

## Role of Relatedness in Higher Education of Chinese Students - A Self Determination Theory Perspective

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### ABSTRACT

Most research on self-determination theory applications in education focuses on competence and autonomy (Wigfield et al., 2019; Vallerand, 2000). After reviewing its mini theories and relevant recent research, this study argues that relatedness is central to motivation in higher education, as seen in a social context. Specifically, through relatedness, students are presented with alternatives to make choices. Such experience prescribes an internal perceived locus of causality, protects students from falling “prawn” to extrinsic motivation, and consequently improves intrinsic motivation (Deci & Ryan, 1985, p. 154). The hypothesized model is tested using PROCESS macro (Hayes, 2013) based on survey responses from 107 Chinese students regarding learning autonomy and intrinsic motivation, and the results show that relatedness has a complete mediation effect on the relationship between i) autonomy and motivation, ii) competence and motivation. In other words, relatedness complements why autonomy and competence lead to intrinsic motivation. Findings suggest new interpretations of best practices in higher education and open new directions for future research.

### INTRODUCTION

“It’s not the full Yale experience, but it’s something.” (Kim, 2015) After recording his whole lecture series on game theory, former provost of Yale University Professor Polak shared comments on Yale Daily News. In traditional classrooms, instructors always make grading and attendance policies. Therefore, it is hard to tell whether students attend the classroom because they truly enjoy the learning experience. However, in massive online open courses, those who watch the recordings will be more likely to enjoy and be motivated by the learning activity (Barak et al., 2016). Otherwise, they can spend time on entertainment or shorter popular science content recommended for second perspectives.

View counts from the most popular courses in engineering (Machine Learning taught by Professor Andrew Ng) (Stanford, 2008), social science (Justice taught by Professor Michael Sandel) (Harvard, 2009), and business (Finance Theory taught by Professor Andrew Lo) (MIT, 2013) tells a different story. The view counts comparison between the first two to six lectures and the last two to six lectures, which is shown to decrease significantly over time, as in Table 1. Similar trends can be found in almost any other popular open course. From this observation, the motivation for learning quickly fades away even when the teaching contents cater to the target students' interests.

**Table 1.** View Counts of Popular Open Courses

	2	3	4	5	6	-6	-5	-4	-3	-2
ML	839k	455k	323k	259k	210k	108k	116k	76k	75k	70k
Finance	2.2m	884k	462k	516k	327k	140k	100k	76k	80k	59k
Justice	5.3m	3.3m	2.7m	1.5m	1.9m	1.3m	1.4m	1.2m	953k	805k

Like what happened in massive online open courses, instructors in the traditional classroom setting would realize that halfway through the course, students may have already lost their interest in the classroom. Student participation and involvement in classroom activities could become increasingly limited (Legault et al., 2006). This raises the question of why students get intrinsically motivated and what can be done to keep students motivated.

Based on survey data from 107 respondents with undergraduate education experience, this study finds out that the missing complementary piece in an educational experience, as implied by Professor Polak in the beginning

paragraph, can be “relatedness”, as one of the three psychological needs in self-determination theory for improving intrinsic motivation. On a theoretical level, relatedness provides necessary choices for students to retain the internal perceived locus of causality, which increases intrinsic motivation.

## LITERATURE REVIEW

### Self Determination Theory

Since the 1970s, Edward L. Deci and Richard Ryan co-founded self-determination theory. It was seen as a breakthrough to the dominating behaviorism in the 20th century, characterized by “black box” thinking on motivation research (Ryan, 2019). When self-determination theory was first proposed, experiments demonstrated that monetary rewards as an extrinsic motivation caused a decrease in intrinsic motivation (Deci, 1971). At its root, the self-determination theory is built on previous works of attribution theory and the assumption that the nature of the perceived locus of causality parallels dimensions of motivation (deCharms, 1983). An excellent example to illustrate the point is that studies have shown that intrinsically motivated students would typically attribute success in learning to working hard, which is internal and changeable (Dickinson, 1995). Following this line of thought, self-determination theory takes an organismic approach and claims that motivation requires satisfaction of three inherent needs: autonomy, competence, and relatedness (Deci, 2012).

Two directions are worth further elaboration here. First, according to self-determination theory, motivation can be categorized into amotivation, extrinsic motivation, and intrinsic motivation (Ryan et al., 2019). The important differentiation between the latter two is that while extrinsic motivation requires reward or punishment, intrinsically motivated people can draw inherent satisfaction from the activity. For this study, every individual respondent shall be treated as having a motivational profile (Wang et al., 2016) with dimensions of both extrinsic motivation and intrinsic motivation. The two types of motivation are not antithetical to each other. Describing someone with decreasing intrinsic motivation means that the relative salience of intrinsic motivation relative to extrinsic ones was reduced.

Second, the definition of each need shall be clarified. Autonomy does not denote the anarchy type of autonomy (Garcia, 1996); on the contrary, autonomy in the self-determination theory means students can self-regulate (Deci, 2012). Competence means feeling capable of negotiating critical activities. For relatedness, the best definition can be similar to “the need to belong” (Baumeister, 1995), i.e., the need to be cared for by others. It is worth pointing out that most traditional self-determination theory research in education is conducted at high school or below, where relatedness takes on primarily a passive tense. The questionnaire prepared for this study takes a more proactive stance, stating that students in their undergraduate education are deemed capable of taking action to generate relatedness. This modification was inspired by Bandura's self-efficacy construct (1977).

In recent years, self-determination theories have found applications in social issues, including education, health care, work environment, and physical activities (Deci, 2012). However, this widespread influence does bring discontent when the mechanism between the three needs is much less clarified. In addition, a more specific understanding of the theory is critical to operationalizing the research findings (Johnson, 2009). Therefore, three mini theories were developed to support further applications of the theory, which are (i) cognitive evaluation theory (“CET”), (ii) causality orientation theory (“COT”), (iii) organismic integration theory (“OIT”) (Deci & Ryan, 1985, p. 9). The first two are interrelated, for which “choice” would serve as the fundamental crux and will be further reviewed at the end of the “Model Development” section.

### Empirical Evidence in Education

Historically, education was studied as embedded in its social context. Teachings were generalized as cultures being passed on to the next generation through the means of collaborative problem-solving that typically would bring immediate recognition (Vygotsky, 1978). Therefore, from its origin, the interface of self-determination theory in psychology and theories in education can be seen as bridged by the central construct of “relatedness”, i.e., it is through relatedness that autonomy and competence can be adequately manifested in social contexts.

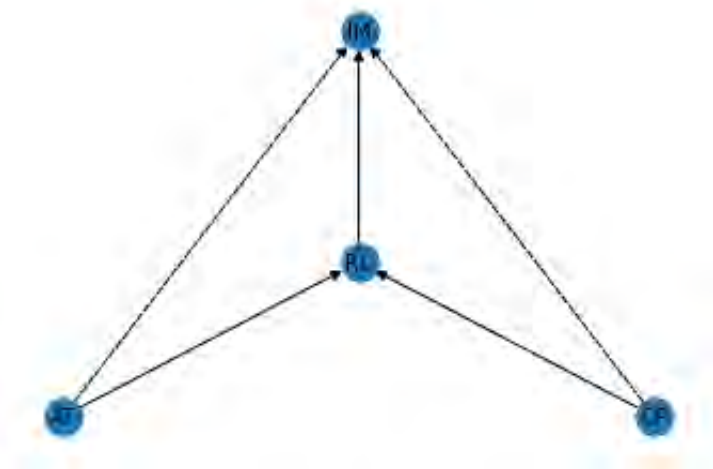
Unfortunately, the reforms of education do not lack detours from education's traditions. It has been documented that the institutionalization of education once gradually decontextualizes the practices from their roots (Ryan & Powelson, 1991). Deeply influenced by social Darwinism, education from the 1940s to the 1970s took on a “law of the jungle” mentality. Later criticism would coin a new concept called “rugged individualism,” where individuals are kept in isolation to be “programmed” into the best of themselves (Johnson, 2009; Skinner, 1968). One practice that emerged from this school of thought is high-stakes testing, which quickly became prevalent. Students in such settings can go through the curriculum at their own pace, and those who score high scores would feel competent for themselves. What causes controversy for self-determination theorists is that high-stakes testing is usually found to have a negative influence on teachers' classroom practices (Korentz, 2017), promotes

various types of gaming coupled with the manipulation of scores and records (Ryan & Brown, 2005), and may bring side effects like depression and anxiety (Elliot et al., 2011).

### Model Development

To simplify the graphical presentation in this section, intrinsic motivation would be denoted by “IM”, autonomy would be denoted by “AT”, relatedness would be denoted by “RL”, and competence would be denoted by “CP”. Studies on self-determination theory have shown that relatedness will play a central role in inherently social activities (Vallerand, 2000), with education being an example, as mentioned at the beginning of the previous section. Particularly given the information provided above, this model brings focus to the role of relatedness by contrasting: (i) From the perspective of self-determination theory, autonomy, competence, and relatedness would bring motivation, and (ii) In high stakes testing, the combination of autonomy and competence has been shown to decrease the intrinsic motivation. Besides, traditional reforms other than high-stakes testing tended to emphasize autonomy or competence and also turned out to be short-lived failures (Johnson, 2009). Therefore, autonomy and competence in the context of education will be adapted in this study as not having a significant effect on intrinsic motivation (dashed line in Figure 1). This would put intrinsic motivation at less salient positions in the students’ motivation profile, thus making it appear as if it has decreased. Instead, the causal relationship is established from autonomy to relatedness. In more recent research, Deci and Ryan (2014) found that when people in a relationship experience autonomy, their relationship quality improves.

On the competence and relatedness relationship side, research from cooperative learning, a close line of inquiry to applied self-determination theory in education (Wigfield, 2019), has shown to be promising. Tjosvold (2003,2006) showed that in competitive cooperation, when participants have a fair winning chance and track records of reaffirming the competence of participants, the nature of competition tends to be more constructive. In a more general case, competence allows less self-worth protection, thus encouraging attributional search when facing failure in relationships (Mayerson & Rhodewalt, 1988). In other words, satisfaction of competence needs increases relatedness exposure. This subtle mechanism, its relevance to effects on intrinsic motivation, and the overall salience of relatedness require further justification.



**Figure 1.** Self-Determination Theory in Higher Education

At this point, the CET and COT theories shall be revisited. Notably, the CET theories specified a process where external rewards could lead to an internal perceived locus of causality when individuals are given choices (Ryan & Deci, 1980). It comes with the benefit that true choices bring more energy and vitality to support sustained intrinsic motivation for activities (Moller et al., 2006). Within the COT theory, behavior based on choice is, by definition, self-determined and bears the autonomy orientation itself (Deci & Ryan, 1985, p. 154).

In high-stakes tests, grades are external regulation. By deliberately replacing relatedness with isolation, students are prone to fall “prawn” (deCharm, 1968) to grades as a cognitive goal. On the contrary, when students are allowed to grow relatedness, they are immediately presented with alternatives from a much more versatile category (Johnson, 2009). Admittedly, what comes along with relatedness can remain external or heavily mixed. However, students can now experience the process of making choices between cognitive and (or within) affective alternatives, which will, according to the theories reviewed so far, lead to internal perceived locus of causality and intrinsic motivation (Ryan & Powelson, 1991).

## RESEARCH METHODOLOGY

### Survey Procedure

There are no directly applicable questionnaires for this study. The current survey questionnaire is built by combining two well-established questionnaires. The first is the Patterns of Adaptive Learning Survey (PALS) (Midgley et al., 1996). It is a widely adopted scale in research related to motivation and beliefs. The second questionnaire on learner autonomy is adapted from a study on autonomy (Spratt et al., 2002), which would cover constructs including relatedness and competence in its list. All survey questions were written and distributed in Chinese. Selected questions from the questionnaire can be found in the Appendix; each item is measured in a five-point Likert scale (Likert, 1932).

Once the questionnaire was initially drafted, a bogus question, that is, a question paraphrased from an existing question, was added to the questionnaire. The answer to both questions ought to be the same. After that, trusted pilot partners were invited to fill out the form to test the completion range, indicating that a carefully filled-out questionnaire would typically take 60 to 120 seconds. Based on the above two settings, any responses that do not have the same answer for the two bogus questions or were completed within 60 seconds would be removed from the dataset during preprocessing.

Student WeChat groups were initially the leading distribution channel in the response collection process. However, the results could have been better, given that more than half of the responses were immediately removed before further in-depth analysis. Five additional online distribution service providers were approached, and only one out of five could deliver high-quality responses consistently. Of the 107 responses eventually included in this study, 70 samples have come from this online distribution channel. The other 37 samples have been collected by approaching friends who have completed undergraduate study. The two tricks (completion time and bogus questions) showed that online distribution channels should be used cautiously and are meant to provide an effective way to screen distribution channels in future studies when distribution channels are limited.

### Reliability

After preliminary preprocessing, communality and Cronbach Alpha of items within each construct were calculated. Many thresholds have been proposed for the cutoff of communality, and the ideal threshold adopted is 0.5 for sufficient explanatory power (Hair et al., 2019, p. 155). Cronbach Alpha is a reliability measure that reflects internal consistency (Cronbach, 1951). The threshold used is 0.7 or above to indicate the homogeneity of items (Cortina, 1993). As seen in Table 2, all communalities are greater than 0.5, and all Cronbach Alpha are greater than 0.7.

**Table 2.** Communality and Cronbach Alpha of Each Construct

	Motivation	Autonomy	Competence	Relatedness
<b>1</b>	0.620 (q4)	0.557 (q7)	0.703 (q10)	0.743 (q13)
<b>2</b>	0.694 (q5)	0.677 (q8)	0.690 (q11)	0.709 (q14)
<b>3</b>	0.569 (q6)	0.720 (q9)	0.610 (q12)	0.765 (q15)
<b>Alpha</b>	0.700	0.732	0.749	0.819

## RESULTS AND DISCUSSION

### Demographic Profile and Descriptive Statistics

For this survey response sample (Table 3), all students are from China, and 90.7% of respondents are between the ages of 22 and 30. In terms of major, 51.4% of students majored in social science. Regarding GPA, most students scored between 3 and 3.7 from an olive-shaped distribution typically seen.

**Table 3.** Demographic Profile of Survey Respondents

		Frequency	Percent (%)
<b>Gender</b>	<b>Male</b>	32	29.9
	<b>Female</b>	75	70.1
<b>Age</b>	<b>18-30</b>	97	90.7
	<b>&gt;30</b>	10	9.3
<b>GPA</b>	<b>&lt;3</b>	4	3.7
	<b>3-3.7</b>	64	59.8

	>3.7	39	36.4
Major	STEM	34	31.8
	Social Science	55	51.4
	Business	18	16.8

The descriptive statistics of the collected sample can be found below, see Table 4. In this sample, the mean of students’ intrinsic motivation is 4.13 on a Likert Scale. Relatedness has the highest standard deviation of 0.82 and the lowest mean of 3.15 among all constructs.

**Table 4.** Descriptive Statistics of Key Constructs

	Mean	Std	Min	Max	Median
<b>Motivation</b>	4.13	0.59	1.67	5.00	4.33
<b>Autonomy</b>	3.81	0.67	1.00	5.00	4
<b>Competence</b>	3.65	0.59	1.00	5.00	3.67
<b>Relatedness</b>	3.15	0.82	1.00	4.67	3

**Correlation Test Results**

In the first step of the analysis, as a preparation for subsequent analysis, a simple correlation test confirms the general applicability of self-determination theory. The numerical value of each construct is computed by averaging the responses of the three questions under the respective construct. As shown in Table 5, intrinsic motivation is shown on 0.05 level to be significantly correlated with all three constructs as predicted by the self-determination theory.

**Table 5.** Correlation Test on Survey Responses

	1	2	3	4
<b>1. Intrinsic Motivation</b>	-			
<b>2. Autonomy</b>	0.280**	-		
<b>3. Competence</b>	0.231*	0.135	-	
<b>4. Relatedness</b>	0.339**	0.346**	0.640**	-

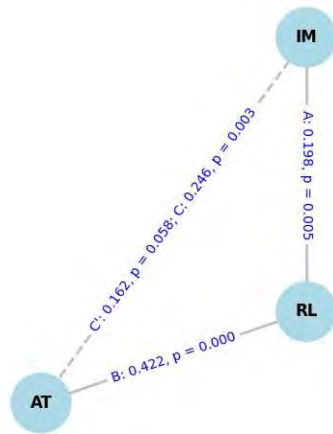
**Mediation Analysis Results**

In the second step, consider the observation on high-stakes testing and the model developed for this study, PROCESS macro (Hayes, 2013, p. 445), particularly Model Four, is used to test the mediation effect of relatedness on the relationship between autonomy and motivation and the relationship between competence and motivation. The purpose of choosing mediation analysis is that it unravels the “black box” (Hafeman, 2009) by explaining “why” autonomy and competence would lead to enhanced intrinsic motivation (Hair et al., 2019, p. 407). As previously reviewed, years of research have found adding a fourth construct unnecessary. Therefore, the assumption of no hidden variable necessary for mediation analysis is satisfied.

The first part of the mediation analysis focuses on autonomy and motivation as mediated by relatedness. Results in Figure 2 found that the direct effect of autonomy on motivation is insignificant (p = 0.058). However, its indirect effect is significant with the lower bound in the output greater than 0, see Table 6. Therefore, it can be concluded that relatedness completely mediates the relationship between autonomy and motivation (Hair et al., 2019, p. 408). It is easy to reconcile the decomposition by calculating  $0.422 \cdot 0.198 + 0.162 = 0.246$ .

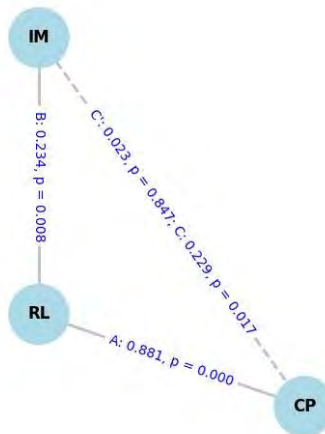
**Table 6.** PROCESS output of Mediation Analysis on Autonomy, Competence, and Intrinsic Motivation

AT-MT	Effect	se	t	p	LLCI	ULCI	c_cs
<b>Total</b>	0.246	0.082	2.99	0.003	0.083	0.409	0.280
<b>Direct</b>	0.162	0.085	1.913	0.058	-0.006	0.331	0.185
<b>Indirect</b>	0.084	0.049			0.007	0.192	
CP-MT	Effect	se	t	p	LLCI	ULCI	c_cs
<b>Total</b>	0.229	0.094	2.427	0.017	0.042	0.416	0.231
<b>Direct</b>	0.023	0.119	0.193	0.847	-0.214	0.260	0.023
<b>Indirect</b>	0.206	0.095			0.034	0.399	



**Figure 2.** Mediation Effect of Relatedness on Autonomy and Motivation

The second analysis shown in Figure 3 shows that the direct effect of competence on motivation is insignificant ( $p = 0.847$ ). However, its indirect effect is significant with the lower bound in the output greater than 0 (Table 6). Therefore, it can be concluded that relatedness completely mediates the relationship between competence and motivation (Hair et al., 2019, p. 408). This decomposition can be numerically reconciled by computing  $0.023 + 0.881 \cdot 0.234 = 0.23$ . In addition, the effect of competence on motivation is shown to be mainly realized through the indirect part ( $0.206 / 0.23 = 89.6\%$ ).



**Figure 3.** Mediation Effect of Relatedness on Competence and Motivation

The results above can be interpreted together as follows: when students increase their competence and autonomy if the relatedness is not allowed to follow its natural path of development, intrinsic motivation in its stable state would tend to remain low (Anderson, 1976) as grades take over as external locus of causality. Suppose that the students, for various reasons, are severely restricted in relatedness, given sufficient autonomy (but not likely competence); intrinsic motivation may still exist where students do not perceive the locus of causality as being completely external. It is worth clarifying that the choice here is distinct from the “what” type of choice provided to support autonomy (Niemiec & Ryan, 2009); instead, it is the “why” in psychological perception. This built-in nondeterministic aspect rooted in attributional search (deCharms, 1983) would make the proposed theory robust.

To extend this line of reasoning, when students have become solely pressured by grades and relatedness brings nothing but negativity (e.g., peer pressure), the proposed theory in this study will not deny intrinsic motivation in classroom learning because students are still given choices, which by definition is autonomy orientated (Deci & Ryan, 1985, p. 154). This would shed light on those who, for irresistible reasons, remain in high-stakes testing scenarios and keep researchers alert and cautious because intrinsic motivation under the theory of this study could, in the worst cases, return to ruthless competitive behavior.

Overall, using the SPSS PROCESS macro, the mediation analysis results support the hypothesized model presented in Figure 1.



## Discussion

The practical implication for universities is to return to their fundamental mission: to help students develop an appreciation for the pleasure of learning. Hopefully, that will last for a life span (Ryan et al., 2019). Higher education, in this sense, provides invaluable opportunities for students to experience self-regulation, practical action, and cooperation, which are crucial attributes of thriving in social organization (Ryan et al., 2019). However, due to the previous prediction that an intrinsic motivation created by a choice made between two external motivations could lead to undesirable behavior, it will be worthwhile efforts, even in higher education, to continue to emphasize providing value and goals guidance (Wigfield, 2019).

On an operation level, instructors and administrators shall provide sufficient opportunity for students to generate such relatedness (Beachboard et al., 2011) and facilitate conflict resolution whenever necessary. This emphasis on relatedness enables new interpretations of existing best practices. For example, some universities recommend that instructors and teaching assistants provide feedback within ten days of submission, define clear grading criteria in the assignment documents, and post sample responses afterward. The recommended practices give the troubled students a choice to move away from intentional manipulation of scores in low transparency environment (Ryan & Brown, 2005) and replace it with the perception of an opportunity to exchange with instructors' informational constructive feedback necessary for the internationalization of self-regulation (Koestner et al., 1984). Another good example would be that in recent years, more instructors have been using Canvas (Aldiab, 2019) to encourage students to answer each other's questions. Instead of questioning their competence when encountering difficult questions (Elliot et al., 2011), students will understand that others may have the same question, thus alleviating self-doubt.

## CONCLUSION

One interesting analogy of this study on relatedness in education is the manufacturing of white bread by Wonder Bread. Adding various combinations of nutrients to the notorious white bread brought the brand's popularity among consumers (Ryan & Powelson, 1991). In the survey, the complete mediation effect of relatedness on the relationship between autonomy, competence, and intrinsic motivation is the empirical evidence of the self-determination theory, its closed related mini theories, and the nifty idea of choice.

In the future, on a theoretical level, research for thoroughly understanding the relationship between competence and relatedness is rare. However, it would be meaningful to explore the underlying mechanism further. For example, when students are highly competent, their satisfaction with relatedness may be suppressed by the perception that peer's actions will become an obstacle to one's own goal (Johnson, 2009) or teachers and parents are exerting a controlling type of relatedness (Deci et al., 1991).

Practically, teachers shall remain conservatively optimistic about the potential of practices that generate relatedness among students. Besides the reasons explained earlier, free riders may push students back to individual study after completing the project (Hall & Buzwell, 2013). In such situations, research should help reduce the negative occurrence by identifying triggers and designing proper policies early on.

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