadth of the literature to be examined. Questions that connect multiple topics can require broad literature reviews. For instance, a study that explores the impact of a biology faculty learning community on the inquiry instruction of faculty could have the following review areas: learning communities among biology faculty, inquiry instruction among biology faculty, and inquiry instruction among biology faculty as a result of professional learning. Biology education researchers need to consider whether their literature review requires studies from different disciplines within or outside DBER. For the example given, it would be fruitful to look at research focused on learning communities with faculty in STEM fields or in general education fields that result in instructional change. It is important not to be too narrow or too broad when reading. When the conclusions of articles start to sound similar or no new insights are gained, the researcher likely has a good foundation for a literature review. This level of reading should allow the researcher to demonstrate a mastery in understanding the researched topic, explain the suitability of the proposed research approach, and point to the need for the refined research question(s).The literature review should include the researchers evaluation and critique of the selected studies. A researcher may have a large collection of studies, but not all of the studies will follow standards important in the reporting of empirical work in the social sciences. The American Educational Research Association (Duran etal., 2006), for example, offers a general discussion about standards for such work: an adequate review of research informing the study, the existence of sound and appropriate data collection and analysis methods, and appropriate conclusions that do not overstep or underexplore the analyzed data. The Institute of Education Sciences and National Science Foundation (2013) also offer Common Guidelines for Education Research and Development that can be used to evaluate collected studies.Because not all journals adhere to such standards, it is important that a researcher review each study to determine the quality of published research, per the guidelines suggested earlier. In some instances, the research may be fatally flawed. Examples of such flaws include data that do not pertain to the question, a lack of discussion about the data collection, poorly constructed instruments, or an inadequate analysis. These types of errors result in studies that are incomplete, error-laden, or inaccurate and should be excluded from the review. Most studies have limitations, and the author(s) often make them explicit. For instance, there may be an instructor effect, recognized bias in the analysis, or issues with the sample population. Limitations are usually addressed by the research team in some way to ensure a sound and acceptable research process. Occasionally, the limitations associated with the study can be significant and not addressed adequately, which leaves a consequential decision in the hands of the researcher. Providing critiques of studies in the literature review process gives the reader confidence that the researcher has carefully examined relevant work in preparation for the study and, ultimately, the manuscript.A solid literature review clearly anchors the proposed study in the field and connects the research question(s), the methodological approach, and the discussion. Reviewing extant research leads to research questions that will contribute to what is known in the field. By summarizing what is known, the literature review points to what needs to be known, which in turn guides decisions about methodology. Finally, notable findings of the new study are discussed in reference to those described in the literature review.Within published BER studies, literature reviews can be placed in different locations in an article. When included in the introductory section of the study, the first few paragraphs of the manuscript set the stage, with the literature review following the opening paragraphs. Cooper etal. (2019) illustrate this approach in their study of course-based undergraduate research experiences (CUREs). An introduction discussing the potential of CURES is followed by an analysis of the existing literature relevant to the design of CUREs that allows for novel student discoveries. Within this review, the authors point out contradictory findings among research on novel student discoveries. This clarifies the need for their study, which is described and highlighted through specific research aims.A literature reviews can also make up a separate section in a paper. For example, the introduction to Todd etal. (2019) illustrates the need for their research topic by highlighting the potential of learning progressions (LPs) and suggesting that LPs may help mitigate learning loss in genetics. At the end of the introduction, the authors state their specific research questions. The review of literature following this opening section comprises two subsections. One focuses on learning loss in general and examines a variety of studies and meta-analyses from the disciplines of medical education, mathematics, and reading. The second section focuses specifically on LPs in genetics and highlights student learning in the midst of LPs. These separate reviews provide insights into the stated research question.A well-conceptualized, comprehensive, and critical literature review reveals the understanding of the topic that the researcher brings to the study. Literature reviews should not be so big that there is no clear area of focus; nor should they be so narrow that no real research question arises. The task for a researcher is to craft an efficient literature review that offers a critical analysis of published work, articulates the need for the study, guides the methodological approach to the topic of study, and provides an adequate foundation for the discussion of the findings.In our own writing of literature reviews, there are often many drafts. An early draft may seem well suited to the study because the need for and approach to the study are well described. However, as the results of the study are analyzed and findings begin to emerge, the existing literature review may be inadequate and need revision. The need for an expanded discussion about the research area can result in the inclusion of new studies that support the explanation of a potential finding. The literature review may also prove to be too broad. Refocusing on a specific area allows for more contemplation of a finding.It should be noted that there are different types of literature reviews, and many books and articles have been written about the different ways to embark on these types of reviews. Among these different resources, the following may be helpful in considering how to refine the review process for scholarly journals:Booth, A., Sutton, A., & Papaioannou, D. (2016a). Systemic approaches to a successful literature review (2nd ed.). Los Angeles, CA: Sage. This book addresses different types of literature reviews and offers important suggestions pertaining to defining the scope of the literature review and assessing extant studies.Booth, W. C., Colomb, G. G., Williams, J. M., Bizup, J., & Fitzgerald, W. T. (2016b). The craft of research (4th ed.). Chicago: University of Chicago Press. This book can help the novice consider how to make the case for an area of study. While this book is not specifically about literature reviews, it offers suggestions about making the case for your study.Galvan, J. L., & Galvan, M. C. (2017). Writing literature reviews: A guide for students of the social and behavioral sciences (7th ed.). Routledge. This book offers guidance on writing different types of literature reviews. For the novice researcher, there are useful suggestions for creating coherent literature reviews.As new education researchers may be less familiar with theoretical frameworks than with literature reviews, this discussion begins with an analogy. Envision a biologist, chemist, and physicist examining together the dramatic effect of a fog tsunami over the ocean. A biologist gazing at this phenomenon may be concerned with the effect of fog on various species. A chemist may be interested in the chemical composition of the fog as water vapor condenses around bits of salt. A physicist may be focused on the refraction of light to make fog appear to be sitting above the ocean. While observing the same objective event, the scientists are operating under different theoretical frameworks that provide a particular perspective or lens for the interpretation of the phenomenon. Each of these scientists brings specialized knowledge, experiences, and values to this phenomenon, and these influence the interpretation of the phenomenon. The scientists theoretical frameworks influence how they design and carry out their studies and interpret their data.Within an educational study, a theoretical framework helps to explain a phenomenon through a particular lens and challenges and extends existing knowledge within the limitations of that lens. Theoretical frameworks are explicitly stated by an educational researcher in the papers framework, theory, or relevant literature section. The framework shapes the types of questions asked, guides the method by which data are collected and analyzed, and informs the discussion of the results of the study. It also reveals the researchers subjectivities, for example, values, social experience, and viewpoint (Allen, 2017). It is essential that a novice researcher learn to explicitly state a theoretical framework, because all research questions are being asked from the researchers implicit or explicit assumptions of a phenomenon of interest (Schwandt, 2000).Theoretical frameworks are one of the most contemplated elements in our work in educational research. In this section, we share three important considerations for new scholars selecting a theoretical framework.The first step in identifying a theoretical framework involves reflecting on the phenomenon within the study and the assumptions aligned with the phenomenon. The phenomenon involves the studied event. There are many possibilities, for example, student learning, instructional approach, or group organization. A researcher holds assumptions about how the phenomenon will be effected, influenced, changed, or portrayed. It is ultimately the researchers assumption(s) about the phenomenon that aligns with a theoretical framework. An example can help illustrate how a researchers reflection on the phenomenon and acknowledgment of assumptions can result in the identification of a theoretical framework.In our example, a biology education researcher may be interested in exploring how students learning of difficult biological concepts can be supported by the interactions of group members. The phenomenon of interest is the interactions among the peers, and the researcher assumes that more knowledgeable students are important in supporting the learning of the group. As a result, the researcher may draw on Vygotskys (1978) sociocultural theory of learning and development that is focused on the phenomenon of student learning in a social setting. This theory posits the critical nature of interactions among students and between students and teachers in the process of building knowledge. A researcher drawing upon this framework holds the assumption that learning is a dynamic social process involving questions and explanations among students in the classroom and that more knowledgeable peers play an important part in the process of building conceptual knowledge.It is important to state at this point that there are many different theoretical frameworks. Some frameworks focus on learning and knowing, while other theoretical frameworks focus on equity, empowerment, or discourse. Some frameworks are well articulated, and others are still being refined. For a new researcher, it can be challenging to find a theoretical framework. Two of the best ways to look for theoretical frameworks is through published works that highlight different frameworks.When a theoretical framework is selected, it should clearly connect to all parts of the study. The framework should augment the study by adding a perspective that provides greater insights into the phenomenon. It should clearly align with the studies described in the literature review. For instance, a framework focused on learning would correspond to research that reported different learning outcomes for similar studies. The methods for data collection and analysis should

enhanced answer keys and reflection questions, can help students and instructors bridge the external and internal factors and support learning (p. 3). They connected the scaffolds in the study to the three dimensions of metacognition and the eventual transformation of existing ideas into new or revised ideas. Their framework provides a rationale for focusing on how students use two different scaffolds, and not on other factors that may influence a students success (self-efficacy, use of active learning, exam format, etc.).In constructing conceptual frameworks, researchers should address needed areas of study and/or contradictions discovered in literature reviews. By attending to these areas, researchers can strengthen their arguments for the importance of a study. For instance, conceptual frameworks can address how the current study will fill gaps in the research, resolve contradictions in existing literature, or suggest a new area of study. While a literature review describes what is known and not known about the phenomenon, the conceptual framework leverages these gaps in describing the current study (Maxwell, 2012). In the example of Sabel etal. (2017), the authors indicated there was a gap in the literature regarding how scaffolds engage students in metacognition to promote learning in large classes. Their study helps fill that gap by describing how scaffolds can support students in the three dimensions of metacognition: intelligibility, plausibility, and wide applicability. In another example, Lane (2016) integrated research from science identity, the ethic of care, the sense of belonging, and an expertise model of student success to form a conceptual framework that addressed the critiques of other frameworks. In a more recent example, Sbeglia etal. (2021) illustrated how a conceptual framework influences the methodological choices and inferences in studies by educational researchers.Sometimes researchers draw upon the conceptual frameworks of other researchers. When a researchers conceptual framework closely aligns with an existing framework, the discussion may be brief. For example, Ghee etal. (2016) referred to portions of SCCT as their conceptual framework to explain the significance of their work on students self-efficacy and career interests. Because the authors conceptualization of this phenomenon aligned with a previously described framework, they briefly mentioned the conceptual framework and provided additional citations that provided more detail for the readers.Within both the BER and the broader DBER communities, conceptual frameworks have been used to describe different constructs. For example, some researchers have used the term conceptual framework to describe students conceptual understandings of a biological phenomenon. This is distinct from a researchers conceptual framework of the educational phenomenon under investigation, which may also need to be explicitly described in the article. Other studies have presented a research logic model or flowchart of the research design as a conceptual framework. These constructions can be quite valuable in helping readers understand the data-collection and analysis process. However, a model depicting the study design does not serve the same role as a conceptual framework. Researchers need to avoid conflating these constructs by differentiating the researchers conceptual framework that guides the study from the research design, when applicable.Explicitly describing conceptual frameworks is essential in depicting the focus of the study. We have found that being explicit in a conceptual framework means using accepted terminology, referencing prior work, and clearly noting connections between terms. This description can also highlight gaps in the literature or suggest potential contributions to the field of study. A well-elucidated conceptual framework can suggest additional studies that may be warranted. This can also spur other researchers to consider how they would approach the examination of a phenomenon and could result in a revised conceptual framework.It can be challenging to create conceptual frameworks, but they are important. Below are two resources that could be helpful in constructing and presenting conceptual frameworks in educational research:Maxwell, J. A. (2012). Qualitative research design: An interactive approach (3rd ed.). Los Angeles, CA: Sage. Chapter 3 in this book describes how to construct conceptual frameworks.Ravitch, S. M., & Riggan, M. (2016). Reason & rigor: How conceptual frameworks guide research. Los Angeles, CA: Sage. This book explains how conceptual frameworks guide the research questions, data collection, data analyses, and interpretation of results.Literature reviews, theoretical frameworks, and conceptual frameworks are all important in DBER and BER. Robust literature reviews reinforce the importance of a study. Theoretical frameworks connect the study to the base of knowledge in educational theory and specify the researchers assumptions. Conceptual frameworks allow researchers to explicitly describe their conceptualization of the relationships among the components of the phenomenon under study. Table 1 provides a general overview of these components in order to assist biology education researchers in thinking about these elements.It is important to emphasize that these different elements are intertwined. When these elements are aligned and complement one another, the study is coherent, and the study findings contribute to knowledge in the field. When literature reviews, theoretical frameworks, and conceptual frameworks are disconnected from one another, the study suffers. The point of the study is lost, suggested findings are unsupported, or important conclusions are invisible to the researcher. In addition, this misalignment may be costly in terms of time and money.Conducting a literature review, selecting a theoretical framework, and building a conceptual framework are some of the most difficult elements of a research study. It takes time to understand the relevant research, identify a theoretical framework that provides important insights into the study, and formulate a conceptual framework that organizes the finding. In the research process, there is often a constant back and forth among these elements as the study evolves. With an ongoing refinement of the review of literature, clarification of the theoretical framework, and articulation of a conceptual framework, a sound study can emerge that makes a contribution to the field. This is the goal of BER and education research.Allee, V. (2000). Knowledge networks and communities of learning. OD Practitioner, 32(4), 413. [Google Scholar]Allen, M. (2017). The Sage encyclopedia of communication research methods (Vols. 14). Los Angeles, CA: Sage. 10.4135/9781483381411 [DOI] [Google Scholar]American Association for the Advancement of Science. (2011). Vision and change in undergraduate biology education: A call to action. Washington, DC. [Google Scholar]Anfara, V. A., Mertz, N. T. (2014). Setting the stage. In Anfara, V. A., Mertz, N. T. (eds.), Theoretical frameworks in qualitative research (pp. 122). Sage. [Google Scholar]Barnes, M. E., Brownell, S. E. (2016). 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[DOI] [PMC free article] [PubMed] [Google Scholar]This section collects any data citations, data availability statements, or supplementary materials included in this article.Articles from CBE Life Sciences Education are provided here courtesy of American Society for Cell Biology A literature review is a comprehensive, critical summary of previous research on a specific topic. It helps to understand the current state of knowledge, identify gaps, and position your own research in the context of existing studies. Its a crucial part of academic work, especially in research projects, theses, and dissertations.Understand the current state of knowledge on a specific topic.Identify gaps in the existing literature or areas where further research is needed.Develop a theoretical framework or support a hypothesis for your own research.Provide a context for your research by grounding it in the existing body of work.Avoid duplication of past research by ensuring your work builds on previous studies.Clearly identify the subject or question you want to explore. This helps narrow down the scope of your review and ensures that you focus on relevant sources.Conduct a broad search to gather sources, such as books, peer-reviewed journal articles, conference papers, dissertations, and other credible materials.Search engines like Google Scholar, databases like JSTOR, PubMed, Scopus, and Web of Science are common academic sources. Many universities offer access to subscription-based databases as well.Once you have identified potential sources, gather them by accessing digital versions through databases, university subscriptions, or public repositories. You may also access physical copies from libraries.Critically evaluate the credibility, relevance, and quality of the sources you find. Look for peer-reviewed articles, books by experts in the field, and high-impact journals.Assess the methodology used in research articles to ensure they are appropriate and robust.Take note of the publication datemake sure to focus on recent studies unless historical perspectives are necessary for your topic.Organize the literature by themes, trends, methodologies, or findings, and identify patterns, contradictions, or gaps.Compare and contrast different studies, noting their strengths, weaknesses, and contributions to the field.Present your findings clearly and concisely. Discuss the strengths and limitations of the studies youve reviewed and highlight the areas where further research is needed.Use a proper citation style (APA, MLA, Chicago, etc.) as per the requirements of your project.As new literature is continuously published, keep your review up-to-date by incorporating the latest studies relevant to your topic.Develop a list of specific keywords or phrases that relate directly to your topic. Use Boolean operators (AND, OR, NOT) to narrow or expand your searchUse databases such as Google Scholar (for scholarly articles), PubMed (for health sciences), JSTOR (for humanities and social sciences), ERIC (for education), Scopus, and Web of Science for a more comprehensive collection of peer-reviewed sources.Use filters to narrow your search by publication date, type of publication (e.g., peer-reviewed journals), or subject area.Read abstracts and summaries to determine whether an article is relevant before downloading or accessing the full text.Accessing Full Text:If access is restricted, use academic libraries, interlibrary loan systems, or consider contacting the author directly. Many researchers share PDFs of their papers upon request.Search for open-access journals or repositories like arXiv, PubMed Central, or Directory of Open Access Journals (DOAJ), which provide free access to full-text articles.After reviewing key articles, check their reference lists for other relevant works that may have been cited but missed in your search.Title Page (if required)If youre submitting a report or dissertation, include a title page that contains the title of your literature review, your name, the course, the instructors name, and the date.A concise summary of the review, typically 150-250 words.Include the purpose of the literature review, the scope, and the key findings or conclusions.Context and Importance: Introduce the topic you are reviewing, why it is significant, and the scope of your review (i.e., the time period, geographical focus, or research question).Purpose: Clearly state the purpose of the literature review (e.g., to synthesize existing research, identify gaps, inform your own research, etc.).Research Questions/Objective: If applicable, introduce your central research question or hypothesis.Search Strategy: Describe the databases, keywords, and search criteria you used to gather the literature (e.g., peer-reviewed articles, books, or grey literature).Inclusion and Exclusion Criteria: Specify any criteria you applied to select or exclude sources (e.g., publication date, language, subject relevance).Review Method: If using systematic or scoping reviews, mention the method for synthesizing or categorizing literature.Thematic or Theoretical Synthesis (Main Body)This is the core of the literature review, where you summarize, analyze, and synthesize the literature.Possible structures for this section:Thematic Structure: Organize your review by major themes or topics found in the literature.Example: If reviewing literature on climate change, you might have sections on the science of climate change, its impacts on ecosystems, and human responses to it.Chronological Structure: Present studies in the order they were published to show the progression of research over time.Example: Early studies focused on the theory of climate change, while later studies look into its economic consequences.Methodological Structure: Organize the review based on the methods used in the research (qualitative, quantitative, mixed-methods, etc.).Example: One section could focus on qualitative research studies, another on quantitative studies, and so on.Theoretical Framework: If applicable, group literature by theories or conceptual frameworks used by the authors. For instance, if reviewing research on motivation, you could discuss literature through the lens of Maslows hierarchy of needs or Self-Determination Theory.Key Findings: For each theme or section, highlight the major findings, common points, contradictions, and the implications of the research.Summary: Recap the key findings of the literature review.Research Gaps: Highlight areas where further research is needed or areas that have not been fully explored.Implications: Discuss the implications of the findings for your own research or for the broader field.Theoretical or Practical Contributions: If relevant, mention how the review contributes to theory or practice.List all the sources you cited in your review. Use the appropriate citation style (e.g., APA, MLA, Chicago) as required by your institution or publication.A theoretical framework provides a foundation for your research by drawing on theories, concepts, and existing knowledge to guide your study. It sets the context and helps to justify your research questions, methodology, and the interpretation of your findings.Establishes a lens through which you analyze your research topic.Explains the relationships between variables or concepts in your research.Provides a solid base to develop hypotheses or predictions.ContentKey Concepts and Theories: Describe the theories and concepts relevant to your research topic. These could be established in prior studies or emerging theoretical perspectives.Variables or Constructs: Identify the variables or constructs that are central to your study, explaining their relationship based on theoretical perspectives.Hypotheses or Propositions: If your study is hypothesis-driven, present any theoretical predictions.Introduction: Briefly introduce the theoretical perspectives that are relevant to your research.Review of Key Theories: Discuss relevant theories in detail, explaining their foundational ideas and how they relate to your research topic.Research Questions or Hypotheses: Based on the theories discussed, outline your research questions or hypotheses.Application to Your Study: Explain how the theoretical framework applies to your research problem and how it guides your methodology and analysis.Visual Representation (optional): Sometimes, researchers include diagrams or models that depict the relationships between different concepts or variables.Deductive reasoning starts with a general theory or hypothesis and then tests it through specific observations or empirical data.Begin with a theory or established knowledge.Develop hypotheses based on this theory.Test the hypotheses with data.Draw conclusions about the validity of the theory based on the results.Inductive reasoning starts with observations or data and then moves toward developing a broader theory or generalization.Begin with specific observations or data.Identify patterns or trends in the data.Develop a theory or general principle based on these observations.In conclusion, the literature review provides a comprehensive synthesis of existing research, highlighting key findings, trends, and gaps in the field. It establishes the current state of knowledge, identifies areas for further exploration, and sets the stage for new contributions to the topic. The theoretical framework, in turn, grounds the study in established theories and concepts, offering a structured lens through which to analyze the research problem. By linking the literature review and theoretical framework, the study gains clarity on the direction of the research, how existing theories inform the studys approach, and how the study will contribute to addressing identified gaps in the literature.Use academic databases such as Google Scholar, PubMed, JSTOR, or Scopus to find peer-reviewed articles and books. You should also consider using university library resources, citation databases, and open-access journals. Be sure to focus on sources that are peer-reviewed and published by credible scholars or institutions.Deductive reasoning starts with a general theory or hypothesis and tests it through specific observations (typically associated with quantitative research). Inductive reasoning starts with observations or data and builds broader generalizations or theories (common in qualitative research).A strong literature review is comprehensive, well-organized, and critical, showing an in-depth understanding of the topic and identifying clear gaps. A strong theoretical framework is well-justified, clear, and directly linked to the research problem, guiding your study effectively. Peer feedback, clear logical progression, and alignment with research objectives can indicate strength

Theoretical review. What is theoretical framework. Theoretical framework and methodology. What is methodological review in research. What's theoretical review in research. What is theoretical review in research.