

Testing a Measurement Model of Multidimensional Intrinsic Motivation in Studying for Examination

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ABSTRACT

Intrinsic motivation is seen as a stronger driver for academic success compared to extrinsic motivation. This study proposed a comprehensive framework for intrinsic motivation by incorporating five different theories in a measurement model. The reason is that there is no single theory that can explain the internal drive to study since different motives logically work together to create the intrinsic motivation. The purpose of this study was to test a measurement model that combined five different theories of motivation when students studied for their examination. The five intrinsic forces were future time perspective, achievement need, learning goal orientation, expectation values, and self determination. The items for each construct were constructed based on literature review in order to provide a tool to measure the level of intrinsic motivation for studying examinations in high school students. Using confirmatory factor analysis, the five-dimension model of intrinsic motivation was found to be acceptable. However, due to high correlations among the five constructs, a second-order factor model measuring intrinsic motivation was suggested. Although the items were found to have acceptable reliability and validity, there is a need to further test the models with different and larger samples. Results have practical implications for teachers to utilize the instrument as well as to pay more attention to the importance of cultivating intrinsic motivation in school children.

Keywords: Intrinsic motivation, measurement model, examination

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INTRODUCTION

The search for factors that promote success in academic performance has led scholars to study extensively the role of motivation in academic learning. Motivation is the internal state of an individual that arouse,

direct and sustain behaviour (Santrock, 2008). Motivations are the reasons for individuals to decide to engage in a particular behaviour in any given situation that they believe is important (Ames, 1992). When students are motivated to learn, they get involved in learning behaviours that they find meaningful and worthwhile and from which they foresee academic benefits (Brophy, 1988).

Schools would be a heavenly centre of excellence if all students have the motivation to learn and the willingness to engage in academic tasks. Then, teachers will have an easy task to meet the three major goals of teaching; first, to get students to become involve in academic tasks; second, to get students to become interested in learning; and third, to get students to cognitively engage in what they learn in school (Woolfolk, 2004). It is no wonder that educators are continuously looking for strategies to improve students' motivation in learning and achieving.

Motivation to achieve well in academic has been the focus of rigorous examination because good academic performance does contribute to the positive psychological development during middle childhood and adolescence. According to Erik Erikson's theory of psychosocial development, the main task for children aged six years through adolescence is to develop a sense of competency in many productive skills that are considered necessary for survival in a culture (Kail & Cavanaugh, 2004; Huffman, 2007). Achieving the skills to read, write and count contributes to the feelings of

industry and competency. Competency is central to children's self esteem, and it can be further categorized into scholastic competence, athletic competence, and likability by peers, physical appearance, and behavioural conduct (Harter, 1999). As children progress through primary schools and become adolescents during secondary school, they develop their scholastic competency. The collections of successes and failures that students gain will help them define their ability in different academic areas such as English, Math and Science (Byrne & Gavin, 1996; Marsh & Yeung, 1997). For instance, a student who believes that she is skilful in English and Arts but not in Science and Mathematics will tend to maintain a positive scholastic competency overall. However, another student who believes that she is not good in any subject area will develop a negative academic competency and thus suffers in her self-esteem and identity formation.

A REVIEW OF THE RELATED LITERATURE

The role of motivation in learning has been extensively studied because scholars are looking for factors that can promote academic achievement. Why is motivation important to academic achievement? Motivated individuals are able to accomplish more since they become their best selves and thus strive to achieve at their highest levels (Haupt, 2006; Elliot, Heimpel, & Wood, 2006). When student motivation is at its highest, achievement can also occur at the highest rate (Hein & Hagger, 2007).

Highly motivated students reported higher satisfaction with their lives, had higher self-esteem, higher intrinsic motivation, and higher grade point averages (Anderman & Gilman, 2006).

Although the ideal vision is to produce a holistic student that excels both in academic and non-academic aspects, education in Malaysia seems to be emphasizing on academic achievement much more than non-academic performance. Schools, teachers and students are often evaluated based on the grades students achieved. Every year, top scorers for each state and at national level will be announced, celebrated and rewarded. The Form Five examination is especially treated as an important indicator for success among school students since obtaining good results will increase students' chance of obtaining scholarships or sponsorship to further studies in higher education or better opportunities to get an entry to university or college.

Despite the concern for emphasizing too much on grades, research has shown that good grades are not totally harmful. In fact, good grades have many benefits and can be productive for the students. Good grades have been established as predictors of school success, future success and individual well-being. Grades in school influence students' future opportunities and shape students' future educational and occupational attainments. Academic grades in school have also been shown to act as a preventive shield for adolescents from involving in misbehaviours because studies have found that good grades are correlated

with reduced drug and alcohol use, reduced absenteeism, and reduced delinquency (Eccles & Wigfield, 2002; Marsh & Yeung 1997). Given that academic success may represent the first steps to the development of healthy functioning students (Seligman & Csikszentmihalyi, 2000), it is important to better understand the motivation that drives adolescents to get good grades.

When discussing the role of motivation in improving students' achievement, the main focus has often been on the difference between extrinsic and intrinsic motivation (Ames, 1992). Extrinsic motivation comes from external sources outside of the individual, such as getting reward or avoiding punishment from social agents such as parents, teachers and peers. Intrinsic motivation pushes from within the individuals, such as when students study hard because they enjoy learning or because they are interested in the content of a subject.

In a classroom setting, students who have intrinsic motivation increase their grades whereas students who are given extrinsic motivation show a lower performance (Lepper, Corpus & Lyengar, 2005). Another study found that students have better performance when parents encourage children's enjoyment in the subject as compared to when parents offer external rewards (Gottfried *et al.*, 2001). Although extrinsic motivation is beneficial and necessary, it may not be long lasting. It needs external regulation, thus putting the responsibility for behaviour outside of the individuals. Students will be driven by

rewards and punishment, but not passion for the task. In contrast, intrinsic motivation functions without the aid of external rewards and/or push. It is self-regulatory since students engage in activities out of interest and they enjoy the experience while doing it.

Students with intrinsic motivation will study hard for an examination because they are interested in and excited to master the subjects and know more about the subjects. The classrooms are said to benefit well when students are intrinsically motivated to learn (Ryan & Deci, 2009). Lepper *et al.* (2005) found that students who had intrinsic motivation achieved higher grades and standardized tests scores compared to students who were extrinsically motivated. In fact, students who were motivated extrinsically had lower level of motivation and less persistence when doing academic tasks (Vansteenkiste *et al.*, 2005). Students whose parents encouraged their pleasure and engagement in studying had higher intrinsic motivation in Mathematics and Science as compared to students whose parents used rewards and external forces to encourage performance (Gottfried *et al.*, 2001).

Many experts are encouraging students to strengthen their intrinsic motivation (Stipek, 2002; Wigfield *et al.*, 2006; Ryan & Deci, 2009). Stipek (2002), for example, viewed intrinsic motivation as benefiting students in many ways. One, students will acquire competency motivation whereby they engage in studying because they want to become competent in a particular subject and they will feel more positive about their ability to master the subject. Another benefit

of intrinsic motivation is students will be naturally curious about what they learn. The third advantage involves the feeling of autonomy where students will feel that they learn because of their own choice, not being forced by external forces. Finally, students with intrinsic motivation will internalize the need and the excitement for studying and learning without having to be pushed by outside forces any longer. Many studies have shown that students who are intrinsically motivated tend to persist longer, manage more challenges, and achieve more in their academic tasks compared to those who are extrinsically motivated (Ames, 1992; Deci & Ryan, 2000; Dweck & Leggett, 1988; Nicholls, 1984; Pintrich & De Groot, 1990).

Based on the many evidences on the benefits of intrinsic motivation, this study looked further into the roles of several kinds of intrinsic motivation acting on academic achievement. Diverse motivational theories and constructs were often studied and explained individually, making the picture not comprehensive. A more integrated model must be examined to understand the internal drives and pushes that influence students to academic excellence. Researchers have been recommended to focus on model-based research in order to determine the causal and interactive relationships between domains of motivation and academic achievement. Subsequently, this study combined five domains of intrinsic motivation which have been defined and investigated in many previous research.

The first one is future time perspective, which involves the ability to see the connections between what one does in present and what one will gain in future (Simons *et al.*, 2004). In fact, students with this perspective perceive a current task as instrumental in attaining their future goals, and thus, their studying behaviour will be enhanced. The second intrinsic motivation is achievement need, which is defined as the *need for achievement* and the capacity to feel pride in accomplishment (Atkinson, 1957; McClelland, 1987). It is argued that the need for achievement is important because it can motivate students unconsciously to perform well or to improve their performance. The third intrinsic motivation is mastery goal. Students with this goal put efforts in learning because they want to acquire new skills, improve their competence, and increase knowledge (Smith, Duda, Allen, & Hall, 2002; McCollum & Kajs, 2007). The fourth motivation included in the framework is students' expectancy values which involve their expectation of reaching a goal, and the value of that goal to them (Eccles & Wigfield, 2002). Students who believe they are capable of mastering their schoolwork typically have positive expectations for success and possess positive values for academic tasks, which contribute to high motivation and achievement. Finally, self-determination theory views students as intrinsically motivated if they believe they are studying because of their own will, not because of external rewards (Ryan & Deci, 2000). Intrinsically motivated students are said to be autonomously regulated because

they have choice to learn what they enjoy. Students with intrinsic motivation will achieve higher grades compared to students with extrinsic motivation.

Although previous studies provided the conceptual clarification of diverse motivational theories and constructs, they were often studied and explained individually. Admittedly, several studies have focused on the interrelations between two or three motivational aspects, yet the picture is still not comprehensive. In order to understand the drives and pushes that influence students to academic excellence, a more comprehensive and integrated picture must be examined. The path of motivation needs to be charted in order to better understand the ups and downs of motivation.

In addition, studying the theories individually will limit in the explanations of why students are motivated to achieve. Future researchers have been recommended to focus on model-based research in order to determine the causal and interactive relationships between domains of motivation and academic achievement by using causal modelling. This would result in a more comprehensive description of the web of factors influencing motivational structures (Middleton & Spanias, 1999). Therefore, the purpose of this study was to test whether a measurement model to measure the five constructs of intrinsic motivation fits the data well.

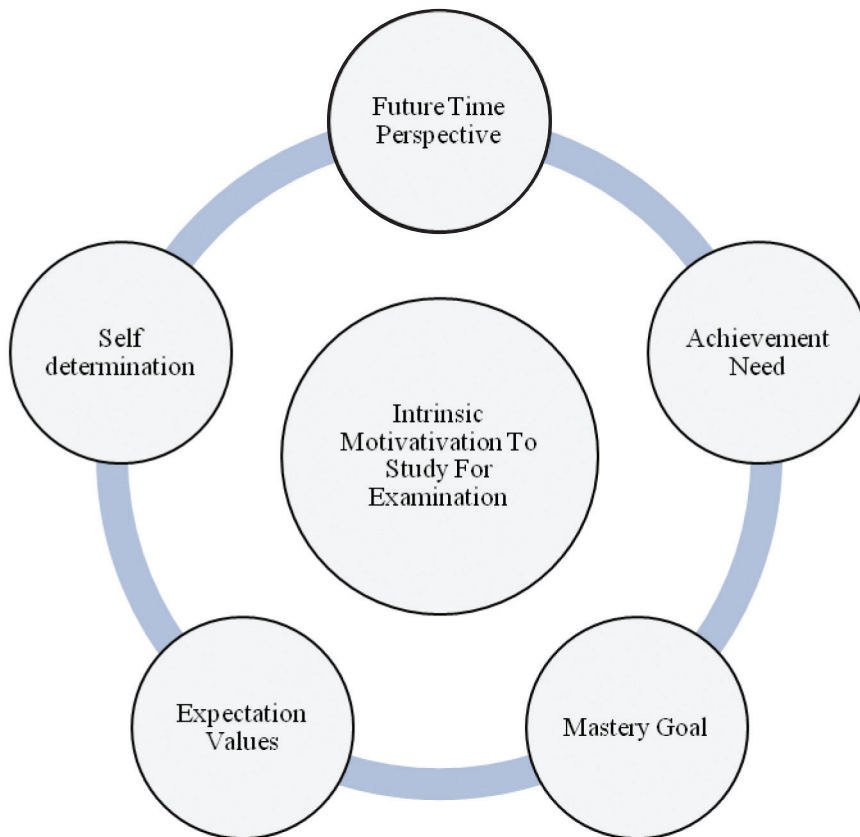


Fig.1: Conceptual Framework

CONCEPTUAL FRAMEWORK OF THE TESTED MODEL

Fig.1 displays the hypothesized model of intrinsic motivation. Five independent latent variables were conceptualized to measure the intrinsic motivation of students who find pleasure and interest when they study for their examination. The five dimensions of intrinsic motivation were hypothesized to be inter-correlated while being unique at the same time. When students have future time perspective, they tend to see the connections between what they do in present and what they will gain in future (Simons *et al.*, 2004). Students having high

achievement need will crave for success and wish to excel in study, school and other academic-related tasks (Kunnanatt, 2008; Kluger & Koslowsky, 1988). Students with mastery goal want to acquire new skills, improve their competence, increase knowledge and understanding through putting efforts (Smith, Duda, Allen, & Hall, 2002). Similarly, students with positive expectancy values highly value good results, enjoy studying, and see the usefulness of good grades to achieve their ambition (Eccles & Wigfield, 2001; Eccles, Wigfield & Schiefele, 1998). Finally, self-determined students are intrinsically motivated if they

believe they are studying because of their own will and not because of external pushes (Vansteenkiste *et al.*, 2009).

METHOD

Participants

A total of 431 completed questionnaires were gathered at the end of data collection for the first stage when the students had just finished their final year examination in November of 2010. When the school reopened for the year 2011, the second stage of data collection was carried out and the examination results of the students were recorded. Twenty-three data could not be traced due to incorrect names given by the students. This resulted in the number of usable data amounting to 408. After processes of factor analyses and confirmatory factor analysis for each scale, thirteen other cases were removed because they were considered as outliers. The number of samples with complete record for further analysis was 395. This number met the minimum required sample of 390 for a population of above 60,000.

The respondents were all Form Four students attending daily secondary government schools in the state of Selangor, Malaysia. The schools were initially selected based on the proportionate stratified sampling to represent the ten districts in Selangor. However, several headmasters of randomly selected schools did not grant the permission for data collection. In the end, a total of eight schools were visited by the researcher, totalling to two rural schools and six urban schools. In terms of sampling

distribution, the sample number almost met the required sampling proportion, where 359 students (89.6%) studied in urban schools and the other 41 students (10.4%) were from rural schools.

Instrument

This study used a questionnaire as a mean of measuring all the five motivational constructs. Literature on numerous studies and research conducted in the area of motivation were reviewed, critically assessed and evaluated before the researcher generated items for the questionnaire. Various items measuring motivational construct could be found from previous research and established instruments, but they were used for Western population, often university students, and also for high school students studying specific subjects such as sports or music. Although it was tempting to simply adopt the existing instruments, the researcher believed it was necessary to seek for unique items that were tailored for Malaysian adolescents and culture. No specific instrument that asked questions on motivation to study for examination was located. Therefore, items for this study were carefully constructed in order to suit the purpose of this study, i.e. the targeted adolescent students, as well as to fit with the cultural and educational background of the sample. The items were generated based on the definitions of each motivational constructs. The items were also worded to measure general preparation tasks geared for examination that is applied across all the academic subjects.

Each subscale had its own instruction to orient students' thinking and reflection to the examination, such as for Mastery Goal subscale, the instruction reads "Using the scale below, please rate the extent to which each item describes you in terms of your reason when studying/preparing for this examination". Most items were stated in a positive direction so that the respondents would rate the items on a 1 to 5 scale, with 1 being "Very untrue of me" and 5 being "Very true of me". A few items were phrased negatively. Before conducting the statistical analysis, these negative items were reverse-scaled so that a response of 1 was transformed to 5, 2 recoded into 4, 3 remained the same, 4 recoded into 2, and 5 recoded into 1.

Based on the literature review, eight items were constructed to measure future time perspectives (Future), ten questions to measure achievement needs (Achieve), four questions to measure mastery goal (Mastery), six questions to measure expectancy values (Value) and eight questions to measure self-determination (Autonomous). A total of thirty-six items were tested for the measurement model.

Data Preparation and Data Screening

The original number of the sample taken for this study was 431 Form Four secondary students. Descriptive statistics was conducted using SPSS 18.0 to identify any invalid data entry and missing data. The main data comprised each student's final examination results in the form of total score and total percentage. A number of 23

cases had to be dropped from the analysis due to the absent data, either because of no name given, wrong name given and names could not be found in the list provided by the school. This loss was mainly due to the limited time of data collection, i.e. at the end of the year, where teachers had many tasks to attend to and could not entertain too many requests from the researcher. In terms of data responses towards the items in the seven instruments, less than 5% of the data were found to be missing and without any obvious pattern. This small number of missing data was acceptable since Hair *et al.* (2005, 1998) suggested that it should be a concern only if more than 15% of the data were missing. In this study, the mean replacement procedure was used to manage the missing data since the small number of missing data was not a major problem (Tabachnick & Fidell, 2007).

Next, outlier cases were examined using Mahalanobis distance (Kline, 2005). The Mahalanobis distance is known to follow a Chi square distribution, where the chi square value at $\alpha = 0.001$ is taken as the threshold value. Based on the Mahalanobis distances generated by SPSS output for all 65 variables used in this study, the cases with D^2 exceeding the critical value were identified as outliers. For these data, with 65 variables, $df=65$, the chi square value for $\alpha = 0.001$ at a degree of freedom = 65 is 124.8. An examination of the saved MAH_1 values generated by SPSS, 12 cases have D^2 larger than 124.8. Since these cases were said to be outliers and would interfere with the multivariate stability of the results, the

outliers were deleted, leaving a final sample size of 395 sixteen year old adolescents.

Skewness and Kurtosis were first evaluated to test normality of the data (Hair *et al.*, 2005, 1998). Data are considered to be normal if skewness is between -3 to +3, while Kurtosis is between -7 to +7. The examination of the skewness and kurtosis values for each variable in this study showed no values larger than 3 for skewness and no values larger than 7 for kurtosis. These results indicate that the multivariate normality assumption is fulfilled for the current data.

Data Analysis

In order to evaluate a model as adequately fit, multiple criteria were taken into consideration. This study followed the rules of thumb criteria for goodness of fit indices. The Chi-Square statistic should be non-significant ($> .05$), so that the null hypothesis can be accepted and the model is said to fit the data. However, due to many shortcomings associated with the chi square test statistic, it is often suggested that not too much emphasis be placed on this particular test (Schermelele-Engel *et al.*, 2003). Other measures should also be looked into. The χ^2/df ratio should be between 2 and 3 as an indicative of an acceptable model. The RMSEA of $< .05$ can be considered as a good fit, the values between $.05 - .08$ as an adequate fit and the values between $.08 - .10$ as an average fit. As for TLI and CFI, the guideline is a value of $.97$ and larger as an indicative of a good fit while the values $> .95$ is indicative of an acceptable fit (Bentler,

1990; Hu & Bentler, 1999). This study followed the above-mentioned guidelines to evaluate the tested model.

When the model initially did not fit, whereby the goodness-of-fit measures did not meet the cut-off requirement, steps were taken to improve the fit indices. Following the guidelines for model modifications, this study first looked at the standardized residual matrix and next at the modification indices. Standardized residuals greater than 2.58 were indicative of a model misfit. A good model is one that includes a majority of standardized residuals close to zero (Schermelele-Engel *et al.*, 2003). Hair *et al.* (2005) advised that absolute values of standardized residuals greater than 4.0 suggest a potential unacceptable level of error. Whereas absolute values of standardized residuals between 2.5 and 4.0 deserve some attention; however, changes to the model may not be necessary if there are no other problems associated with the associated variables.

The next result to inspect was the modification indices (M.I.), which suggest the estimate change in chi square value and the possible parameter change. A good model should include modification indices close to one, and any modification indices larger than 3.84 is an indicative of recommended change. It is reminded and cautioned in many reviews (see Schermelele-Engel *et al.*, 2003) that any modification made to the model should be based on theoretical justification, not simply based on the number criteria.

RESULTS

Exploratory Factor Analysis of the Items

Exploratory factor analysis (EFA) was recommended for the newly constructed items that had not been used in any setting or with any population before (Wolters & Daugherty, 2007). In particular, EFA was used to identify the underlying factor structures for all the five scales in this study. Each set of items in a scale was assessed for their unidimensionality using principal components analysis (PCA) as a prerequisite to the instrument's reliability and validity (Gerbing & Anderson, 1993; Hair *et al.*, 1998). The EFA procedures involved three main steps, namely, assessing the suitability of the data for factor analysis, factor rotation and extraction, and interpretation of factors.

When assessing the suitability of data for running EFA, the adequacy of the sample size was met with a recommended minimum ratio of respondents to item as 5 respondents: 1 item ratio (Nunnally and Bernstein, 1994). In addition, Kaiser-Meyer-Olkin (KMO) was more than 0.60 and the Bartlett's test of sphericity was significant ($p < .05$) for all the five scales (Tabacknick & Fidell, 2006, 2001). Factor extraction and rotation were conducted to finalize the items to be included in the model. In order to identify the number of factors to extract using factor extraction, only the components that have an eigenvalue of 1 or more were chosen for further investigation. After that, the scree plot was examined to confirm the number of factors above the elbow since these factors were said to be contributing the most to the explanation of the variance in the data set.

Next, factor rotation using direct oblimin confirmed the number of factors rotated and each item's loadings were inspected. Interpretation of the factors was the next process, where appropriate names were given to each factor. Only factor loadings $> \pm .50$ were selected because they contributed significantly to the measured constructs, indicating a high convergent validity (Hair *et al.*, 1998).

The next step was examining the internal consistency of the items by ensuring that the Cronbach alpha values approached 0.70 and above (Hair *et al.*, 1998). Meanwhile, the values of the inter-item correlations must ranged from 0.20 – 0.70 to indicate that the items were adequately associated with those within their construct. The item-total correlations of > 0.30 also supported the assumption that the items were mainly measuring the same underlying construct. A good item should be correlated with its own scale, and this is called convergent validity. In addition, an item should be correlated with its own scale more than with scales assessing different constructs (discriminant validity). Due to space constraint, the results of EFA is not discussed at length here; however, Table 1 summarizes the relevant results mentioned in ensuring that the good items were chosen for the next stage of the analysis. It is adequate to report that after the initial evaluation of items, based on the above criterion, the total items removed from the scales were two for Future, four for Achieve, none from Mastery, one from Value, and three from Autonomous.

TABLE 1
Selected Statistical Outputs for the Items

Items	Factor loading	Item-total correlation	Inter-item correlations					
			fut1	fut2	fut3	fut4	fut6	fut8
fut4	.813	.579	1.000	.497	.515	.432	.364	.470
fut3	.790	.674		1.000	.541	.553	.548	.463
fut2	.787	.679			1.000	.650	.436	.464
fut8	.753	.703				1.000	.526	.534
fut6	.742	.616					1.000	.541
fut1	.704	.635						1.000
Cronbach alpha		.86						
Variance explained		58.6%						
			ach7	ach9	ach2	ach8	ach1	ach6
ach7	.758	.614	1.000	.498	.399	.432	.386	.344
ach9	.755	.604		1.000	.359	.389	.416	.368
ach2	.656	.465			1.000	.314	.341	.223
ach8	.620	.436				1.000	.205	.206
ach1	.616	.452					1.000	.248
ach6	.523	.388						1.000
Cronbach alpha		.75						
Variance explained		50.2%						
			goal2	goal1	goal3	goal4		
goal2	.836	.642	1.000	.521	.519	.412		
goal1	.758	.502		1.000	.339	.337		
goal3	.720	.514			1.000	.363		
goal4	.657	.462				1.000		
Cronbach alpha		.74						
Variance explained		40.2%						
			value1	value2	value3	value4	value5	value6
value1	.769	.603	1.000	.462	.418	.540	.206	.611
value2	.761	.621		1.000	.657	.418	.352	.363
value3	.757	.613			1.000	.449	.332	.375
value4	.748	.588				1.000	.251	.518
value5	.744	.383					1.000	.315
value6	.518	.593						1.000
Cronbach alpha		.86						
Variance explained		52.1%						

TABLE 1 (continued)

			det3	det	det5	det4	det1
det3	.823	.691	1.000	.510	.587	.628	.441
det2	.783	.655		1.000	.434	.436	.676
det5	.783	.636			1.000	.619	.389
det4	.778	.628				1.000	.323
det1	.716	.572					1.000
Cronbach alpha		.84					
Variance explained		60.5%					

Confirmatory factor Analysis for Each Construct of Intrinsic Motivation

Each subscale model was first tested using CFA. Due to limited space, instead of showing the five different measurement models separately, Fig. 2 shows the five subscale models combined into an initial correlated first-order model of intrinsic motivation. Using the various guidelines for evaluating the fit of good model, selected items were removed or errors were correlated. Basically, the selected items had factor loadings > 0.50, indicating the convergent validity of the items for each construct. After making sure that all the parameters were significant at p<.001 level and all the loadings were above .50, standardized residual co-variances were examined to identify if any values exceeded 2.58. The items with many large co-variances were deleted one at a time to see if the model fit would be improved. Modification indices were also inspected to search for the largest M.I, after which double-headed arrows were added (one at a time) to see the improvement to the fit indices. The removal of the items and an addition of double-headed arrows were

made only after considering that the actions were theoretically justified. In brief, the items removed due to the large standardized residual co-variances were fut5 and fut7 for Future, ach3, ach4, ach5 and ach10 for Achieve, none for Mastery, value5 for Value, and det6, det7 and det8 for Autonomous. In addition, the number of double-headed arrows added for Future was three between fut2 and fut6, fut8 and fut6, as well as between fut1 and fut4, but none for Achieve model, none for Mastery, one for Value between value2 and value3, and one for Autonomous between det1 and det2.

Confirmatory factor Analysis of the Five Factor Model for Intrinsic Motivation

After each model finally achieved a good fit, they were ready to be combined into the full measurement model, as shown in Fig.3. The model shows all the five factors measuring intrinsic motivation which had incorporated the various modifications made earlier. The results of confirmatory factor analysis revealed that the model was only marginally acceptable (Chi-Square, $\chi^2 = 564.86$, $df=284$, relative Chi-Square, $\chi^2/df = 1.99$, TLI =.934 and CFI =.942, and

RMSEA = .050). All the regression weights were significant. Inspection of standardized regression weights revealed item ach6 with loading below .50, thus it was removed.

Items fut1 and goal4 were removed due to the large standardized residual covariance with other items. Three error co-variances were added between items fut3 and fut4,

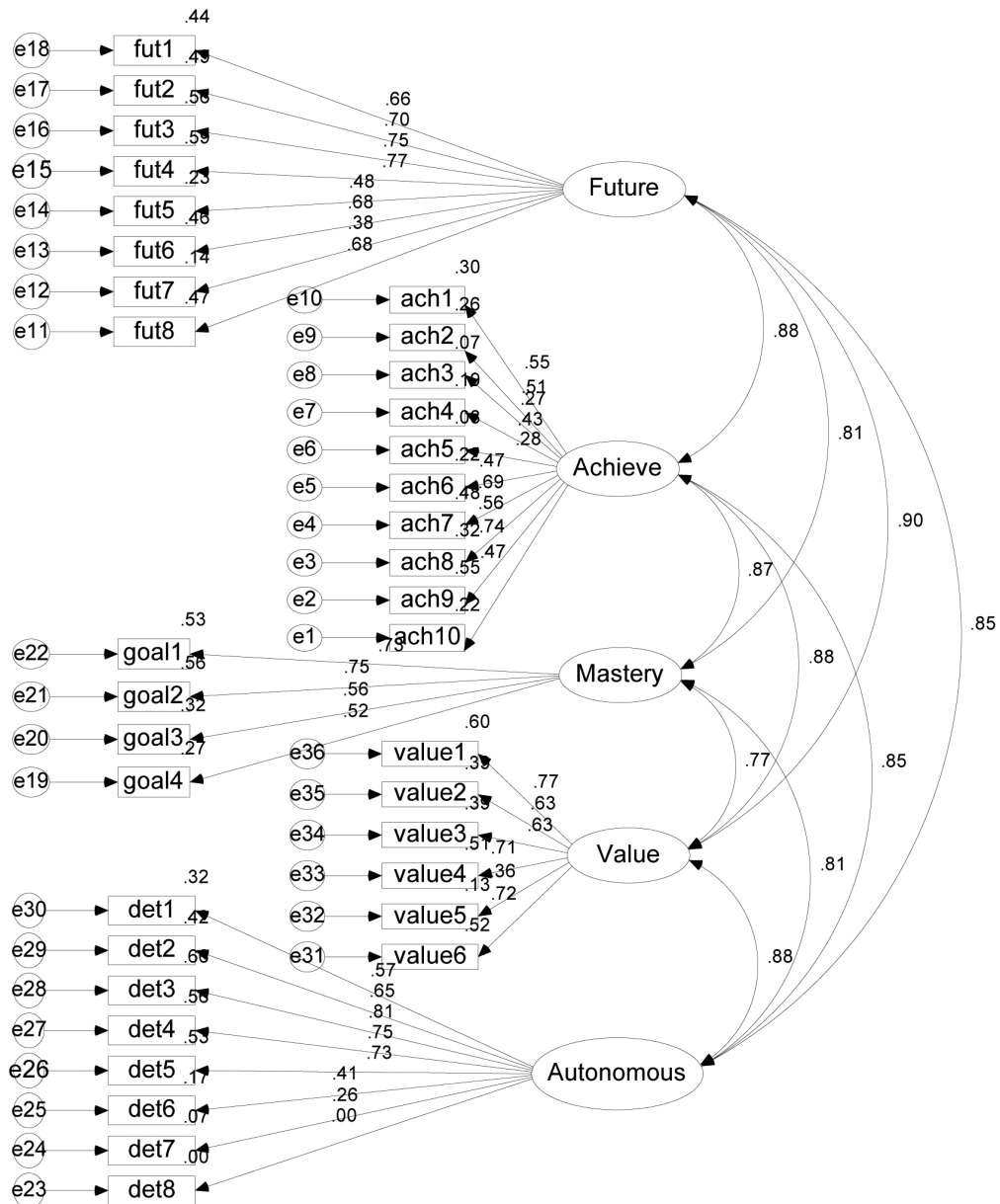


Fig.2 Initial Correlated First-order Model of Intrinsic Motivation

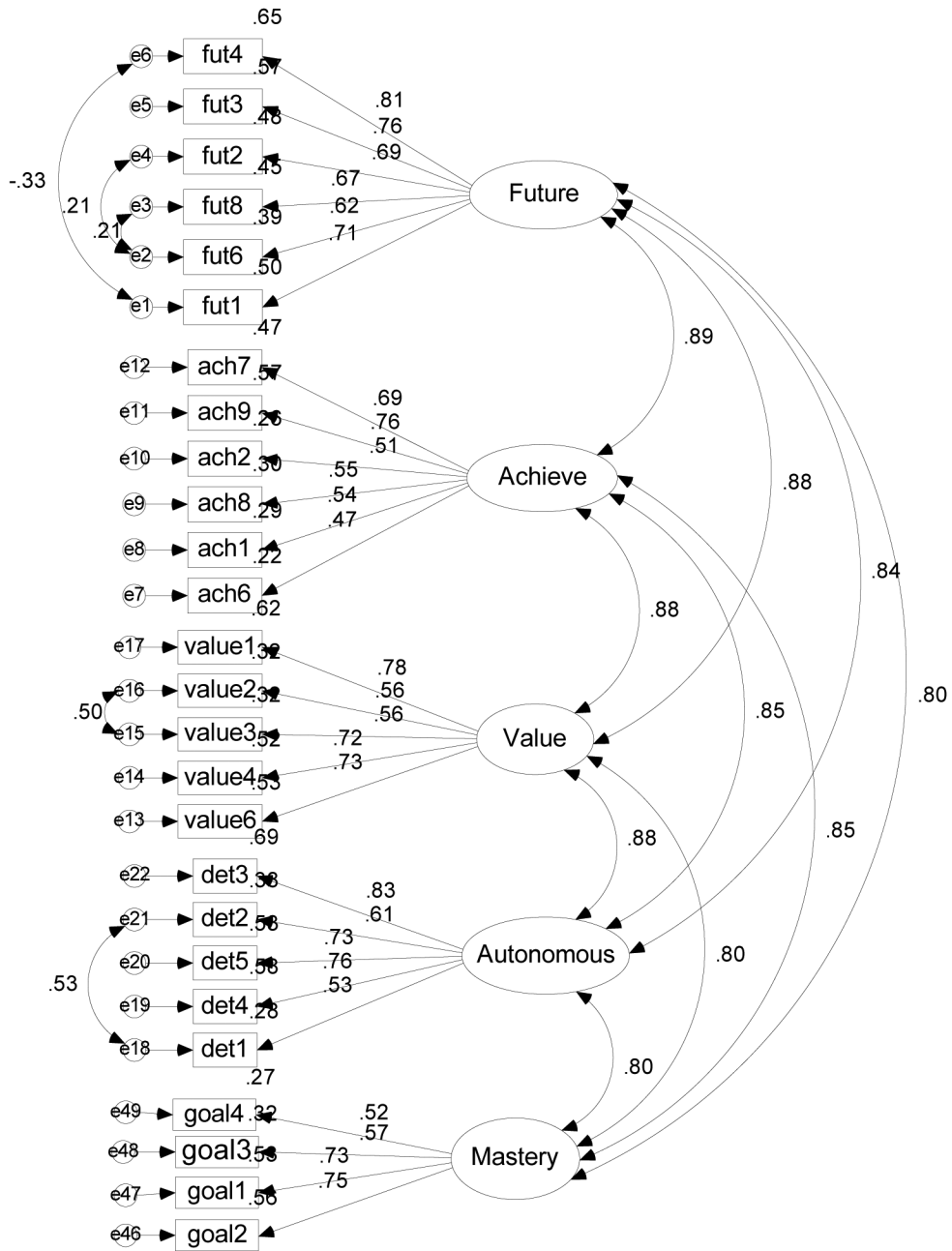


Fig.3 Tested Correlated First-order Model of Intrinsic Motivation

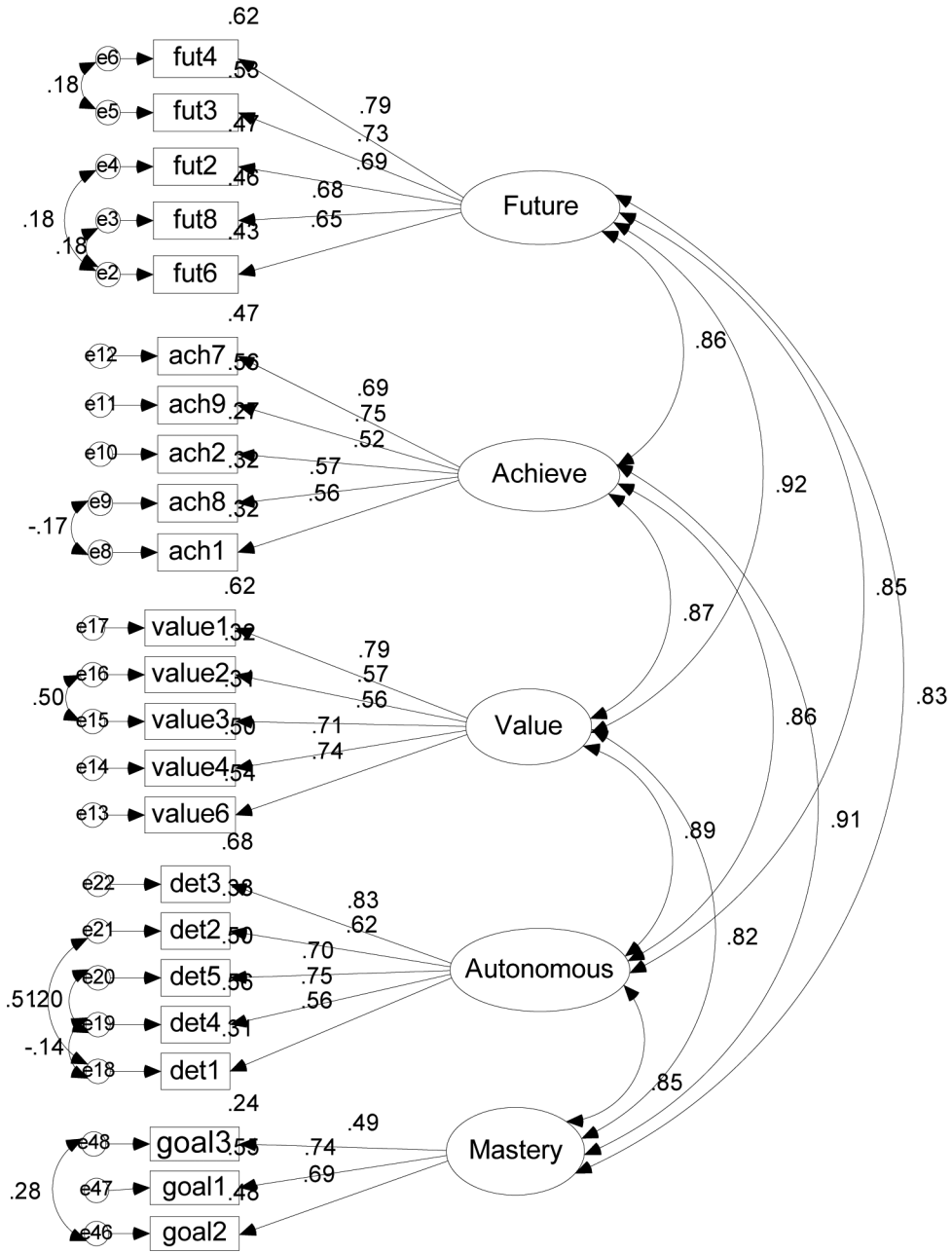


Fig.4 Improved Correlated First-order Model of Intrinsic Motivation

det1 and det4, as well as det5 and det4. Each modification was done one by one and the inspection of the model improvement was carefully monitored every time. The model had better fit indices with Chi-Square, $\chi^2 = 356.8$, $df=211$, relative Chi-Square, $\chi^2/df = 1.69$, TLI =.960 and CFI =.967, and RMSEA =.042. Fig.4 shows the improved correlated first-order model of intrinsic motivation.

The Re-Specified Model of Intrinsic Motivation

Even though the measurement model was acceptable, the high correlations among several constructs indicated the possibility of second-order factor for intrinsic motivation. Future, Value, Achieve, Mastery, and Autonomous were highly correlated with each other, with r ranging from .819 to .951. This indicated that the items from the different dimensions were actually measuring the same thing. The correlations between the constructs of > 0.85 indicates multicollinearity and need to be adjusted either by deleting one of the constructs, combining two constructs together or creating a second-order factor (Hair *et al.*, 1998, 2005). Re-specification of the model was also carried out. The five highly correlated constructs were suited to measure intrinsic motivation since future time preferences, achievement need, expectancy value, autonomous self regulation and mastery goal were all referring to internal motives for wanting to excel in the present task (i.e. doing well in the examination) in order to gain some rewards in future. Thus, the model was restructured to include a

second-order factor named Intrinsic which was measured by the five indicators; Future, Value, Achieve, Autonomous and Mastery.

The re-specified model shown in Fig.5 was tested and the data showed an acceptable fit. All the regression weights were significant and indicators loadings were larger than .50. The model was an acceptable fit with Chi-Square, $\chi^2 = 370.69$, $df=216$, relative Chi-Square, $\chi^2/df = 1.72$, TLI =.959 and CFI =.965, and RMSEA =.043. The model in Fig.5 replaced the original proposed model of intrinsic motivation, which was initially drawn in Fig.2.

CONCLUSION

The re-specified model of intrinsic motivation, from five different first-order factors model to a second-order factor, supports the notion that intrinsic motivation is indeed multidimensional. Intrinsic motivation is an integrated force of future time perspective, achievement need, mastery goal, expectancy value and autonomous self-determinism. The constructed instrument consisted of a final 23 good items that can be used in schools to measure students' motivational level when studying for their examination. With a slight modification to the sentences, the items can be used to measure students' level of intrinsic motivation in any school-related or learning-related task. Of course, further replications and validations of the items are still required to ensure the reliability of the items.

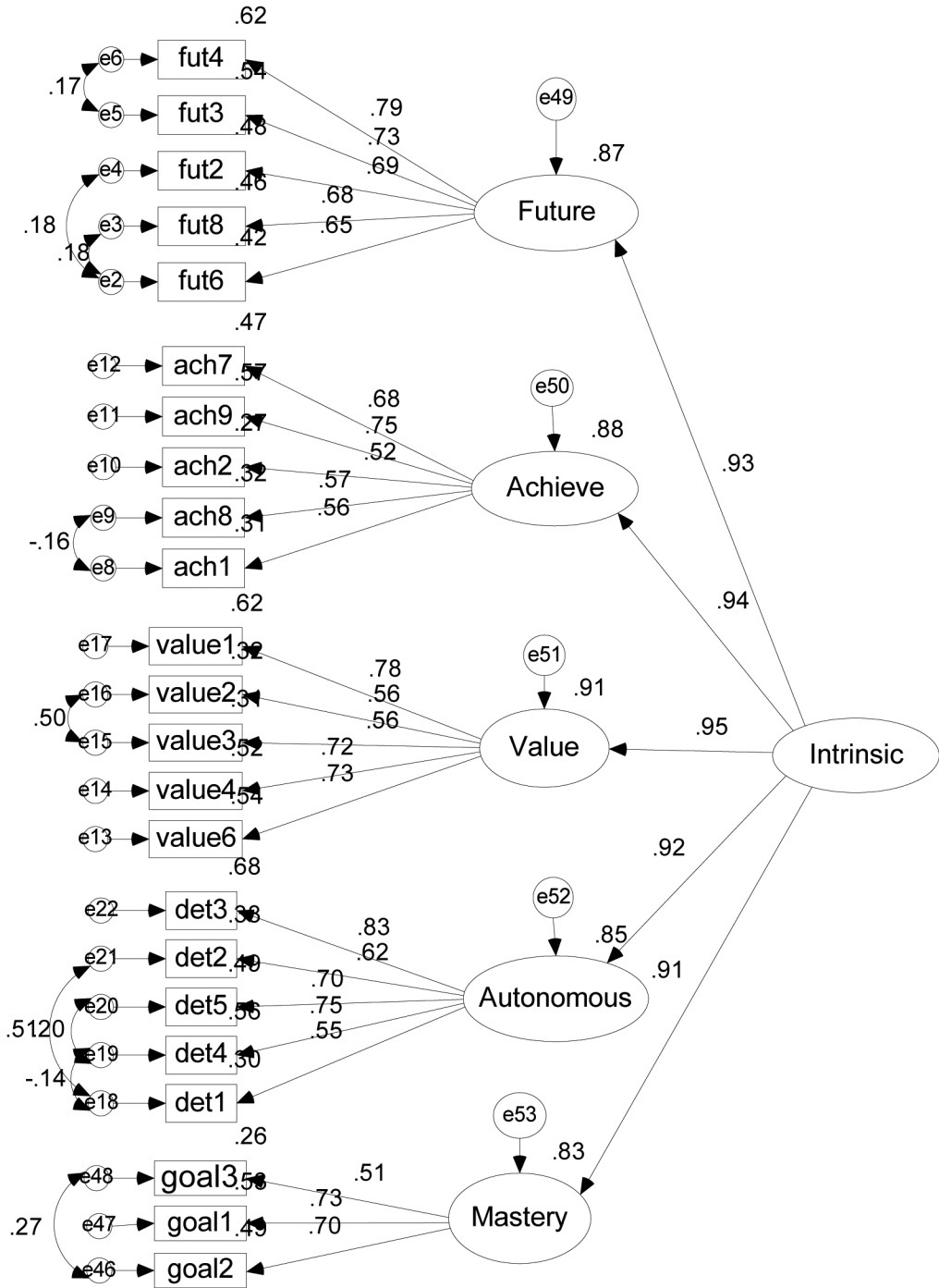


Fig.5: Re-specified Second-Order Factor Model of Intrinsic Motivation

The validation of this instrument will be beneficial to teachers in order to get a glimpse on their students' level of motivation in learning. Subsequently, teachers, parents and even students themselves can evaluate the existence and strength of each dimension of motivation within individuals so as to ensure that the students have adequate push from within themselves to excel academically. In this way, students need not depend too much on extrinsic motivation, such as advice, support and reminder from teachers and parents. They can initiate learning behaviours on their own since they are intrinsically motivated.

Empirically, five different motivational constructs have been found to be highly correlated with each other, thus, supporting a more defined construct of intrinsic motivation. The model tested in this study has provided a contribution to the literature on the significance of students' motivational drives that come from within to make them achieve focus and concentration in studying, and thus obtaining better results in performance tasks. The significant intercorrelations of the motivational forces studied in one comprehensive measurement model is a good response to the urge that numerous motivation theories need to be studied together, not individually (Middleton & Spanias, 1999). This further adds to the understanding of the drives and pushes that influence students to academic excellence by obtaining a more comprehensive and integrated picture of intrinsic motivation.

The current results add to the extensive knowledge that many of the motivational

forces are indeed related to each other. For instance, studies have established the relationships between future time perspective and expectancy values. For instance, Eccles and Wigfield (2002) suggested that schooling is by definition future-oriented as it contains utility value to attain future goals but not all students anticipate the future goals their current schooling may serve. Indeed, some students have a clear view of their future and also understand how doing one's best at school is important to achieve highly valued educational or professional goals in the future. Other students, in contrast, lack such an extended future time perspective, and as a result, attach less value to their current school work. The findings of this study also support past research that found mastery-oriented students tended to place high intrinsic value on learning and were inclined to use deep information processing strategies (an aspect of self-determination theory (Church *et al.*, 2001; Elliot & McGregor, 2001).

LIMITATIONS OF THE STUDY

One limitation of the study was the construction of items, which were based on the literature and theories instead of the adoption of well-validated instruments from previous research. However, the need to construct new items to suit the purpose of this study was justified earlier in this report. Admittedly more investigation and replication with different samples are needed to ensure the validity and reliability of the instrument.

Another limitation is the minimal sample size that centred only on one state in the country. Due to the limited time for data collection, whereby students were around for only two weeks after their final examination, the researcher managed to survey only the available number of students from selected schools. Hence, future study should have more samples on wider area coverage to increase the generalizability of the results.

More items can be generated to improve the scale. For this particular study, 36 initial items were selected after the pilot study, and these did not include the other items measured for several other constructs that were not reported in this report. The length of the questionnaire had to be limited to ensure that high school students could respond to the items at ease. Thus, more potential items could not be listed, limiting the possibility of good items or factors not being identified nor measured.

SUGGESTIONS FOR FUTURE RESEARCH

Further validation of the instrument can improve the definition of intrinsic motivation and identify the different dimensions of this internal drive. This study only included five different theories to measure intrinsic motivation, whereas numerous other theories have been debated to explain motivation. The more dimensions of what push students from within can be identified, the easier it will be for parents and teachers to take actions on cultivating this particular type of motivation in students.

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