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Examining the behavioral features of Chinese teachers and students in the learner-centered instruction

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Abstract
The purpose of the study was to reveal whether and how learner-centered instruction in comparison with traditional teacher-centered instruction might present unique effects on the learning behaviors and academic motivation of Chinese students. Meanwhile, it was also explored how the distinctive instructing features of Chinese teachers assuming the learner-centered approaches in comparison with those teachers in the traditional classroom, might impact on the associations between learner-centered instruction and learning behaviors of Chinese students. Measures assessing the perceived instruction behaviors of teachers and students' learning behaviors and academic motivation were administered to 394 high-school students in the experimental group and 368 high-school students in the control group. The results indicated that the implementation of learner-centered instruction brought certain changes on the instruction behaviors of Chinese teachers, which might have certain beneficial influences on students' learning behaviors inside the classroom but failed to better support students to be autonomous and self-directed learners.

Keywords Learner-centered instruction · Learning behavior · Academic motivation · Chinese student

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Introduction

In past decades, the school education in China has been intensively criticized for its dominant instruction approaches being stereotyped, dogmatic, and teacher centered (Frambach et al. 2014; Gui and Cheng 2018; Wang et al. 2018; Wu and Zhang 2016; Zhao 2018). Many Chinese educators were making efforts to transform school education by introducing learner-centered approaches into classroom instruction (An 2013; Gui and Cheng 2018; Wang et al. 2018; Zhao 2018; Zhu and Zen 2017). Nevertheless, some scholars (Hattie 2012; Lavy 2011; Schwerdt and Wuppermann 2011; Zhao 2018; Zhu and Zen 2017) have questioned the effectiveness of the learner-centered pedagogy and reported a variety of difficulties or obstacles encountered in practicing learner-centered instruction especially for non-Western student groups. Watkins and Biggs (2001) made the claim that the concept of learner-centered learning was originated from Western cultures and may not necessarily apply to non-Western cultural groups. Take the Chinese student group as an example, they are more adapted to traditionally valued teacher-centered approaches rather than the learner-centered approaches. Regardless the enthusiastic advocacy of many Chinese educational innovators to propel the paradigm shift from teacher- to learner-centered instruction, the questions regarding whether learner-centered instruction truly applies to Chinese student population, and how it might influence the learning of Chinese students (positively or negatively) should be explored and answered. In particular, we are interested in how learner-centered instruction might affect Chinese students' learning behaviors, as effective learning behaviors are critical for being successful in learning (Hidi and Harackiewicz 2000; Wu and Zhang 2016). It has been suggested by Western scholars (Borich 2010; Herington and Weaven 2008; Pee et al. 2000; Stefaniak and Tracey 2015; Wismath 2013) that learner-centered instruction encourages autonomous and self-directed learning behaviors of students. However, it was reported in China that Chinese students remained quiet and dependent while their teachers were assuming learner-centered designs (Zhao 2018; Zhu and Zen 2017). Similar findings were also reported by Western scholars (Frambach et al. 2014; Kennedy 2002; Li and Yue 2006; Wang et al. 2012), who observed that students from Eastern countries tended to present passive learning behaviors and had difficulties in fitting into learner-centered instruction in the Western classroom environment. This phenomenon was considered problematic by some Western teachers who had the experiences of instructing Eastern students (Clark and Gieve 2006). Therefore, it presents a critical research question for both Chinese and Western educators regarding whether the influences of learner-centered instruction on the learning behaviors of Eastern students (Chinese students in particular in this study) would exhibit distinctive patterns in comparison with Western students. If learner-centered instruction fails to induce expected behavioral responses of Chinese students, we need to explore potential explanations and relevant impacting factors. As the focus of this study was on the efficiency of the instruction approaches implemented in the Chinese classroom environment, the first impacting factor that we considered mostly relevant was to what extent Chinese teachers were truly assuming learner-centered instruction while they were encouraged to do so. As Chinese teachers are generally habituated to playing authoritative roles in the classroom, the following questions concern us: what features or difficulties would they exhibit or encounter while encouraged to assume the learner-centered methods, and how might these features or difficulties affect Chinese students' learning? All these questions remain to be answered. Thus, the current research was assumed to examine how learner-centered instruction relates to Chinese students' learning behaviors, and whether the learner-centered approach presents any distinct impacts in comparison with the traditional teacher-

centered approach. Along with this exploration, another variable that is academic motivation, was proven highly relevant to both learner-centered instruction (Alfassi 2004; Flowers et al. 2000) and students' learning behaviors (Reeve et al. 2004). It was also included in the research for the purpose to better examine the effects of learner-centered instruction on the learning of Chinese students. Furthermore, the study explored the features of learner-centered instruction for the Chinese teacher group, which might offer us a useful perspective to illuminate the relations between learner-centered pedagogy and Chinese students' learning behaviors.

The effectiveness of learner-centered instruction

In comparison with the teacher-centered paradigm that has a focus on "teaching delivery rather than on student learning" (Blumberg 2004; Laurillard 2013; Paige and Daniel 2015), the learner-centered pedagogy makes students the focus. The students are empowered to arrange the learning process: they can set goals, make plans, and choose methods for their own learning (Baeten et al. 2010; Yap 2016). The learner-centered pedagogy has been embraced by educators as an antidote or a remedy to more "traditional" forms of classroom relations and appeals to those who seek to challenge traditional notions of teacher-centered, curricular, and canonical authority (Dyson 2010).

Weimer (2013) defined five aspects of teaching that should be subject to change to achieve learner-centered instruction, including the balance of power, the function of content, the role of the teacher, the responsibility for learning, and the purposes and processes of assessment. In order to move to learner-centered teaching, the balance of power should shift gradually toward students with the increase of their ability of controlling their own behaviors, so that they take more but appropriate responsibilities for learning. Instructors should not obsess with "how much to cover" in the courses but use certain rich domains of content as a means to help students to be a lifelong learner. So, they could acquire the "deeper" key abilities to analyze, compute, relate, and self-assess their own understanding. In learner-centered teaching, the instructor becomes a facilitator instead of a transmitter of knowledge and creates an environment to support students' learning. Instructors encourage students to take more responsibilities for learning. The instructor should not consider grading final exams as the sole approach of assessment but explore more supportive ways of evaluation (e.g., self- and peer evaluation) that actually develop students as learners and use both formative and summative feedback to improve student performance. The five aspects of learning discussed by Weimer specified and enriched the concept of learner-centered instruction and were adopted by quite a few scholars or educators as a basic framework to design learner-centered teaching and develop instruments or processes to assess relevant practices (Blumberg 2009).

However, the efficiency of implementing the learner-centered paradigm remains an arguable issue concerned by a few scholars and educators (Andersen and Andersen 2017; Hattie 2012; Lavy 2011; Schwerdt and Wuppermann 2011). On one hand, a number of studies have indicated that the implementation of learner-centered teaching modalities could generate positive outcomes in enhancing students' academic achievements, learning interests, and academic engagement (Alfassi 2004; Hancock et al. 2002; Polly et al. 2015; Macaulay and Nagley 2008; McCombs 2001; McCombs and Quiat 2000, 2002; Meece et al. 2004; Wheatley 1999), and meeting psychological needs of students (Smit et al. 2014). On the other hand, some scholars raised doubts and negative opinions regarding the efficiency of learner-centered pedagogies. For instance, Hattie (2012) pointed out that regardless of the enthusiastic acclamations and applauses given to learner-centered instruction in the past half century, the

empirical evidences supporting its effectiveness were nevertheless not solid. Mayer (2004) claimed that the apparently compelling epistemological beliefs upholding the learner-centered pedagogy concealed its low-efficiency or inefficiency in reality. Andersen and Andersen (2017) reported that learner-centered instructional strategy had a negative impact on academic achievements for participants. In the meantime, a few studies (Lavy 2011; Schwerdt and Wuppermann 2011) revealed that the teacher-centered pedagogy had its own advantages in positively affecting students' motivation and academic achievements in learning certain subject contents. Goldschmidt et al. (2016) offered different treatments (teacher guided vs. student centered) in discussing socioscientific issues to 10th-grade students during biology lessons. It was found that the teacher-guided discussion led to better efficiency and significantly better scores.

Current empirical research in Western literature provided both supportive and oppositive evidences for the practices of learner-centered paradigm (Alfassi 2004; Andersen and Andersen 2017; Hancock et al. 2002; Lavy 2011; Macaulay and Nagley 2008; McCombs 2001; Polly et al. 2015; Schwerdt and Wuppermann 2011). In China, many Chinese schools (from primary school to college) have been actively involved in the experiments and the implementation of such learner-centered teaching designs as project-based learning, problem-based learning, heuristic mode of teaching, situational teaching approach, cooperative learning, personalized teaching, etc. (Wang et al. 2018; Zhao 2018; Zhu and Zen 2017). However, the effectiveness of these practices was seldomly examined through rigorously designed empirical research, and reports portraying the outcomes of these practices were relatively absent in professional journals. Chinese students in comparison with Western students present idiographic traits in styles, habits, views, and behaviors in learning (Gui and Cheng 2018). For instance, Chinese students were observed keeping quiet and passively relying on teachers' guidance both in Chinese and Western classrooms, whereas Western students tended to participate more actively in classroom activities and lead their own learning (Cheng and Guan 2012). Thus, Chinese students might perform in a distinctive manner while certain teaching paradigm is imposed on them. Watkins and Biggs (2001) suggested that Chinese students who are inherited with the Confucian legacies and living in the collectivistic culture, are more adapted to teacher-directed classroom instruction, and thus have difficulties in fitting in with learner-centered teaching. However, some other researchers (Wu and Zhang 2016) pointed out that learner-centered instruction encouraged Chinese students to be more active and autonomous in learning. Due to the shortage of relevant investigation, it is still unclear regarding what effects (negative or positive) the learner-centered paradigm would have on the learning of Chinese students in comparison with traditional teacher-centered pedagogy. Further exploration is required to evaluate the outcomes of implementing the learner-centered paradigm in Chinese classrooms and to achieve more accurate understanding of the effects of the paradigm shift.

Moreover, while we are examining how learner-centered instruction might affect Chinese students' learning, one relevant and critical concern is that to what extent Chinese teachers in such experiments scaffolding the paradigm shift were actually performing learner-centered teaching. Like Chinese students who might be adapted to teacher-centered instruction, Chinese teachers might get habituated to playing the authoritative roles in the classroom. In the meantime, in Chinese education system, the scores from some vital exams (e.g., national exam) would determine whether a student could get enrolled in a middle school with high reputation or receive an offer from a desired college. The principal task for teachers is to prepare their students to get ready for these high stake exams. The instruction offering to

Chinese students is accordingly rigorous, formalized, and accompanied with increasing emotional intensity with the approaching of the exam dates. This exam-directed education would at least to a certain degree restrict teachers from releasing their own power and allowing students to take over control. Researchers (Wu and Zhang 2016) have pointed out that some Chinese teachers have reported encountering difficulties and obstacles while they were encouraged to assume learner-centered methods. Thus, a critical question concerns us: to what extent Chinese teachers are actually able to implement learner-centered teaching while they are encouraged to do so. This question should be examined first before moving to the next question regarding how learner-centered instruction might affect the learning of Chinese students. However, it should be noted that learner- and teacher-centered instruction were usually described as two extremes on a continuum (O'Neill and McMahon 2005). In reality, a teacher hardly relies on a single teaching design (De Kock et al. 2004). Even in Chinese traditional classroom instruction, it is not rare for the teacher to encourage students to be autonomous and self-directed. Therefore, we can also apply relevant measure to assess the extent to which those teachers in traditional classrooms would present learner-centered teaching behaviors.

Learner-centered instruction and students' academic motivation and learning behaviors

In examining the effectiveness of learner-centered teaching paradigm, the major attention has been given to the investigation of the effects of relevant instructional strategies on students' academic achievements (Aslam and Kingdon 2011; Bodovski and Farkas 2007; Lavy 2011; Schwerdt and Wuppermann 2011; Van Klaveren 2011). The present research was focusing on how learner-centered instruction might affect the learning behaviors of students along with another highly relevant variable that is academic motivation. The reason has been suggested by scholars (Hidi and Harackiewicz 2000; Wu and Zhang 2016) who pointed out that an effective instruction design should have positive impacts on students' academic motivation and foster their efficient learning behaviors. It was generally approved that academic motivation is among the most powerful determinants of students' performances and achievements in schools (Reeve et al. 2004; Ryan and Connell 1989). According to Vallerand et al. (1992), academic motivation comprises three components: intrinsic motivation, extrinsic motivation, and amotivation. Both intrinsic motivation and extrinsic motivation have significant impacts on the learning of students (Reeve et al. 2004). In the meanwhile, effective learning behaviors (such as paying attention to the lecture, participating in the classroom activities, cooperating with other students, completing assignments and homework, and planning, managing, and reflecting on the learning processes, etc.) were proven critical for students being successful in schools (Bandura 1997; Borich 2010). The focus on academic motivation and learning behaviors, instead of academic achievement, has an important advantage in fostering the exploration of the functioning mechanism underlying the effects of teaching paradigms.

A few studies in Western literature have provided empirical evidence to suggest that the implementation of learner-centered instruction would have positive impacts on students' motivation (Alfassi 2004; Flowers et al. 2000) and lead to efficient learning behaviors of students (Herington and Weaven 2008; Pee et al. 2000; Stefaniak and Tracey 2015; Wismath 2013). For instance, Flowers et al. (2000) found that students in a computer technology course were more motivated to learn when exposed to learner-centered instruction. And some scholars (Herington and Weaven 2008; Pee et al. 2000) have argued that learner-centered instruction

could attribute to the enhancement of such learning behaviors of students as participating in classroom activities, self-regulated behaviors, cooperative behaviors, etc. However, it is unclear whether the effects of learner-centered instruction on students' motivation and learning behaviors would remain unvaried for students from various cultures. Scholars have pointed out that students from non-Western cultures (e.g., Asian, Pacific) responded differently in learner-centered teaching designs in comparison with Western students (Frambach et al. 2014). They might be less motivated, keeping quiet, or even getting nervous in learner-centered instruction (Frambach et al. 2014; Gwee 2008; Khoo 2003; Wang et al. 2012). The reason could be that Eastern students got habituated to playing the role as passive receivers of knowledge in the classroom. On the other hand, some scholars revealed that Chinese students were very capable of adjusting their learning approaches to fit in with Western methods (Gieve and Clark 2005; Gu and Schweisfurth 2006; Wang et al. 2012). It remains to be explored regarding how exactly learner-centered instruction relates to Chinese students' academic motivation and learning behaviors. Would Chinese students receiving learner-centered classroom instruction tend to be more motivated in learning and present more effective behavioral traits than students receiving teacher-entered instruction? It still awaits exploration regarding whether learner-centered instruction in comparison with teacher-centered instruction has better or worse influences on Chinese students' learning.

The present research

Based on the above discussion, the present study raised the following research questions and assumptions.

1. The first question concerns to what aspects and to what extent Chinese teachers assuming the learner-centered approaches would present distinctive instructing traits comparing with teachers assuming the traditional teacher-centered approaches. By the definition of learner-centered instruction, it was assumed that teachers following learner-centered paradigms would be more tending to students' individual needs, playing the role of facilitator rather than authoritarian, empowering students to direct their own learning, assuming supportive assessments, giving feedbacks, and implementing learner-centered teaching methods (hypothesis 1).
2. The second question concerns whether students in the learner-centered classroom present distinctive learning behaviors and higher or lower academic motivation in comparison with students in the teacher-centered classroom. Scholars (Alfassi 2004; Goldschmidt et al. 2016; Polly et al. 2015) have suggested that learner-centered instruction enhances students' academic motivation and encourages students' autonomous and self-directed learning behaviors. It was thus hypothesized that students in the learner-centered classroom tend to have higher level of academic motivation, present more attentional, participating, responding, and interactive behaviors in the classroom and are inclined to be more autonomous and independent in managing their own learning (hypothesis 2).
3. The third question concerns whether learner-centered instruction significantly relates to Chinese students' academic motivation and learning behaviors, and whether these relations differ significantly between the experimental and control groups. Based on previous research (Goldschmidt, Scharfenberg, & Bogner, 2016; Polly et al. 2015), it was hypothesized that learner-centered instruction significantly relates to Chinese students' academic motivation, and such learning behaviors as preview, review, participating in

classroom activities, interacting with other students, planning, managing, and reflecting on their own learning, etc. (hypothesis 3). Suppose that learner-centered teaching approach would lead to autonomous and self-directed behaviors of students, it was expected that this influence of learner-centered instruction should be more evident in experimental classes implementing the learner-centered methods than in traditional classes. It was thus hypothesized that learner-centered instruction would have more significant connections with students' academic motivation and learning behaviors in the learner-centered classroom than in the teacher-centered classroom. In other words, it was speculated that group (experiment vs. control) moderates the relations between learner-centered instruction and students' academic motivation and learning behaviors (hypothesis 4).

Methodology

Participants

Participants were young students recruited from four secondary schools in the Southeastern part of China. These schools are all located in municipal settings. Two of these schools were chosen because their administrators advocated the innovation of classroom instruction and have taken serious measures to support their teachers to implement the learner-centered modalities in teaching. A large portion of teachers in these schools voluntarily participated in the training offered by a professional team comprising lecturers from a local university who were specialized in advocating learner-centered teaching designs. The training lasted for 2 months. During the first 2 weeks of training, the trainees attended a 24-h course instructing relevant theories and methods. And then during the rest 1.5 months, each trainee tried to design and implement learner-centered instruction modalities in his/her class under the supervision of a specialist from the local university. Students taught by these teachers who received the training were chosen to participate in the experimental group. After deleting 11 invalid cases for univariate/multivariate outliers, and incomplete or careless responses (for instance, choosing "3" or "4" for all items), the final data pool consisted of 394 participants (209 females, and 185 males) in this group. They were in 7–9 grades ($M = 14.25$ years, $SD = 1.09$) from junior high schools (128 seventh grade, 136 eighth grade, and 130 ninth grade).

The rest two schools were considered regular schools largely comparable in reputation, the sources of students, and education quality with the two experimental schools. The teachers in these schools largely followed traditional teaching approaches. At each school, one classroom was randomly chosen among four to six classrooms at each grade. Students in these classes were invited to participate in the study on a voluntary base. The final data pool for this group consisted of 368 participants (191 females, and 177 males). They were also in 7–9 grades ($M = 14.67$ years, $SD = 1.01$) from junior high schools (128 seventh grade, 126 eighth grade, and 114 ninth grade).

Instruments

The Scale of Learner-Centered Instruction

The Scale of Learner-Centered Instruction (SLI) was developed by Yang and Xu (2015) and is administered to students to assess the extent to which their teachers are perceived to assume the

learner-centered approach to instruction. The measure adopts a 5-point Likert-style Scale ("strongly disagree" to "strongly agree") and consists of five subscales. It has 30 items in total with 5 items for each subscale. The subscale of "individualization" assesses the level the teacher reaches out to meet the individual needs of students (e.g., "The teacher offers individual support while I encounter difficulties in learning"). The subscale of "facilitating" assesses the degree that the teacher plays the role as a facilitator instead of an authoritative person (e.g., "The teacher provides necessary resources that support our exploration in classes"). The subscale "empowerment" assesses the extent to which the teacher allows students to lead their own learning (e.g., "The teacher offers opportunities for us to organize learning and discussion"). The subscale of "supportive assessment" assesses the level that the teacher assumes multiple forms of assessment instead of only final exams, and the frequency that the teacher offers feedbacks to students' learning (e.g., "The teacher provides opportunities for us to self- or peer assess the outcomes of learning"). The subscale of "teaching methods" assesses how often the teacher assumes learner-centered teaching methods such as problem-based learning, cooperative learning, project-based learning, etc. (e.g., "The teacher frequently urges us to work with peers to solve problems in the classroom").

Cronbach's alphas reported by Yang and Xu (2015) were .74 for individualization, .78 for facilitating, .82 for empowerment, .71 for supportive assessment, and .85 for teaching methods. They also claimed that the construct validity and reliability of the instrument have been confirmed in a few studies. Cronbach's alphas in the current study were between .74 and .83 for the five subscales.

The Academic Motivation Scale

The Academic Motivation Scale (AMS; Vallerand et al. 1992) was used to assess students' motivation for engaging in school activities. The scale was translated into Chinese version through a translation-back-translation procedure. The AMS is composed of seven subscales measuring intrinsic motivation, extrinsic motivation and amotivation on a 7-point Likert Scale (1 = not at all true to 7 = very true). The amotivation items were excluded in this study due to that they were unfit for the purposes of the research. The six subscales (24 items) of the instrument measuring intrinsic motivation (e.g., "Because I experience pleasure and satisfaction while learning new things") and extrinsic motivation (e.g., "Because I think that the school education will help me better prepare for my career in the future") were used in the assessment. Cronbach's alphas for the subscales in the current research were in the range of .78 and .88 which indicate high level of internal consistency. The construct validity of the instrument was supported by previous research (Cokley et al. 2001; Fairchild et al. 2005).

The Questionnaire of Learning Behaviors for High School Students

The Questionnaire of Learning Behaviors for High School Students (QLBHSS) was developed by Cheng, Gu and Guan (2013) to measure students' learning behaviors in and out of the classroom after counseling a few relevant instruments (e.g., Crosby and French 2002; Mcdermott 1999). The QLBHSS has 12 subscales with 60 items in total. It employs a 5-point Likert-style Scale ("strongly disagree" to "strongly agree"). Based on the results of factor analyses in pilot studies, the authors categorized the learning behaviors of students into five dimensions with each dimension comprising several subscales. The dimension of general tasks involves three subscales (preview, review, and homework) which were designed to assess

students' behaviors in implementing the general tasks outside the classroom. The dimension of classroom regular behaviors (including attentional, participating, and responding behaviors) assesses the regular behaviors that students commonly present in the classroom, such as attending to the instruction (e.g., observing, listening, and taking notes), participating (e.g., asking questions, participating in classroom activities, operating the assigned tasks, etc), and making responses (e.g., answering questions, making eye contact with the teacher, etc). The dimension of autonomy (including autonomous behavior, and extrocontrol behavior) evaluates the tendency of the subjects either to mater their own learning or to rely on the instruction of teachers. The dimension of sociality (including independence, and interaction) assesses to what extent students present independent or interactive behaviors in learning. The strategic dimension (including planning and managing behavior, and reflective behavior) evaluates whether students present strategic behaviors such as setting goals, making plans, time managing, reflecting on the learning processes, and making self-evaluation. The questionnaire has been multiply revised based on the comments from expert reviewers in related fields and the examination of pilot studies. The results of running confirmatory and exploratory factor analyses provided support to the construct validity of the instrument Cheng, Gu, & Guan, 2013. Cronbach's alphas were .81 for preview, .79 for review, .72 for homework, .82 for attentional behavior, .84 for participating behavior, .77 for responding behavior, .81 for autonomous behavior, .88 for extrocontrol behavior, .79 for independence, .80 for interaction, .71 for planning and managing behavior, and .80 for reflective behavior in the present study.

Procedure

After receiving approval for the research from school administrators, the authors made contact through emails and phone calls with teachers, and acquired their agreements to allow their students to participate. Measures which took approximately 25 min to complete were administered to students in the classroom by the authors with the assistance of school teachers. The students were asked to choose one course that they were currently taking and evaluate the teacher's instruction behaviors and their own motivation and learning behaviors in that course. The participants were given similar instruction concerning the purpose of the study, the issue of confidentiality and the volunteer nature of the study. Any questions raised by students were clarified by the authors.

To make sure that the potential behavioral differences between the experimental group and the control group could be attributed to the training and the implementation of learner-centered instruction, relevant measures have been administered to a portion of students (315 cases) in the experimental schools before their teachers receiving the training. Due to that there was a change of the trainee list after the implementation of the pre-tests, we were unable to compute the differences between pre- and post-tests. However, when the data from pre-tests was compared with the data from the control schools, no significant differences were noticed for both teaching behaviors of teachers and learning behaviors of students. These results laid a base for us to make further comparison between the experimental group and the control group.

Results

Cross-group differences in performing learner-centered instruction

The first purpose of the study was to examine whether teachers conducting learner-centered instruction (experimental group) truly present distinctive traits in the learner-centered measure in comparing with teachers in traditional classes (control group). Means and standard deviations for each of the learner-centered variables by experimental group and control group are shown in Table 1. It can be noted that experimental group had higher means on all learner-centered variables. A one-way MANOVA was performed to investigate the cross-group differences in the learner-centered variables under investigation (hypothesis 1). Five learner-centered variables were used as dependent variables. The results revealed statistically significant difference between experimental group and control group in the combined dependent variables, $F(5, 756) = 40.89$, Wilks' $\lambda = .79$; $p < .001$, $\eta^2 = .21$.

Follow-up univariate ANOVAs revealed that experimental group scored significantly higher on: (1) facilitating, $F(1, 760) = 80.65$, $p < .001$; (2) supportive assessment, $F(1, 760) = 60.12$, $p < .001$; and (3) teaching method, $F(1, 760) = 98.07$, $p < .001$. The two groups showed no significant difference in individualization and empowerment.

Cross-group differences in academic motivation and learning behaviors

Another purpose of the study was to examine whether students in the experimental group present distinctive traits in academic motivation and learning behaviors in comparison with students in the control group. Means and standard deviations for each of the motivation and behavior variables by experimental group and control group are shown in Table 2. It can be noted that experimental group had higher means on most motivation and learning behavior variables except on planning and managing behavior. A one-way MANOVA was performed to investigate the cross-group differences in the motivation and learning behavior variables under investigation (hypothesis 2). Two motivation and twelve learning behavior variables were used as dependent variables. The results revealed statistically significant difference between experimental group and control group in the combined dependent variables, $F(14, 747) = 29.27$, Wilks' $\lambda = .65$; $p < .001$, $\eta^2 = .35$.

Follow-up univariate ANOVAs revealed that experimental group scored significantly higher on: (1) intrinsic motivation, $F(1, 760) = 39.46$, $p < .001$; (2) preview, $F(1, 760) = 68.22$, $p < .001$; (3) attentional behavior, $F(1, 760) = 37.45$, $p < .001$; (4) participating behavior, $F(1, 760) = 108.75$, $p < .001$; (5) responding behavior, $F(1, 760) = 107.50$, $p < .001$; (6)

Table 1 Means and standard deviations and one-way analysis of variance for five learner-centered instruction variables

Variable	Experimental ($n = 394$)		Control ($n = 368$)		F	p value
	M	SD	M	SD		
Individualization	3.77	1.18	3.64	1.11	2.42	.120
Facilitating	3.95	1.02	3.23	1.17	80.65	.000
Empowerment	3.66	1.04	3.54	1.14	2.41	.120
Supportive assessment	3.95	1.12	3.33	1.09	60.12	.000
Teaching methods	3.79	1.06	2.97	1.12	98.07	.000

Table 2 Means and standard deviations and univariate analysis of variance for academic motivation and learning behavior variables

Variable	Experimental ($n = 394$)		Control ($n = 368$)		F	p value
	M	SD	M	SD		
1. Intrinsic motivation	3.69	.91	3.26	.98	39.46	.000
2. Extrinsic motivation	3.27	.87	3.17	.86	2.53	.112
3. Preview	3.36	.93	2.82	.87	58.21	.000
4. Review	3.31	.92	3.22	.83	1.89	.169
5. Homework	3.54	.96	3.41	.88	2.50	.114
6. Attentional	3.94	.80	3.59	.78	37.45	.000
7. Participating	3.73	.90	3.03	.94	108.75	.000
8. Responding	3.93	.85	3.34	.71	107.50	.000
9. Autonomic	3.59	71	3.51	.78	2.18	.140
10. Extrocontrol	3.23	.87	3.09	.82	5.52	.019
11. Independent	3.44	.95	3.35	.96	1.53	.216
12. Interactive	3.59	.83	3.12	.81	64.29	.000
13. Planning and managing	2.83	.95	2.92	.89	1.78	.183
14. Reflective	3.22	.88	3.10	.95	2.43	.119

extrocontrol behavior, $F(1, 760) = 5.51$, $p < .05$; (7) interactive behavior, $F(1, 760) = 64.30$, $p < .001$. The two groups showed no significant difference in extrinsic motivation, review, homework, autonomous, independent, planning and managing, and reflective behaviors.

Relations and moderation effects of group

To examine whether learner-centered instruction significantly relates to Chinese students' academic motivation and learning behaviors, and whether these relations differ across experimental and control groups, two steps were taken to analyze the data. Firstly, multivariate multiple regression analyses were conducted to inspect whether and to what extent learner-centered instruction relates to academic motivation and learning behavior variables (hypothesis 3). Then, a series of hierarchical regression analyses were conducted to examine the moderation effects of group (experiment vs. control) (hypothesis 4).

In multivariate multiple regression analyses, five learner-centered instruction variables as predictors and two motivation variables plus twelve behavior variables as the criterion variables were involved in the analysis. The results revealed that learner-centered instruction accounted for 49% variance in academic motivation and learning behaviors, Wilks's $\lambda = .51$, $F(14, 743) = 82.15$, $p < .001$, $\eta^2 = .49$ (where η^2 is the multivariate effect size). The results of follow-up analyses indicated that the learner-centered instruction was significantly related to all motivation and behavior variables, and the effect sizes were in the range of .04 and .09.

To conduct the hierarchical regression analyses, the group (experimental vs. control) as a categorical variable was transferred into dummy variable. The general means for five learner-centered instruction variables were calculated to estimate the general level of teachers in performing learner-centered instruction and were used in the analyses. In Step 1 of the hierarchical regression analyses, group and general means of teachers in the learner-centered measure were entered as simultaneous predictors. One of the academic motivation or learning behavior variables was entered as the criterion variable. In Step 2, the two-way interaction

between group and the assigned predictor was entered to examine whether group moderates the relationship between the predictor and the criterion variable. The interaction term was created by multiplying the centered means of the predictors. Fourteen hierarchical regression analyses were subsequentially conducted.

The results of hierarchical regression analyses indicated significant moderation effects of group in the relations between learner-centered instruction and intrinsic motivation ($\Delta R^2 = .01$, $p < .05$), preview ($\Delta R^2 = .01$, $p < .05$), attentional behavior ($\Delta R^2 = .01$, $p < .05$), participating behavior ($\Delta R^2 = .04$, $p < .001$), responding behavior ($\Delta R^2 = .03$, $p < .001$), and interactive behavior ($\Delta R^2 = .01$, $p < .05$). The significant interaction effects were then further interpreted by examining simple regression lines for experimental group and control group, respectively. It was found that learner-centered instruction was a significant predictor of intrinsic motivation, preview, attentional behavior, responding behavior, and interactive behavior both in the experimental group ($\beta = .36$, $p < .001$; $\beta = .45$, $p < .001$; $\beta = .42$, $p < .001$; $\beta = .42$, $p < .001$; $\beta = .46$, $p < .001$, respectively), and in the control group ($\beta = .19$, $p < .001$; $\beta = .30$, $p < .001$; $\beta = .28$, $p < .001$; $\beta = .23$, $p < .001$; $\beta = .32$, $p < .001$, respectively). But the significance level was higher in the experimental group than in the control group. Learner-centered instruction was a significant predictor of participating behavior for the experimental group ($\beta = .42$, $p < .001$), but not for the control group ($\beta = .8$, $p > .05$). The moderation effects were nonsignificant for group in the relations between learner-centered instruction and the rest learning behavior variables (including review, homework, autonomous, extrocontrol, independent, interactive, planning and managing, and reflective behaviors) along with the extrinsic motivation.

Discussions

To a certain degree, the transition of school teaching from the teacher-centered approach to the learner-centered approach has been deemed by many Chinese educators (Gui and Cheng 2018; Wang et al. 2018; Zhao 2018) as one of the major routes to reform the traditional education system which was described as being 'stereotyped, dogmatic and rigid'. However, some scholars believe that Chinese students due to their Confucian tradition, are more fitting in with the teacher-centered paradigm (Watkins and Biggs 2001; Wu and Zhang 2016). Currently, we are short of empirical research to examine the effectiveness of learner-centered instruction while applying to the Chinese student group. The present study examined how learner-centered instruction relates to Chinese students' academic motivation and learning behaviors. The first step was to inspect whether Chinese teachers were truly assuming learner-centered teaching paradigms. The results of data analyses comparing the instruction behaviors of teachers between the experimental and control groups indicated that teachers in the experimental group scored significantly higher on facilitating, supportive assessment, and teaching methods but showed no significant differences with teachers in the control group in individualization and empowerment. These results suggest that teachers in the experimental group functioned better in utilizing more resources to support students' learning, assuming formative assessment measures, giving feedbacks, and implementing such instruction designs as problem-based teaching, cooperative learning, project-based learning, etc. Thus, the advocacy of learner-centered instruction among Chinese teachers could produce certain expected and presumably beneficial changes in regarding to their teaching approaches.

On the other hand, however, they apparently did not do better in meeting individual needs of students, and empowering students to lead their own learning in comparison with teachers in traditional classrooms. The education in Chinese schools is largely exam oriented (Wu and Zhang 2016). Teachers are under tremendous pressure to prepare their students to achieve high scores in exams by following a strict, rigid, and uniform teaching procedure. This pressure could have certain influence on the behaviors of those teachers experimenting with learner-centered teaching modalities, and made them unable or unwilling to guide students to move forward according to their own speed, and allow students to play the leading roles of their own leaning. Wu and Zhang (2016) reported that some Chinese teachers who experimented with the learner-centered teaching modalities, complained that they encountered the difficulties of completing teaching tasks or meeting those goals or requirements established by the departments of educational administration. There are obstacles existing in the education system preventing Chinese teachers from freely and deeply implementing learner-centered instruction.

When students in the experimental group were compared with those in the control group in academic motivation and learning behaviors, it was revealed that the experimental group scored significantly higher in intrinsic motivation, and in such learning behaviors as attentional, participating, responding, extrocontrol, and interacting. It seems that learner-centered instruction had notable influences on students' behaviors inside the classroom rather than behaviors outside the classroom. It is unexpected that these two groups showed no significant differences in such behaviors as autonomous, independent, planning, managing, and reflecting. Furthermore, the results of moderation effect analyses indicated that learner-centered instruction had more significant relations with intrinsic motivation, attentional, participating, responding, and interactive behaviors for the experimental group than for the control group. These results indicated that learner-centered instruction apparently produced certain influences on the motivation and learning behaviors of students in the experimental group. However, the influences were largely restricted within the classroom. Especially, learner-centered instruction failed to encourage such behaviors for Chinese students as autonomous, planning, managing, and reflecting. Scholars (Herington and Weaven 2008; Pee et al. 2000) have claimed that learner-centered instruction would lead students to be autonomous and self-directed in their learning. The results of the current research however were inconsistent with this claim. It was also found in this paper that Chinese teachers in the experimental group did not do better than teachers in the control group in meeting individual needs and empowering students. These results to a certain extent give us some clue in illuminating the reason why learner-centered instruction failed to produce some expected outcomes on the learning behaviors of Chinese students. The exam-oriented Chinese education system might restrict teachers from sufficiently empowering students, and thus hinder them from encouraging students to be autonomous and self-directed.

In general regression analyses, it was also found that learner-centered instruction was significantly and positively related to most of the motivational and behavioral variables. These results provided certain evidence to oppose the argument raised by some scholars (Watkins and Biggs 2001; Wu and Zhang 2016) that learner-centered instruction is unsuitable for students from Confucian cultures, and suggested that Chinese students could adapt to and benefit from the learner-centered teaching designs. Therefore the answer to the question regarding whether the learner-centered teaching methods apply to Chinese students is twofold: on one hand, this teaching approach could bring beneficial effects on Chinese students' learning; on the other

hand, there are difficulties and barriers to overcome before this teaching approach could be sufficiently implemented in practice.

Chinese students were also frequently observed keeping quiet in Western classrooms (Kennedy 2002; Li and Yue 2006), and their passive behavioral responses to learner-centered instruction were considered problematic for some Western instructors (Clark and Gieve 2006). The findings of this study indicated that the learning behaviors of Chinese students could change with the transformation of teaching approaches and instruction environments. However, the learner-centered paradigm implemented in a Chinese classroom or in a Western classroom, might produce different impacts on Chinese students' learning. Although it was reported that Chinese students were observed to be less motivated, keeping quiet, or even getting nervous in learner-centered instruction in the Western classroom (Frambach et al. 2014; Gwee 2008; Wang et al. 2012), it might be argued that these observed passive responses of Chinese students could be largely induced by the new instruction environment rather than by the teaching approaches assumed by the instructors. Therefore, the question regarding how learner-centered instruction in the Western classroom would actually affect the learning of Chinese students in controlling the new environment effects still presents as an interesting topic waiting to be explored.

Conclusions and limitations

To summarize, the study indicated that Chinese teachers adopting the learner-centered instruction modalities were able to offer more resources and use supportive assessments to foster students' learning, but were unable to do better in meeting students' individual needs and allowing students to lead learning. The learner-centered approach had more significant influence on students' learning behaviors inside the classroom, rather than their behaviors outside the classroom. The implementation of this instruction paradigm brought certain benefits in enhancing students' intrinsic motivation and their participating level in the classroom, but provided limited support to urge students to be autonomous and self-directed learners. This limitation more or less could be traced back to the exam-directed education system in China. Educators, school administrators and educational policy makers are encouraged to take measures to support teachers to overcome the difficulties and barriers that they may encounter in implementing learner-centered instruction.

The current study has the values in helping us achieve a better understanding of the relations between learner-centered instruction and Chinese students' academic motivation and learning behaviors, solve the arguments regarding the effectiveness of the learner-centered teaching modalities, and foster the consideration regarding how to renovate the classroom instruction in China. The study suggests that the implementation of learner-centered instruction in Chinese schools would bring some positive outcomes. However, the expectation that Chinese school education would have significant changes once the learner-centered ideals and methods were introduced into the classroom instruction, might be over-optimistic. On the macroscopic level, Chinese education system needs to endure significant adjustments to allow teachers to deeply and freely experiment with learner-centered methods. The study may also attribute to the research field by reminding scholars the importance of considering the cross-cultural differences while investigating the effectiveness of learner-centered instruction. The learner-cenetered methods might function variedly across cultural

groups, ages, subjects, sex, etc. All these are relevant variables that should be involved in the investigation.

However, the research has its own limitations. As an experimental research, it was preferred to perform pre-tests for the teachers and students in the experimental group before the training and the implementation of learner-centered instruction. However, due to that the participation in the training was voluntary, there was a significant change of trainees after the implementation of the pre-tests. We had to recruit the control group from other schools. Although the analyses comparing the pre-test data from the experimental schools and the data from the control schools indicated non-significant differences in teaching behaviors of teachers and learning behaviors of students, there were still other potential impacting factors left uncontrolled. Therefore, the concern regarding whether the significant differences in learning and teaching behaviors revealed between the experimental and control groups in this study could be truly attributed to the training and the implementation of learner-centered instruction, should be examined through replicated studies in future. Furthermore, the study offered one explanation regarding why learner-centered instruction failed to better encourage Chinese students' autonomous and self-directed learning behaviors from the perspective of teachers who were unable to empower students to lead their own learning. However, there might be other causes or impacting factors existing. More studies should be encouraged to explore alternative explanations. The study only examined how learner-centered instruction relates to academic motivation and learning behaviors of high school students. Many other psychological processes (e.g., memory, cognition, and emotion) are not involved. Their relations with the learner-centered paradigm for the Chinese student group should be examined in future. Moreover, future research should involve students from a wider range of grade (from primary school to college) and various subjects (science, art, math, literacy, sport, etc) to thoroughly examine the influence patterns of learner-centered instruction on the learning of Chinese students.

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Current themes of research:

The research of the author in these years has been focused on the investigation of the cross-cultural differences in learning behavior, cognitive style, and learning style between Chinese students and Western students. He also investigated how various teaching approaches might affect Chinese students' learning behaviors and how to assume appropriate teaching designs to induce effective learning behaviors of students. A few relevant articles have been published in professional journals.

Most relevant publications in the field of Psychology of Education:

Cheng, H., & Zhang, S. (2017). Examining the relationship between holistic/analytic style and classroom learning behaviors of high school students. *European Journal of Psychology of Education*, *32*(2).
Cheng, H., & Guan, S. (2012). The role of learning approaches in explaining the distinct learning behaviors presented by American and Chinese undergraduates in the classroom. *Learning and Individual Differences, 22*(3), 414-418.
Cheng, H., Andrade, H.L., & Yan, Z. (2011). A cross-cultural study of learning behaviors in the classroom: From a thinking style perspective. *Educational Psychology, 31*(7), 825–841. https://doi.org/10.1080/01443410.2011.608526.

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Current themes of research:

The research of Dr. Ding is largely focus on the learning styles presented by Children in classroom environments, and the development of lying. She use experimental methods to investigate how children come to grips with the concept and moral implication of lying, whether children are gullible or they are able to detect others' lies, and whether children can tell convincing lies in various social situations.