PROBLEM
Reuse of already existing resources and solutions became a strategy for cost reduction and efficient improvement of the information system development process. Currently, building repositories of reusable artifacts for database design is based on manual approaches that depend mainly on experienced and scarce modeling designers and domain experts.

PURPOSES
In this research, we explored knowledge-based and pattern-based approaches that help database designers develop quality conceptual data models based on reusable patterns. The purposes of this research are:
(1) Proposing an automatic method for creating the EIR and RIR as new repositories of reusable artifacts for ER (Entity-Relationship) modeling design;
(2) Developing EIPW (Entity Instance Pattern WordNet) with EIR and RIR by integrating pattern-based technique and various modeling techniques;
(3) Evaluating the usefulness of the EIPW by human subject experiments.

Creating the EIR and RIR
EIR and RIR are the repositories of EIPs (Entity Instance Pattern) and RIPs (Relationship Instance Pattern), respectively. These repositories contain ER modeling patterns from prior designs and serve as knowledge-based repositories for conceptual modeling. An EIP is a pattern of a single entity and its properties. An RIP is a binary relationship with cardinality constraints between two entities. We propose a method based on a database reverse engineering concept to automatically extract EIPs and RIPs from relational schemas. The metadata model of an EIP and an RIP is shown in Figure 1.

RESULTS
A 2X2 within-subjects analysis of variance was performed on ER model quality scores as a function of EIPW (with, no tool) and task size (medium, moderate) as shown in Table 1.

| QUALITY SCORE | System (EIPW, no tool) F(1,19) = 96.01, p < 0.000 |
| System x Task Size | F(1,19) = 1.06, p < 0.317 |

From the calculated means shown in Figure 4, the ER models created by the EIPW were better than those created by no tool for each task size. From Table 1, the result showed that the main effect of system (with EIPW, no tool) was significant (p < 0.00). Therefore, this empirical result indicated the significant improvement in designer performance when using our EIPW.

CONCLUSION
We have proposed a method for improving the process of database design. The results suggested that our reusable patterns can indeed be an asset in supporting the database design process because they minimize the cognitive load on the designers and ensure that the database designs are correct.

Reference