different components, and the handling of different sizes and shapes. Zeisel [Zei85] draws attention to the difficulties in the presentation of statistical tables and presents some solutions to these difficulties. He also discusses analytical techniques for the refinement of statistical tables to meet readers requirements. The emphasis of his book is on the relationships among data that describe what is and what happens, rather than on issues of presentational form.

Based on these studies, we have abstracted guidelines for the design of high-quality tables at different stages of composition. These guidelines are summarized.

1.2.1 Logical structure design

At this stage, we decide the content of a table by taking into account the readers' requirements and convenience. There are three guidelines for this stage:

1. Contain only necessary information [Hal43, Zei85]

   Suppose a course instructor needs to design a table to show students their final marks. Students are concerned not only with their marks but also how their marks compare with those of other students. Thus, the table should list not only the marks for each student, but should also give the average, minimum and maximum marks. On the other hand, a large table with complex structure needs more time to comprehend. If a table contains more information than readers need, it is better to simplify the table by combining items and removing redundant and unrelated items. For example, if a department chair wants to examine the marks for a course, he or she is probably interested only in the average, minimum, and maximum marks, and how many students have failed the course. Thus, a table for the chair need not display the marks of every student. We can consider such a summary table a view, in the database sense, of the original table.

2. Present a table as an explicit structure [WF70]

   A table in which all the information is given explicitly such that a reader needs only to locate the required item, is called an *explicit structure*. A table that contain all necessary information, but requires readers to do some calculation after locating