Media can be defined by its technology, symbol systems, and processing capabilities. The most obvious characteristic of a medium is its technology: the mechanical and electronic aspects that determine its function and, to some extent, its shape and other physical features. These are the characteristics that are commonly used to classify a medium such as a television, a radio, and so on. The cognitive effects of these characteristics, if any, are usually indirect. Characteristics such as size, shape, and weight make it more likely that a student will learn with a book but not a computer while on a bus, although of course this predilection is changing as computers get smaller, lighter, and cheaper. A few cognitive effects of technology, however, are more direct. For example, the size and resolution of many computer screens are such that reading their texts may be more difficult than reading the text of some books (Haas, 1989).

However, the primary effect of a medium's technology is to enable and constrain its other two capabilities: the symbol systems it can employ and the processes that can be performed with it. For example, a computer with a graphics board or a speech synthesis board can use different symbols in its presentations than those without these features. Computers with enough memory to run expert systems can process information in different ways than those without such a memory. These additional symbol systems and processing capabilities are likely to account for the cognitive effects of these systems, rather than the technology, per se.

Symbol systems and processing capabilities have a number of important implications for learning. Salomon (1974, 1979) describes the relationship between a medium's symbol systems and mental representations. Symbol systems are modes of appearance (Goodman, 1976), or sets of elements (words, picture components, etc.), that are interrelated within each system by syntax and are used in specifiable ways in relation to fields of reference. (Words and sentences in a text may represent people, objects, and activities and be structured in a way that forms a story.) A medium can be described and perhaps distinguished from other media by its capabilities to employ certain symbol systems. Thus, television can be thought of as a medium that is capable of employing representational (i.e., pictorial) and…
expected to have an effect on learning processes and outcomes. Whether or not a medium's capabilities make a difference in learning depends on how they correspond to the particular learning situation—the tasks and learners involved—and the way the medium's capabilities are used by the instructional design. Tasks vary in their situational characteristics and in the demands they place on the learner to create mental representations of certain information and to operate on that information in certain ways. Learners vary in their processing capabilities, the information and procedures that they have stored in long-term memory, their motivations and purposes for learning, and their metacognitive knowledge of when and how to use these procedures and information.

Many learners, perhaps most, can and frequently do supply useful representations and operations for themselves from the information externally available, regardless of the medium used. But learners will benefit most from the use of a particular medium with certain capabilities (as compared to the use of a medium without these) if the capabilities are employed by the instructional method to provide certain representations or perform or model certain cognitive operations that are salient to the task and situation and that the learners cannot or do not perform or provide for themselves. These representations and operations, in turn, influence problem solving and the ability to generate and use representations in subsequently encountered situations. This view of learning with media as a continuous, reciprocal interaction between person and situation—between learner and mediated information—is compatible with Snow's (1989) evolving aptitude-treatment interaction theory.
二、請將下列文字翻譯成中文。（20分）

教育研究在過去十幾年中有了變化。過去主要由測量、操作定義、變量、假設測試和統計所支配的研究領域，為追求強調描述、歸納、扎根理論和人們理解的研究方式，讓出了位置。我們將這種方式稱為“質性研究”。

對質性方法研究教育問題的依賴日益增長。大多數教育研究者對研究策略的變化持積極態度，許多研究者將質性方法融入教學和研究中。更多的教育研究者自稱質性方法專家，職位招募廣告中常有質性技能的要求。一個人只要看看政府機構的資金模式、教育研究會議的項目，或當前書籍的標題以及各教育期刊的內容，就知道質性研究已經成熟（Popkewitz, 1984）。更多教育研究課程聚焦於質性方法（Wolcott, 1983；Bogdan, 1983），而一般研究課程則將這種領域納入其課程內容。

雖然人類學和社會學研究者自一個世紀以來就使用這種方法，但“質性研究”一詞直到20世紀60年代末才在社會科學中使用。我們將質性研究用作一個名詞，用以指代共享某些特徵的研究策略。收集的數據被稱為“軟的”，即充滿對人物、地點和對話的描述，並且不易通過統計程序處理。研究問題不是由變量操作化形成，而是用於調查整個複雜的、具體的問題。當進行質性研究的人在收集數據時，他們不會著眼於要回答的特定問題或要測試的假設。他們也關心從受試者的觀點來理解行為。外部原因不那麼重要。他們往往通過與受試者常用地方的長時間接觸來收集數據。

最著名的質性研究代表人物和最能體現我們剛提到的特徵的人物是參與觀察和深入訪談。這名看著非裔美國兒童下車的研究人員正在進行參與觀察研究。研究者進入他或她將研究的人物的世界，與他們熟悉，被他們信任，並有系統地詳細地記錄他/她所聽所見的內容。這些內容是通過其他資料如學校備忘錄和記錄、報紙文章和照片來補充的。

參與觀察和深入訪談是我們最常見的質性研究方式。參與觀察的代表人物是詹姆斯·班傑明（James Benjamin），他寫了一本書《融入社區：參與觀察的理論與實踐》（Community: A Field Guide to Participatory Observation）。這本書詳細介紹了參與觀察的方法和實踐。班傑明在《質性研究》（Qualitative Research）雜志上撰寫的文章中，解釋了如何進行參與觀察研究，他指出，參與觀察研究者應該花時間與受試者一起生活，了解他們的日常生活和文化。他還強調了研究者在與受試者互動時的敏感性和謹慎性。

質性研究的另一個重要方面是深入訪談。這是一種深入、系統地探討某一主題的方法。深入訪談通常包含幾個問題，每個問題都對進一步探討提供幫助。研究者會計劃訪談的時間和地點，並使用開放式問題來激發受訪者的談話。然而，質性研究的另一個特徵是，研究者不會期望從實驗設計那樣的結構中獲得答案，而是傾向於開放性和互動性的訪談，讓受訪者自由表達自己的觀點。
三、請將下列文字整理摘要，以中文製作一份報告或教學可用之文件。(10分)

<table>
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<th>硬性資料</th>
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<td>事實、結果、事件、歷史、統計、力量、目標、程序、物理現象、可觀察的偏差、時間因素、趨勢、生產力、品質和效能水平</td>
<td>感覺、意見、人性因素、摩擦、態度、滿意度水平、壓力、挫折感、人格衝突、行為、流言蜚語、直覺、直覺反應、思維障礙。</td>
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2.問題認識技術 - 資料收集過程

研究方法：資料收集過程將幫助您系統性地研究問題的背景和影響。這十步的方法將引導您通過設計和實施對問題的調查。

(1) 確定整個信息類型的需要，以界定問題。
(2) 選擇最適合這種信息的資料收集方法。
(3) 定義每個適當技術要收集的具體目標資料。
(4) 收集所需的資料。
(5) 分析資料以找出模式。
(6) 建立確認分析的方法，如實驗或更專注的資料收集過程。
(7) 收集資料以確認模式。
(8) 將資料和分析記錄在易於理解的形式中。
(9) 設計視覺化的展示，如果其他人需要使用您的分析。
(10) 將資料和分析呈現出來。