In 1978, Thurston showed that all knots are either torus knots, satellite knots or hyperbolic knots. We extend the notion of hyperbolicity first to virtual knots and then to Turaev surfaces associated to knot diagrams. We use this to show that we can associate hyperbolic invariants to any classical or virtual knot, including torus knots, satellite knots and even the trivial knot. (Received January 24, 2019)