Let $P$ be a poset and let $P^*$ be the set of all finite length words over $P$. Generalized subword order is the partial order on $P^*$ obtained by letting $u \leq w$ if and only if there is a subword $u'$ of $w$ having the same length as $u$ such that each element of $u$ is less than or equal to the corresponding element of $u'$ in the partial order on $P$. Classical subword order arises when $P$ is an antichain, while letting $P$ be a chain gives an order on compositions. For any finite poset $P$, we use discrete Morse theory to give a simple formula for the Möbius function of $P^*$ in terms of the Möbius function of $P$. This permits us to rederive in an easy and uniform manner previous results of Björner, Sagan and Vatter, and Tomie. (Received September 16, 2011)