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Degree **:** Ph.D.

Title of Thesis : The Effect of a Suggested Program for Teaching Novel Based on Language Decision Making Approach in Developing the First Year Secondary School Students' Critical Reading Skill, and its Achievement of the Standards Document for EFL Learning

Supervisors : Dr. Michel Robert Bonneu, Dr. Sanaa Abd El-Aziz Ismail and Dr. Ahmed Mahmoud Gad

Abstract :

The study of longitudinal data plays a significant role in medicine, epidemiology and social sciences. Typically, the interest is in the dependence of the outcome variable on the covariates. The generalized linear models (GLMs) were proposed to unify the regression approach for a wide variety of discrete and continuous longitudinal data. The responses (outcomes) in longitudinal data are usually correlated since repeated observations are taken from the same subject. Ignoring this type of correlation may affect the validity of the likelihood inference. Hence, an extension of the GLMs, that account for such correlation, is needed. This can be done by inclusion of random effects in the linear predictor; that is the generalized linear mixed models (GLMMs) (also called the random effects models). The objective of this thesis is to calculate the maximum likelihood estimates (MLEs) for the regression parameters of the logit model, when the traditional assumption of normal random effects is relaxed. In this case, a more convenient skewed distribution, such as the lognormal distribution, is used instead. However, adding non-normal random effects to the GLMM complicates the likelihood estimation considerably because the likelihood function can no longer be expressed in a closed form. So, the direct numerical evaluation techniques (such as Newton-Raphson) become analytically and computationally tedious. To overcome such problems, the present study proposes and develops a Monte Carlo EM (MCEM) algorithm, to obtain the maximum likelihood estimates for a logistic regression model when the lognormal distribution is assumed as the random effects density.

Keywords:

Random effects models; Generalized linear mixed models (GLMM); Generalized linear models (GLM); MCEM algorithm.