Concrete grammar for *Assignment* **and** *Expression* **(Tucker and Noonan, 2007)**

$$Assignment \rightarrow Identifier \, [\, [\, Expression\,]\,] \; = \; Expression;$$

$$Expression \rightarrow Conjunction \, \{\, ||\, Conjunction\, \}$$
$$Conjunction \rightarrow Equality \, \{\, \&\&\, Equality\, \}$$
$$Equality \rightarrow Relation \, [\, EquOp\, Relation\,]$$
$$EquOp \rightarrow == \;|\; !=$$
$$Relation \rightarrow Addition \, [\, RelOp\, Addition\,]$$
$$RelOp \rightarrow < \;|\; < = \;|\; > \;|\; > =$$
$$Addition \rightarrow Term \, \{\, AddOp\, Term\, \}$$
$$AddOp \rightarrow + \;|\; -$$
$$Term \rightarrow Factor \, \{\, MulOp\, Factor\, \}$$
$$MulOp \rightarrow * \;|\; / \;|\; \%$$
$$Factor \rightarrow [\, UnaryOp\,]\, Primary$$
$$UnaryOp \rightarrow - \;|\; !$$
$$Primary \rightarrow Identifier \, [\, [\, Expression\,]\,] \;|\; Literal \;|$$
$$(\, Expression\,) \;|\; Type \, (\, Expression\,)$$

Abstract grammar for *Conditional***,** *Assignment* **and** *Expression* **(Tucker and Noonan, 2007)**

$$Conditional Expression \text{ test; } Statement \text{ thenbranch, elsebranch}$$
$$Assignment = Variable \text{ target; } Expression \text{ source}$$
$$Expression = Variable \;|\; Value \;|\; Binary \;|\; Unary$$
$$Binary = Operator \text{ op; } Expression \text{ term1, term1}$$
$$Unary = Operator \text{ op; } Expression \text{ term}$$
$$Variable = String \text{ id}$$
$$Value = IntValue \;|\; BoolValue \;|\; FloatValue \;|\; CharValue$$
$$IntValue = Integer \text{ value}$$
$$BoolValue = Boolean \text{ value}$$
$$FloatValue = Float \text{ value}$$
$$CharValue = Char \text{ value}$$
$$Operator = + \;|\; - \;|\; * \;|\; / \;|! \;|\; == \;|\; != \;|< \;|> \;|\; < = \;|\; > =$$