LEDs and current limiting resistors

Two key parameters of LEDs are usually provided: forward voltage (typically 3.2 volts) and ideal current (20 milliamps).
To light an LED, a power source is needed. A simplified circuit diagram can be introduced, emphasizing the necessity of using a resistor to prevent rapid LED failure. According to Kirchhoff's voltage law, the total voltage in a closed circuit must equal zero. Using Ohm's Law (Resistance = Voltage / Current), the required current limiting resistance can be calculated. If exact resistor values aren't available, larger resistors can be used safely.
The power rating of resistors is crucial; using a power calculation (Voltage*Current), it’s determined that a quarter-watt resistor suffices.
When connecting multiple LEDs, placing them in series rather than parallel saves power and increases efficiency by reducing wasted energy.
Caution against trusting manufacturers' specifications on forward voltage is advised; actual consumption may exceed stated values.
Variability in forward voltage among different LEDs necessitates careful management of current flow; small changes in supply voltage can lead to significant increases in current draw.
A single large resistor may not effectively manage current when multiple LEDs are connected due to differing forward voltages among them.
The best practice involves measuring when exactly 20 milliamps flow through each LED instead of relying solely on constant voltage setups.