this will often lead to under-estimation of the school performance and as a consequence would yield a misleading conclusion. IRT based person-fit statistic showed some promise in detecting aberrant response pattern. Note that the decision whether or not to exclude an examinee's score in the analysis is a decision that requires some serious thought from the analyst. Person-fit analysis should not be used as the only basis for such decision. Instead, other relevant information should be considered.

It was also shown that the estimate of item characteristic, such as the item difficulty, is less appealing in the CTT framework, for example, the estimate is not invariant to the sample of examinees who took the test. Although we have not shown in this study how the estimate of the item parameters from IRT framework are affected by the sample of examinees, several studies have shown that the item parameter estimates using the IRT are invariant of the examinee population and estimates of examinee parameters are invariant of the test items. See for example, Hambleton and Swaminathan (1985), van der Linden and Hambleton (1997).

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Appendices

A.1. IRT Item Parameters (2PL Model) and CTT Item Difficulty Estimates for Low and High Ability Examinees

Item No.	IRT Parameters		CTT Item Difficulty Estimates	
	Difficulty	Discrimination	Low	High
1	-1.93	0.84	0.88	0.99
2	-1.87	1.18	0.81	0.93
3	-1.61	1.44	0.93	1.00
4	-1.51	1.95	0.92	1.00
5	-1.49	1.58	0.86	0.99
6	-1.07	0.75	0.88	1.00
7	-1.05	0.91	0.81	0.95
8	-1.00	0.05	0.62	0.88
9	-0.87	1.53	0.70	1.00
10	-0.85	1.65	0.64	0.80
11	-0.77	1.59	0.69	0.94
12	-0.74	0.07	0.60	0.96
13	-0.69	0.76	0.63	0.89
14	-0.55	1.48	0.51	0.56
15	-0.54	0.14	0.49	0.85
16	-0.32	1.36	0.52	0.82
17	-0.32	0.90	0.46	0.81
18	-0.26	0.48	0.51	0.57
19	0.06	0.63	0.49	0.55
20	0.17	1.15	0.49	0.64
21	0.20	1.79	0.47	0.81
22	0.20	1.41	0.35	0.63
23	0.61	1.09	0.36	0.90
24	0.68	0.41	0.45	0.78
25	0.91	1.54	0.43	0.86
26	1.02	0.34	0.37	0.88
27	1.05	0.93	0.43	0.83
28	1.08	1.91	0.39	0.80
29	1.13	1.96	0.28	0.79
30	1.15	1.25	0.35	0.65
31	1.18	0.04	0.26	0.82
32	1.20	0.74	0.34	0.61
33	1.35	1.83	0.43	0.50
34	1.45	1.90	0.33	0.62
35	1.50	0.28	0.30	0.59
36	1.55	0.17	0.40	0.44
37	1.62	1.43	0.29	0.61
38	1.67	1.96	0.34	0.54
39	1.96	1.74	0.48	0.52
40	1.96	1.37	0.18	0.52

A.2. S-Plus Function that Estimates the Ability Parameter Under the 2PLM with Known Item Parameters

```
PLM2.ThetaEstimate    <- function(X, ai, bi)
{
# Description: This function implements the estimation of the ability parameter (and
#              standard error) of the 2PLmodel; the item parameters are known.
# Reference: Baker, F. B. (1992). Item Response Theory: Parameter Estimation Techniques,
#            New York: Marcel Dekker, Inc.
# Programed by: Leonardo S. Sotaridona

# Notations:
#            X  - a matrix of responses; the number of columns gives the
#                 number of examinees
#            ai - a vector of discrimination parameter
#            bi - a vector of difficulty parameter

   Theta  <- rep(NA,ncol(X))     # object where the ability estimates are saved
   SE     <- rep(NA,ncol(X))     # object where the standard error of the ability
                                 # estimates are saved

for(i in 1:ncol(X))
   {
      Uj    <- X[,i]
      Tej   <- 0
      Tej1  <- 1

# Estimation using Newton-Raphson procedure
   while(abs(Tj1)>.001)
      {
         Pj<- (1+exp(-ai*(Tj-bi)))^-1
         Qj<- 1-Pj
         Wij<- Pj*Qj
         Tj1<- sum(ai*Wij*((Uj-Pj)/(Pj*Qj)))/sum(((ai^2)*Wij))
         Tj  <- Tj+Tj1
         SEj    <- sqrt(1/sum(((ai^2)*Wij)))
      }
      Theta[i]    <- Tj
      SE[i]       <- SEj
   }
         list(Theta=Theta, SE=SE)
}
#End
```

A.3. S-Plus Function that Computes the Standardized Loglikelihood Person-Fit Statistic

```
L.z <-function(Xi,theta, bi,ai,ci,d=1) {

# Description: This program computes Pi (θj) for 1PL, 2PL, or 3PL models
# given the vector of item and examinee parameters:
#       ai - a vector of discrimination parameters
#       bi - a vector of difficulty parameters
#       ci - a vector of guessing parameters
#       theta - a vector of examinee parameters
#       Xi - a matrix of responses

# For 1PL, ci is a vector of zeros and ai a vector of ones.
# For 2PL, only ci is a vector or zeros.
# The output is a vector of standardized loglikelihood statistics. The length of
# this vector is the same as the number of examinees (or ltheta)

# Programmed by LS Sotaridona, 6 November 2002


# number of items and number of examinees
      lbi <-length(bi)
      ltheta <-length(theta)

# some tricks
      theta1    <-kronecker(matrix(theta,1,ltheta),rep(1,lbi))
      ai1       <-kronecker(ai,matrix(1,1,ltheta))
      bi1       <-kronecker(bi,matrix(1,1,ltheta))
      ci1       <-kronecker(ci,matrix(1,1,ltheta))

#Probability of correct response
      Pi <- ci1+(1-ci1)*(1+exp(-ai1*d*(theta1-bi1)))^(-1)
      wi <-log(Pi/(1-Pi))

# loglikelihood statistic
      Wn <-colSums((Xi-Pi)*wi)
      sigma <- (1/lbi)*colSums((wi^2)*(1-Pi)*Pi)
      lz <-Wn/sqrt((lbi)*sigma)

# output
      list(lz=lz)

#end
}
```

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Two hard copies (original and duplicate) and a diskette copy of the manuscript (preferably formatted using Microsoft Word for Windows) should be submitted. However, before submitting a manuscript, please examine this issue (Vol. 52, Nos. 1-4) of The Philippine Statistician as a guide and note the following points:

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   1.2 The total number of pages should not exceed 20 including tables, figures and appendices.
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   1.5 Acknowledgment should appear at the end of the text.
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2. Abstract

   2.1 The manuscript should begin with an abstract consisting of one paragraph followed by three to six key words.
   2.2 Avoid mathematical expressions in the abstract
   2.3 Use Times New Roman size 10 font for the text of the abstract.

3. Style

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   4.1 All figures and tables should be numbered consecutively with Arabic numerals, with self-explanatory titles at the top.
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