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RESEARCH NOTES

Fitting a Model to Students' Cognitive engagement: A Step Towards Accountable Education in Medical Education

Ajustar un modelo al compromiso cognitivo de los estudiantes: un paso hacia una educación responsable en educación médica

Parisa Mehrdadian
Master of Health Education, School of Health, Sabzevar University of Medical Sciences, Sabzevar, Iran
ORCID ID: (0000-0001-5204-7917)

Mehdi Rabiei
phd of higher education,Education development center, Sabzevar university of medical sciences, Sabzevar, Iran
ORCID **ID:** (0000-0003-3644-0318)

Razieh Khosrorad*
Assistant Professor of Educational psychology, School of Health, Sabzevar University of Medical Sciences, Sabzevar, Iran
ORCID ID: (0000-0001-8385-4797)

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*** Correspondence**

Email: khosroradR@medsab.ac.ir

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Abstract

Introduction: Motivation is one of the most important effective factors in learning. It can lead to long-lasting learning in connection with identity. Creating an appropriate setting for development and actualization of students with different Scientific, social and cultural abilities is one of the accountable education package's The Health System Evaluation Plan. Whereas emotion regulation and management is one of the important needs of students and empowering them in this field is a necessity. **Method**: Present study is a kind of non-experimental design. To speak more precisely, it is a type of correlations design which has analyzed a structural pattern of variables relationship, done in 2016 in Sabzevar university of medical Sciences, 720 students was selected using multistage cluster sampling as the sample group and employed Berzonsky's identity style Inventory (ISI-3), achievement goals scale of Midgley et al(PALS), and motivated strategies for learning questionnaire (MSLQ). Data was analyzed using path analysis. **Results**: nformational identity style has both direct and indirect effect (through the intervening role of mastery goals) on cognitive engagement (P<0.01). Normative identity style has an effect The path from diffuse-avoidant identity style to performance-avoidance goals was excluded from fitted model, fitted model predicts 41% of cognitive engagement. **Conclusion**: Inorder to improve learning, cognitive engagement (mental efforts) can be targeted using motivational and identity variables.

Key words: informational identity style, normative identity style, diffuse-avoidant identity style, mastery goals, performance-approach goals, performance-avoidance goals, cognitive engagement, path analysis

Resumen

Introducción: La motivación es uno de los factores efectivos más importantes en el aprendizaje. Puede conducir a un aprendizaje duradero en relación con la identidad. La creación de un entorno apropiado para el desarrollo y la actualización de estudiantes con diferentes habilidades científicas, sociales y culturales es uno de los planes de evaluación del sistema de salud del paquete educativo responsable. Considerando que la regulación y el manejo de las emociones es una de las necesidades importantes de los estudiantes y empoderarlos en este campo es una necesidad. Método: El presente estudio es una especie de diseño no experimental. Para hablar más precisamente, se trata de un tipo de diseño de correlaciones que ha analizado un patrón estructural de relación de variables, realizado en 2016 en la Universidad de Ciencias Médicas de Sabzevar, se seleccionaron 720 estudiantes utilizando un muestreo por conglomerados multietapa como grupo muestral y emplearon el Inventario de estilos de identidad de Berzonsky. (ISI-3), escala de metas de logro de Midgley et al (PALS) y cuestionario de estrategias motivadas para el aprendizaje (MSLQ). Los datos se analizaron mediante análisis de ruta. Resultados: el estilo de identidad informacional tiene un efecto directo e indirecto (a través del papel intermedio de las metas de dominio) sobre el compromiso cognitivo (P <0.01). El estilo de identidad normativo tiene un efecto El camino desde el estilo de identidad de evitación difusa hasta las metas de evitación del desempeño se excluyó del modelo ajustado, el modelo ajustado predice el 41% de compromiso cognitivo. Conclusión: Con el fin de mejorar el aprendizaje, el compromiso cognitivo (esfuerzos mentales) puede enfocarse utilizando variables motivacionales e identitarias.

Palabras clave: estilo de identidad informacional, estilo de identidad normativo, estilo de identidad de evitación difusa, metas de dominio, metas de enfoque de desempeño, metas de evitación de desempeño, compromiso cognitivo, análisis de ruta

Introduction

Nowadays, besides intelligence and talent that are considered amongst the important non-acquired prerequisites determining the quality and the quantity of learning in human beings, there are more acquisitionaleffective factors in the process of learning amongst them are mental effort orcognitive,meta-cognitive and self-regulating sterategies, including repeat and reviews expanding and organizing, planning, regulation, control, and systematization. When using

cognitive and meta-cognitive strategies in different levels, students are mentally active, so theyare able to process information welland it leads to learning and academic achievement.

One way to mentally activate students is the presence of motivation. Research shows that students need motivational and cognitive skills to do their assignments and to achieve an acceptable performance (Pintrich, 2000).

Socio- cognitive perspective and patterns of motivation have introduced a few prominent motivational structures which facilitate motivation and learning, and consequently promote academic achievement. Achievement goal is a motivational structure which in fact shows the intention behind engagement in tasks and assignments in educational environments (Dweck, 1986). Though there are several classifications of achievement goals, they all refer to mastery and performance goals. Based on their personal norms, learners with mastery goals are seeking to acquire new knowledge and skills in order to comprehend materials and to achieve mastery, while their real goal is to learn and experience. But learners with performance-based goals are focused on their own abilities and competence. They are trying to prove their capabilities by outperformance (Dupeyrat & Marian, 2005). Some researchers have expanded Dweck's goals theory by dividing performance goals into two dimensions: performance-approach goals and performance-avoidance goals. Students who choose performance-approach goals are careful about their performance.They always perform well at doing assignments to prove themselves as being intelligent and talented. But students with performance-avoidance goals try to do so by getting away from assignments. In other words, they avoid doing their assignments to hide their weak points.

The general assumption in achievement goals literature is that mastery goals lead to adapted motivational and educational consequences, while performance goals leads to non-adapted ones (Dupeyrat & Marine, 2004). The fundamental reasoning behind this belief is that when students aim to learn, to comprehend, and to correct their performance, such a goal helps them retain self-efficiency. It also inhibits them from being overwhelmed by negative thoughts and emotions. It, therefore, helps students benefit from free mental capacity. In contrary, when trying to prove their abilities to others by achieving good marks or when trying to hide their weak points, students not only suffers from such negative emotions as stress and anxiety, they also are always worried about other students' performance. This leads to a decrease in their mental capacity.One of the hypotheses about achievement goals, that has been constantly examined by scholars, controls the relationship between students' achievement goals and their cognitive engagement. Many studies suggest that students with mastery goals use compatible strategies (Pintrich, 2000). It is not clear how performance goals are related to learning strategies and mental efforts. Positive, negative, and no relationship have been reported in different studies.

Motivation is one of the effective factors on active mental efforts. Getting to know the fundamental factors of motivation, thus, can improve cognitive engagement andlearning.Since many researchers confirm that identity and motivation are related (Kaplan & Flum, 2010), and that some theorists state that identity is the source of motivation, identity can be considered as the underlying aspect of motivation.

In the current study identity style structure is used to study identity. According to Berzonsky's social-cognitive theory (identity is defined as a self-related theory which is developed by individuals as a result of facing and dealing with different situations in life (Berzonsky, 2003). As Berzonsky states, people make theories about themselves in three different styles: informational identity style, normative identity style, and diffuse-avoidant style.

People with informational identity style seek for and evaluate information about themselves. They study and assess things before accepting them.Informational identity style is related to mental health, problem-based ,coping sterategies, academic autonomy, and need for cognition. Students who apply normative identity style rely on important people's instructions and expectations –such as parents and teachers- in their decision making. Individuals with diffuse-

avoidant style avoid facing problems and conflicts related to identity. Their behavior is determined according to settings and the feeling of satisfaction or pleasure. Kaplan and Flum (Kaplan & Flum, 2010) state that identity styles and achievement goals have some features in common with respect to fundamental processes and theoretical emphases. Such relationships have been confirmed in several studies (Khosrojerdi, 2012; Alavirafiee et al., 2018; Babaeisanglagi, 2010; Zakeri & Kohoulat, 2009).

This study mainly aims to investigate the role of identity styles in predicting cognitive engagement for learning. Here, motivation is likely to play the role of an intervening variable. A conceptual model is developed according to previous literature and is tested using advanced statistical methods.

Materials and Methods

The present study investigates the causal relationships between the variables using path analysis. It provides the opportunity to assess a set of regression equations (Hooman, 2009).

The hypothesis tested in the method is a specific causal relationship between a set of invisible structures. These structures are measured using a group of (visible) indicator variables (Hooman, 2009).

Our population consists of 720 students from different majors 2016 in Sabzevar university of medical Sciences. The population volume is determined using common N:q method, where N is the number of observations and q is the number of parameters to be estimated. This ratio has been 15 to 20 in many studies.Considering the number of parameters in the most perfect model as well as the number of excluded questionnaires, our final population includes 720 students.The sample group was selected using multistage cluster sampling. Three different sets of questionnaires were used to collect data:

1- Revised inventory of identity style (ISI-3): was firstly designed by Berzonsky in 1989 and revised several times. It includes 40 items from which 11 items are related to informational identity style, 9 items to normative identity style, 10 items to diffuse-avoidant style, and 10 items to identity commitment. Answers were designed based on Likert 5-point scale. Its reliability and validity were evaluated according to previous studies (Berzonsky, 1997; Hejazi et al., 2009; Hejazi et al., 2009). In the current study compound reliability was used to test the reliability. “ConformityFactor Analysis” was used to validate the measure of identity styles. Findings from Conformity Factor Analysis show that all indices are at an acceptable level.

2- Achievement goalsscale (Midgley et al., 2000): consists of 14 questions and 3 sub-measures. All questions, adopted from Midgley et al. (1998), were rated according to Likert 5-point scale. Its reliability and validity were evaluated according to previous studies (Midgley et al., 1998; GholamaliLavasani et al., 2008).

3- Compound reliability was used to test the reliability. Findings (mastery goals =0.78, performance-approach goals=0.80) confirm the validity of the measure.Findings from Conformity Factor Analysis (RMR=0.14, AGFI=0.99, GFI=0.99, CFI=0.99) show that all indices are at an acceptable level.

4- Motivational Strategies for Learning Questionnaire (MSLQ): All questions were rated according to Likert 5-point scale. Its reliability and validity were evaluated according to previous studies (Abedini, 2007; Pintrich, 2000). Composite reliability (0.77) was used to test the reliability and “Conformity Factor Analysis” to validate the measure (RMR=0.09, AGFI=0.97, GFI=0.98, CFI=0.97).

Having completed and scored the questionnaires; researcher analyzed the data using path analysis. Fit testing was carried out and fitness indices were calculated. Software LISREL 8.7 was used to analyze the data.

Findings

Correlation matrix shows that the maximum value belongs to cognitive engagement and mastery goals (0.84) with the significance level of 0.01.

Table 1. Exanimated paths in structural function model

Examinated paths	Standardized total effect	Standardized indirect effect	Standardized total effect	Explaned variance
on cognitive engagement from:				0.41
mastery goals	0.39**		0.39**	
performance-approach goals	0.14		0.14*	
performance-avoidance goals	0.09**		0.09**	
informational identity style	0.19	0.23**	0.42**	
normative identity style		0.08**	0.08**	
on mastery goals from:				0.24
informational identity style	0.48**		0.48**	
On performance-approach goals from:				0.06
normative identity style	0.28**		0.28**	
on performance-avoidance goals from:				0.05
normative identity style	0.23**		0.23**	

In order to fit the model to data, model generating methodwasused (the conceptual model in Fig 1). Considering the study background and the initial fitting, fit testing was not done for the model. Indices were not fitted and some paths were not significant either. According to the exploratory method and considering the study background, non-significant paths were excluded one by one to obtain the final model (Fig 2) (the path from diffuse-avoidant identity to performance-avoidance goals).The intervening role of achievement goals in the relationship between cognitive engagement and identity styles was confirmed. Indices in this model were at an appropriate level and there was no reason to reject the model.As table 1 shows all the direct impacts of exogenous latent variables on endogenous ones are positive. Informational identity style has the highest effect on mastery goals (0.48)which is significant (p< 0/01). Among direct effects of endogenous variables on endogenous ones, it is seen that mastery goals has a strong effect on cognitive engagement (0.39) Informational identity style has both direct and indirect impacts on cognitive engagement. Its indirect effect is accomplished through mastery goals.Data analysis reveals that our data is of good fitness with our structural model.

Table 2. Goodness of fit for the structural model

Index	estimate
X^2	10.68
df	3
GFI	0.98
AGFI	0.96
RMR	0.071

Diagram 2: shows thefited model with data of this research.

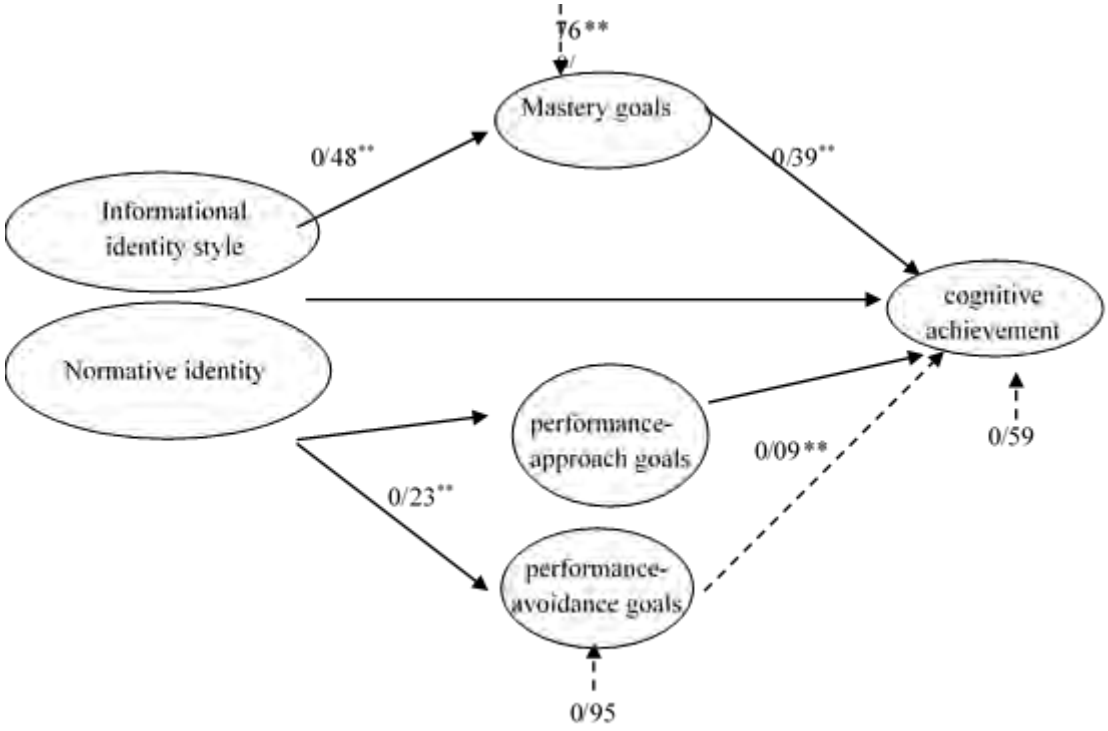

Fig. 2. Path diagram fited model of identity styles, cognitive achievement, and achievement goals

Discussion

Path analysis shows that informational identity style influences cognitive engagement (mental efforts) both directly and indirectly (through mastery goals or motivations). Both effects are positive. Mastery goal has an intervening role between cognitive engagement and informational identity style. Informational identity style has a positive and direct influence on mastery goals. This finding is consistence with Kaplan and Flum (Kaplan & Flum, 2010), Hejazi et al. (2003), and Zakeriand Kohulat (2009), and Babaee (2010).Mastery goal has a strong, direct, and positive effect on cognitive engagement. Since cognitive engagement includes cognitive, meta-cognitive, and self-regulatory strategies, the above-mentioned finding is in consistency with Meece et al. (1988), Miller et al. (1996), Wolterz et al. (1996), Hejazi et al. (2008), Hejazi et al. (2008), Mohsenpoor et al. (2006), Hejazi et al. (2003), and Khosrojerdi (2012).

Students with informational identity style always seek for challenging situations, taking advantage of sources of information. They use their newly-acquired information to develop and modify their own theories.Theory measures have motivational function and influence choosing the goals. When choosing educational goals, informational students prefer those orientations which are mainly focused on evolution, improving skills and knowledge. Such goals create motivation to challenge assignments. Since assignment is considered an effective factor in informational students' achievement, it is of special value and importance. Students, therefore, apply all their mental and cognitive competence and do their best to capture assignments. The type ofgoals chose by students creates motivations in them. The goal-based motivation activates nervous system and guide mental efforts to process the information. It has a deep effect on the type of cognitive activities and finally leads to success and mental health.

Another finding of this study is that informational identity style has a direct and positive impact on cognitive engagement. It is consistent with our conceptual model and earlier research. For instance, Duriez and Soenens (2005) and Berzonsky and Sullivan (2006) state that informational identity style is related to high levels of need for cognition, cognitive complication, and mental health.

What is interesting in our finding is the coefficient of direct effect of informational identity style (0.19) which is much more lower than when mastery goals plays an intervening role (0.42). Therefore, it can be concluded that seeking for information imposes more effects on targeted mental efforts and is organized through achievement goals. Although informational identity style is an adapted one, it cannot always lead to cognitive engagement in assignments. In fact, students may adopt informational identity style, but face difficulty in selecting suitable options or become confusedwhen searching for information. Eventually they fail to achieve any significant success.

The remaining part of model analysis suggests that normative identity style influences cognitive engagement through performance-avoidance and performance-approach goals. But when motivational system is activated through performance-approach goals (engagement in achievement assignment with the aim of improving value through showing abilities and competence), mental efforts and cognitive engagement are lower than when motivational system is activated by mastery goals (engagement in achievement assignment with the aim of learning and finding new information).The coefficient of direct effect of mastery goals on cognitive achievement is 0.39 with the level of significance at 0.01, while the coefficient of direct effect of performance-approach goals on cognitive achievement is 0.14. As to performance-avoidance goals (avoidance from engagement in assignments to hide weak points) this coefficient is 0.09.It indicates identity style has a direct and positive effect on performance-approach goals. It is in consistency with Kaplan and Flum (2010), Hejazi et al. (2003), Babaee (2010), and ZakeriandKohoulat (2009).

Performance-approach goal has a positive and significant effect on cognitive achievement. It is in consistency with Meece et al. (2007), Hejazi et al. (2009), butnot consistent with khosrojerdi (2012), Hejazi et al. (2008), and Elliot and McGregor (2008). This inconsistency suggests that the relationship between performance-approach goals and cognitive achievement needs further research and investigation.Wolterz (1996) states that the relationship between performance goals and cognitive achievement in high school and university students is unclear and vague. Literature review indicates that this relationship depends on the group characteristics, age, and the type of mental strategies adopted by them.Midgley et al. emphasize that the relationship between performance goals and learning efficiency is dependent on the nature of outputs, individuals' characteristics, and environmental settings (Midgley et al., 1998). It is evidently shown that performance goals in competitive settings are more facilitator for boys rather than for girls, as well as for university students rather than high school students. The path from diffuse-avoidant identity style to performance-avoidant identity style was deleted from the fitted model. It is consistent with Khosrojerdi.

According to Berzonsky et al. (Elliot & McGregor, 1999) diffuse-avoidant identity style is negatively related to educational achievement. The reason is that individuals with diffuse-avoidant identity style avoid discovering "themselves" and self-regulation. They are also engaged in irrelevant and diffuse assignments.

Lack of significance can be the result of students' characteristics with diffuse-avoidant identity style. They show very low levels of readiness in dealing with problems and assignments and lack clear educational goals. Cognitive strategies and non-adaptive confronting double their problems. Considering the point that they are fully focused on desired presence and social influence to maintain social self-esteem and that self-assessments by such individuals are based on immediate or case expectations and situational demands, this state is probably caused by unclear answers to the questionnaires.

The overall conclusion from findings shows that mastery goals can guide informational identity acquisition toward targeted mental efforts, so that the process of acquisition of knowledge and skills witnesses more interest and speed. This leads to long-lasting learning, because in the current age, short-term knowledge acquisition for teenagers is not sufficient. Educational system, therefore, needs to facilitate long-lasting learning. In order to achieve such a goal, evolutional processes needs to be employed and it can be accomplished through facilitating identity development.

Since prolonged teen years delay identity determination until the first years of university, this is the duty of educational systems to provide conditions for adaptive identity styles to be shaped, that is information hunting, thinking, and problem solving. They are also responsible to initiate motivational-mastery orientations in students, lead students to self-regulated and targeted learning and to prevent them from being confused when choosing information.

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