Article
Satisfaction with Online Chinese Learning among International Students in China: A Study Based on the fsQCA Method
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Abstract: The outbreak of the COVID-19 pandemic compelled Chinese international education to swiftly move online. Conducted in late 2021, this survey study collected self-reported data on online learning environments, student engagement, Chinese as a foreign language (CFL) learning achievement, and student satisfaction among 440 international students in Chinese higher education institutions. Based on the configuration perspective, fuzzy set qualitative comparative analysis (fsQCA) was used to explore the multiple concurrent paths of the online learning environment (the accessibility of online learning resources, student interaction, teacher support, course organization), student engagement, and learning achievement affecting international students’ online CFL learning satisfaction. The results indicate that satisfactory teacher support combined with student engagement was an important path leading to international students’ satisfaction with online CFL learning. Meanwhile, the inadequate accessibility of online learning resources combined with the absence of learning achievement was likely to trigger international students’ dissatisfaction with online CFL learning.

Keywords: online learning environment; student engagement; learning achievement; Chinese as a foreign language learning; student satisfaction; international students in China; fsQCA

1. Introduction

Following the outbreak of the COVID-19 pandemic in early 2020, universities worldwide were compelled to shut down and rapidly switch from face-to-face instruction to online teaching. Compared to well-designed and well-organized online courses before the pandemic, such as MOOCs, emergency online teaching, with its “unplanned” feature [1], brought about challenges and difficulties for learners in higher education. International students, in particular, were among the most vulnerable student cohorts, encountering academic challenges whilst managing linguistic and intercultural learning difficulties [2–4].

In 2018, the number of international students enrolled in Chinese higher education institutions (HEIs) reached 492,185, making China the third most popular international student destination country in the world [5]. Before COVID-19, the Chinese government had strategically shifted its focus on international education from merely increasing the international student number to the “improvement of the quality and effectiveness (tizhizengxiao)” of education [6]. The intent was to further enhance the global reputation of its higher education sector through the provision of satisfactory, high-quality educational services (see also [7]). Since the pandemic outbreak, China’s international education has also transitioned to online instruction. As of December 2022, roughly 200,000 international students registered at Chinese HEIs were stranded outside China due to restricted international mobility [8]. These students had to continue their education online through various asynchronous and synchronous teaching technologies.

Internationally, the rapid shift in educational delivery modes during the pandemic promoted a critical discussion of student satisfaction with online learning experiences. While some research reported high levels of student online learning satisfaction (e.g., [9]),
others revealed less satisfactory online learning environments and their impacts on student engagement in online education [10]. Moreover, of the studies conducted on online satisfaction during the pandemic, the majority focused on students’ learning experiences in general (e.g., [11]). Some discussed student satisfaction with online medical learning (e.g., [10]). We identified only a few studies investigating student satisfaction with online foreign language learning (e.g., [12]); most of these, however, focused on the online learning of English as a foreign language. So far, limited research attention has been devoted to the online learning satisfaction of international students in China during the pandemic; in particular, studies focusing on these students’ online learning of Chinese as a foreign language (CFL) remain rare.

Online learning satisfaction during the pandemic has been investigated in the literature considering various factors, but mainly examining the net effects of independent variables on dependent variables, using variance-based methods, such as multiple regression analysis (MRA), analysis of variance (ANOVA), and structural equation modeling (SEM). These models, assuming symmetrical relationships between variables, propose that a predictor should be simultaneously necessary and sufficient for a given outcome [13]. Nonetheless, there may exist opposite relations between the same variables of a sample in real life; thus, merely concentrating on net effects and symmetric relations may be misleading [14]. Overlooking the complex interplay among variables may hinder the capture of the unique patterns of factors influencing student satisfaction with online learning. Thus, it is critical to adopt a configuration analysis to reveal the relationships between different combinations of causal conditions and outcome variables.

The current study focused on international students in Chinese HEIs, assessing their satisfaction with online CFL learning during the COVID-19 pandemic. Drawing on complex theory and configuration analysis, this study acknowledges that student satisfaction is a complex phenomenon that cannot be sufficiently explained by a single variable. The interplay of various variables necessitates an analytical approach, allowing for the exploration of their combined impact. To this end, following Teng [15], the fuzzy set qualitative comparative analysis (fsQCA) method was adopted, which enabled an examination of the combined influences of factors on international student CFL learning satisfaction. These research findings have implications for the sustainable development of online international education within China and would also have relevance in global contexts in the post-COVID era.

2. Literature Review and Model Construction

2.1. Theoretical Background

Several theoretical frameworks have been employed to assess online learning outcomes. For example, the “Presage–Process–Product” model (i.e., the “3P” model) proposed by Biggs [16] provides a conceptual framework for analyzing students’ learning in higher education. Presage factors involve learning contextual factors, process factors relating to students’ learning behaviors in learning processes, and product factors referring to factors indicating the learning outcomes, including learning performance, student satisfaction, etc. Another notable theoretical framework is the Input–Environment–Output model (i.e., I-E-O model) proposed by Astin [17] for the purpose of assessment in higher education. Input factors mainly refer to learners’ characteristics, cognitive functioning, and behavioral patterns. The environment refers to what students experience in the educational program, including the programs, curricula, teaching practices, facilities, etc. Output factors involve students’ knowledge, attitudes, feelings, etc.

Both theoretical frameworks have become widely adopted models for online learning, which emphasize the potential influences of contextual factors and students’ learning behaviors on learning outcomes.

In this study, critical factors were identified from major theories of online learning effectiveness research and related work on student satisfaction with online learning in the following two sub-sections. Drawing on the complexity theory and configuration analysis,
this research explored how and what configurations of international students perceived online learning environments and their online learning behaviors to influence their learning satisfaction during the pandemic and in what ways.

2.2. Student Satisfaction in Online Learning

Student satisfaction was defined as students’ perceptions of the value of their learning experiences within HEIs [17] (p. 273). It has been widely accepted as a critical indicator for assessing the quality and effectiveness of higher education [18]. Over recent decades, with advancements in information technology and the accelerated development of remote, distant, and online education, an increasing body of research has investigated student satisfaction with online learning in general and satisfaction with online foreign language learning in particular. The findings of these studies acknowledged student satisfaction as an important determinant of online learning success (e.g., [19,20]). Satisfaction is positively associated with enhanced online learning motivation, higher rates of online course retention and learning continuance [21–23], and improved institutional reputation and student loyalty [24]. Martínez-Argüelles and Batalla-Busquets [25], for example, observed that students who perceived the online education that they received as satisfactory were more likely to continue their studies at the same institution and recommend it to prospective students.

Since the outbreak of COVID-19, researchers have explored student satisfaction with emergency online learning and its influencing factors, but these research results vary. Simsek et al. [26] surveyed 13,447 college students in Turkey and reported a moderate level of satisfaction with online learning during the pandemic. Maqableh and Alia [27] focused on 835 undergraduate students in Jordan and found that over one-third of their survey participants were dissatisfied with their online learning experiences, largely due to psychological issues and poor course management. Similarly, Ji et al. [12] reported a moderate level of satisfaction among 82 Korean students learning English as a foreign language (EFL) online. Using mixed methods, this research also revealed that student engagement in online learning significantly predicted initial and end-of-semester satisfaction. Particularly relevant to the current research, Teng [15] employed the fsQCA method and explored the configurations of factors affecting Chinese students’ online learning satisfaction, contributing to the in-depth understanding of emergency online education in the context of mainland China. Despite these contributions, research on online CFL learning among international students in China remains limited. The characteristics and factors affecting these students’ satisfaction with online CFL learning are largely unknown, hence requiring further investigation.

2.3. Associated Influencing Factors of Student Satisfaction in Online Learning

2.3.1. Online Learning Environments and Student Satisfaction

Online learning environments refer to the environment where learning takes place through electronic devices and internet-based technology, driven by the spatial-temporal separation of teachers, students, and learning resources [28,29]. Expanding upon this definition, Martin and Bolliger [20] proposed an online learner satisfaction framework that consisted of four critical dimensions of online learning environments as follows: the learner, the instructor, the course, and the program organization. Yu [30] confirmed the significance of these four elements, namely, the student, teacher, online platform, and instructional design, in shaping students’ online learning satisfaction.

Previous empirical studies have explored the influences of online learning environments on student satisfaction through an examination of the following four environmental elements: teacher support, student interaction, course organization, and the accessibility of online learning resources. For example, course organization was found to be significantly associated with students’ online learning satisfaction [31–33]. Specifically, Shin and Sok (2023) [33] reported that course structure was the most prominent factor influencing online EFL learning satisfaction among Korean university students. Abdelrady and Akram [31] reported that course
design, when integrated with user-friendly digital tools, promoted satisfaction levels among Saudi undergraduates in online EFL learning.

Regarding teacher support and student interaction, research findings are mixed. Fatani [32] and Shin and Sok [33] reported the significant influences of teacher support and student interaction, respectively, on overall online learning satisfaction and satisfaction with online foreign language acquisition. By contrast, Alqurashi [34] reported that peer interaction had no significant influence on student satisfaction in online learning contexts. Similarly, Han et al. [35] found no significant impact of teacher support on Chinese college student satisfaction with online EFL learning. Moreover, in-depth interviews with Korean students highlighted the positive influences of resource accessibility on these students’ satisfaction with online EFL learning [12,33]. These findings are supported by a study of international students in China, which confirmed the significance of resource accessibility in enhancing online learning satisfaction during the pandemic [36].

These aforementioned studies have offered valuable insights into the influence of online learning environments on student satisfaction. However, research on online CFL learning remains limited, and there is an urgent need for empirical research to investigate whether online CFL learning environments influence international students’ satisfaction and how.

2.3.2. Student Engagement and Student Satisfaction

Student engagement is defined as “the time and energy students devote to educationally purposeful activities” [37]. Student engagement serves as an important indicator of online learning quality [35]; its enhancement helps to foster students’ sense of connectedness to online learning environments [38]. Empirical studies have reported a significant association between student engagement and online learning satisfaction (e.g., [39]). In online EFL learning, significant influences of student engagement on satisfaction were observed among Korean college students [12,33]. By contrast, this impact was found to be insignificant among Chinese students in their online EFL learning [35]. The contrasting results reflect the complex relationship between student engagement and online foreign language learning, which deserves further investigation.

2.3.3. Learning Achievement and Student Satisfaction

Learning achievement refers to the competencies, proficiencies, and skills that students have acquired through educational instruction [40] (p. 1). It also stands as a critical indicator of higher education quality, aligning with higher education’s primary goal of fostering individuals’ intellectual and professional development [17]. Previous studies have shown that knowledge accumulation and skill development contribute significantly to student satisfaction (e.g., [41]). It has also been reported that students’ development of knowledge and skills could enhance their enjoyment, which, in turn, is highly associated with their learning satisfaction [42]. It is worth noting that the current literature has predominantly analyzed learning achievement and student satisfaction as separate subjects, often overlooking the interactive relationships between the two, which merit further investigation.

In summary, previous studies illuminated the impact of factors such as online learning environments, student engagement, and learning achievement on student online learning satisfaction during COVID-19. However, only a few of these studies specifically focused on foreign language learning, and none investigated international students’ satisfaction with CFL learning during the pandemic. Furthermore, the review above reveals that methodologically, these studies adopted variance-based methods to analyze the net effect of a single influential variable on online learning satisfaction. The influences of variable combinations on the learning satisfaction of international students remain underexplored. This research considers that higher education functions as a complex service ecosystem [43], wherein student satisfaction emerges from the complex interplay of multiple variables. Adopting the fsQCA method, the present research examines the combinations of antecedent
conditions that influence international students’ satisfaction with online CFL learning in China.

2.4. Model Construction

2.4.1. Complexity Theory and Configuration Analysis

This study draws on the principles of the complexity theory with a recognition that given the complex nature of online learning experiences, the insights derived from single variables can be insufficient. The complexity theory stresses holism, non-linear relationships, and the interconnectedness of components as important characteristics of complex systems [44]. The premise of the complex theory, i.e., “equifinality”, suggests that multiple configurations (i.e., combinations) of different antecedents can lead to the same outcome with equivalent efficacy [45] (p. 4). Another principle of the complexity theory is “asymmetry”, which means that a cause leading to the presence of an outcome may be not the opposite that leads to the absence of the outcome [9]. This theoretical perspective challenges variance-based approaches, such as correlation and regression, which, although revealing significant directional relationships, are linear and reductionist in nature, overlooking the synergistic effects of multiple factors interacting in tandem [44].

2.4.2. Conceptual Model

Within the domain of online education, the complex theory teaches us that learner experiences are likely to be shaped by the dynamic interplay of environmental factors and factors related to individual learning behaviors and outcomes (see [13]). Thus, student online learning satisfaction may be better explained not by a range of individual predictors but rather by certain combinations of these predictors with varying intensities of each predictor.

Drawing on the complexity theory, previous studies on online education have adopted the fsQCA method to reveal the causal mechanisms among various factors predicting specific outcomes [15,45]. Based on a set-theoretical perspective, fsQCA treats the relationships among variables as memberships between sets [46]. By assessing the membership scores of the single variables or combinations of variables in different sets, fsQCA calculates the membership relations of configurations to the presence or absence of the outcome, thus reasoning the causality. Therefore, the outcome is either the presence of a set or absence of a set, which is different from a continuous variable in conventional variance-based research.

In this study, the adoption of fsQCA, guided by the complexity theory, allows for a nuanced understanding of how different factors collectively influence international students’ satisfaction with online CFL learning, offering a more holistic perspective of multifaceted dynamics in complex systems. Figure 1 presents the fsQCA research framework, which represents seven sets of constructs and their interactions. These seven sets of constructs reflect the outcome variable (dependent variable, i.e., student satisfaction) of this study and the six sets of causal conditions (independent variables).

Figure 1. FsQCA research framework.
3. Methodology

3.1. Research Aim and Questions

As shown in Figure 1, this study utilized the fsQCA method to explore the combined effect of multiple factors—namely, the accessibility of online learning resources, student interactions, teacher support, course organization, student engagement, and learning achievement—on international students’ satisfaction for online CFL learning in Chinese HEIs. Following the fsQCA method, this research proposes that the above-mentioned factors may or may not explain international students’ (dis)satisfaction depending on how these factors are combined (see [47]). In this research, from a methodological point of view, high satisfaction is used to refer to the presence of “a condition” (e.g., student satisfaction), while non-high satisfaction is used to refer to the absence of the condition (e.g., student dissatisfaction) [47] (p. 690). Specifically, the research questions are listed below as follows:

RQ1: To what extent were international students in China satisfied with online CFL learning?
RQ2: Do environmental factors, student engagement, and learning achievement collectively explain high and non-high satisfaction among international students in online CFL learning? If so, in what ways?

3.2. The fsQCA Method

Qualitative comparative analysis (QCA) is a methodological approach developed by sociologist Charles C. Ragin in 1987, which combines elements of both qualitative and quantitative approaches to examine the causality of adequacy and necessity [48]. Different from traditional statistical analysis methods focusing on the influences of individual variables on an outcome variable, QCA adopts a perspective of configuration and aims to identify causal mechanisms triggered by combinations of multiple antecedent conditions. Utilizing Boolean algorithm principles, the QCA method identifies one or several combinations of conditions leading to the same outcome variable, making it suitable for analyzing both small and large-scale sample sizes (e.g., [15]).

As a type of QCA, fsQCA is suitable for examining continuous variables. In contrast to linear data analysis methods, such as regression and SEM, that typically isolate the influences of a set of variables on an outcome, fsQCA examines how distinct combinations of variables lead to the presence of a consequent condition while highlighting how the absence of these antecedent variables does not necessarily lead to the absence of the consequent condition [46,47]. Linear data analysis methods assume symmetric relations among variables [49] and may not be sufficient to properly understand complex phenomena due to the potential non-linear relationships among variables [50]. Therefore, it is necessary to analyze such complex phenomena as clusters of interconnected conditions, aiming for a holistic and concurrent insight into the patterns they form [51]. Since fsQCA allows for a more comprehensive understanding of the causal complexity inherent in educational settings, particularly with regard to the asymmetrical relations among antecedent variables and their consequent condition, it was chosen to analyze the survey data in this study.

3.3. Data Collection

Data collection took place at eight universities located in the East, Northeast, and Central regions of China. In October 2021, the research team contacted international offices or international schools of the eight universities and obtained permission to conduct the study. An online questionnaire was then distributed via WeChat, a widely used social media application in mainland China, to all international students at the participating universities. The questionnaire began with a detailed explanation of the research purposes and the ethical principles of voluntary participation and confidentiality. Prospective respondents were required to sign informed consent before completing the questionnaire. Data collection spanned from 29 October to 30 November 2021, resulting in 455 responses. Respondents answered all the required questions, and no missing data were involved in the study. To detect multivariate outliers, the Mahalanobis distance test was performed [52]. The test identified 15 cases that fell below the critical chi-square threshold at a significant level.
of 0.001. These outliers were subsequently removed, leaving a final sample of 440 valid responses for analysis.

3.4. Participants

All the participants enrolled in full-time online Chinese courses during the Autumn semester of 2021. The demographic details of the participants are presented in Table 1. Of the 440 international students, 54.1% (n = 238) were male, and 45.9% (n = 202) were female. Most of them (93%, n = 409) were degree students, of whom 29.3% (n = 129) were undergraduate students, 63.7% (n = 280) were postgraduate students, and only 7% (n = 31) enrolled in short-term language training programs. Among all the participants, 58.6% (n = 258) were from Asia, 31.8% (n = 140) were from Africa, and 9.6% (n = 42) were from other continents. In addition, 72% (n = 317) of the students received family financial support, 19.4% (n = 85) obtained scholarships, and 8.6% (n = 38) paid tuition fees through other sources. Most of the students (67.5%, n = 297) enrolled in teaching-oriented universities, while 32.5% (143) enrolled in research-oriented universities.

Table 1. Participants’ demographic profile.

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>238</td>
<td>54.1%</td>
</tr>
<tr>
<td>Female</td>
<td>202</td>
<td>45.9%</td>
</tr>
<tr>
<td>Educational level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undergraduate</td>
<td>129</td>
<td>29.3%</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>280</td>
<td>63.7%</td>
</tr>
<tr>
<td>Non-degree, short-term language training</td>
<td>31</td>
<td>7%</td>
</tr>
<tr>
<td>Continent of origin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asia</td>
<td>258</td>
<td>58.6%</td>
</tr>
<tr>
<td>Africa</td>
<td>140</td>
<td>31.8%</td>
</tr>
<tr>
<td>Other</td>
<td>42</td>
<td>9.6%</td>
</tr>
<tr>
<td>Tuition fee supported by</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>317</td>
<td>72%</td>
</tr>
<tr>
<td>Scholarship</td>
<td>85</td>
<td>19.4%</td>
</tr>
<tr>
<td>Other</td>
<td>38</td>
<td>8.6%</td>
</tr>
<tr>
<td>Online learning experience prior to COVID-19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>111</td>
<td>25%</td>
</tr>
<tr>
<td>No</td>
<td>329</td>
<td>75%</td>
</tr>
<tr>
<td>Types of online Chinese courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synchronous</td>
<td>117</td>
<td>26.6%</td>
</tr>
<tr>
<td>Asynchronous</td>
<td>99</td>
<td>22.5%</td>
</tr>
<tr>
<td>Both</td>
<td>224</td>
<td>50.9%</td>
</tr>
<tr>
<td>University type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research-oriented</td>
<td>143</td>
<td>32.5%</td>
</tr>
<tr>
<td>Teaching-oriented</td>
<td>297</td>
<td>67.5%</td>
</tr>
</tbody>
</table>

3.5. Variable Measure

The survey questionnaire consisted of two parts. The first part collected the participants’ demographic information. The second part measured international students’ perceptions of online CFL learning environments, engagement in online CFL learning, learning achievement, and satisfaction.

The online learning environment scale was developed from the Web-based Learning Environment Instrument (WEBLEI, [28]) and the University Mathematics Classroom Environment Questionnaire (UMCEQ, [53]), both of which are established tools for assessing online learning environments in higher education (e.g., [54]). The original WEBLEI was a widely adopted five-point Likert scale to assess the online learning environment in higher education (e.g., [55]). It consisted of four sub-scales, i.e., access, interaction, results, and response, respectively, assessing access to virtual materials, online interaction, lesson structure, course organization, and students’ subjective experiences of online learning (enjoyment, confidence, success, tedium, etc.). The original UMCEQ was a five-point Likert scale, which consisted of four dimensions, including teacher support and student autonomy, cooperation and competition among students, satisfaction and difficulty of learning mathematics, and the innovation of teaching and classroom discipline. Although UMCEQ was created by Chinese scholars with its original focus on examining Chinese students’ mathematics learning, its modified version has proven effective for assessing international students’ learning across disciplines in Chinese HEIs (e.g., [56]). In the current study, three
WEBLI sub-scales, e.g., access, interaction, and results, were used to assess international students’ perceived accessibility of online learning resources (7 items, Cronbach’s $\alpha = 0.901$), student interaction (3 items, Cronbach’s $\alpha = 0.876$) and course organization (7 items, Cronbach’s $\alpha = 0.945$), and the items of teacher support of UMCEQ were used to measure participants’ perceived teacher support (6 items, Cronbach’s $\alpha = 0.938$).

The scales developed by Dowson and McInerney [57] and Skinner et al. [58] were utilized and tailored to assess student engagement in online CFL learning (9 items, Cronbach’s $\alpha = 0.938$). Five items were used to evaluate international students’ CFL learning achievement (Cronbach’s $\alpha = 0.915$), focusing on self-reported development in speaking, writing, listening, reading, and overall communicative skills in the Chinese language. Additionally, international students’ satisfaction with online CFL learning (7 items, Cronbach’s $\alpha = 0.951$) was assessed using the scales developed by Wei and Chou [59] and Chen and Adesope [60].

The questionnaire used a five-point Likert scale, ranging from 1 for “strongly disagree” to 5 for “strongly agree”. The expressions of the original items were refined to better suit the purposes of this study. For example, “The organization of each lesson is easy to follow” was modified to “The organization of each online Chinese lesson is easy to follow”, and “I enjoy learning new things in class” was changed to “I enjoy learning new things in my online Chinese lessons”. The questionnaire was reviewed by an expert panel of three members and then tested in a pilot study with 63 international students [61], which confirmed the questionnaire’s reliability and validity.

3.6. Data Analysis

Data analyses were conducted using SPSS 25.0 and fsQCA 3.0. Normality distribution, descriptive statistics, and the reliability and validity of the instruments were calculated using SPSS 25.0. The software fsQCA 3.0 was used to conduct the calibration of questionnaire data, the analysis of necessary conditions, the construction of the truth table and configuration analysis, and modeling the presence of outcome (high satisfaction) and the absence of outcome (non-high satisfaction). Tests for the reliability and validity of the instruments, normality of distribution, and the calibration of the questionnaire data serve as a form of pre-processing of fsQCA standard analysis. In the following sub-section, we present the results of the reliability and validity tests, as well as the calibration test. The results of the descriptive statistics and analyses of necessary conditions and configurations are presented in Section 4.

3.6.1. Reliability and Validity Test

As presented in Table 2, Cronbach’s $\alpha$ coefficients ranged from 0.876 to 0.951, indicating the good internal consistency of the measurement instruments [62]. The Kaiser–Meyer–Olkin (KMO) values were higher than 0.7, the $p$-value of Bartlett’s spherical test was less than 0.001, and the factor loadings were greater than 0.6, indicating the good reliability and validity of the measurement items [63,64]. In addition, the combined reliability (CR) was above 0.8, and the average extraction variance (AVE) was above 0.5, indicating the good convergent validity of the scale [65,66]. In summary, the questionnaire had good reliability and validity and, thus, could be used for further analysis.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cronbach’s $\alpha$</th>
<th>KMO</th>
<th>$p$ of Bartlett’s Spherical Test</th>
<th>Factor Loading</th>
<th>AVE</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC</td>
<td>0.901</td>
<td>0.834</td>
<td>0.000</td>
<td>0.689–0.793</td>
<td>0.554</td>
<td>0.896</td>
</tr>
<tr>
<td>SI</td>
<td>0.876</td>
<td>0.728</td>
<td>0.000</td>
<td>0.818–0.882</td>
<td>0.713</td>
<td>0.881</td>
</tr>
<tr>
<td>TS</td>
<td>0.938</td>
<td>0.918</td>
<td>0.000</td>
<td>0.823–0.875</td>
<td>0.721</td>
<td>0.939</td>
</tr>
<tr>
<td>CO</td>
<td>0.945</td>
<td>0.947</td>
<td>0.000</td>
<td>0.822–0.873</td>
<td>0.713</td>
<td>0.946</td>
</tr>
<tr>
<td>SE</td>
<td>0.938</td>
<td>0.931</td>
<td>0.000</td>
<td>0.690–0.844</td>
<td>0.599</td>
<td>0.931</td>
</tr>
<tr>
<td>LA</td>
<td>0.915</td>
<td>0.879</td>
<td>0.000</td>
<td>0.741–0.869</td>
<td>0.675</td>
<td>0.912</td>
</tr>
<tr>
<td>SA</td>
<td>0.951</td>
<td>0.958</td>
<td>0.000</td>
<td>0.778–0.920</td>
<td>0.725</td>
<td>0.949</td>
</tr>
</tbody>
</table>

Note. ACC = accessibility of online learning resources, SI = student interaction, TS = teacher support, CO = course organization, SE = student engagement, LA = learning achievement, SA = student satisfaction.
3.6.2. Calibration

Prior to performing configuration analysis, survey data were calibrated using the fsQCA 3.0. First, three points of calibration criteria were selected to anchor the point of full membership, the crossover point, and the point of full non-membership. Normally, the anchor points are selected according to the research aim and data type [13]. For example, in a direct calibration, anchors for the five-point Likert scale are usually 5, 3, 1, whereas they are 6, 4, and 2 for the seven-point Likert scale [13]. All values of variables were then transformed into fuzzy sets, with a score ranging from 0 to 1. A score of 1 represents the full membership in a set, 0 represents the full non-membership in a set, and 0.5 represents the point of maximum ambiguity [46]. Therefore, scores close to 1 indicate strong membership in a set, whereas scores higher than 0 but lower than 0.5 indicate weak membership in a set [46]. Cases exactly on 0.5 are excluded from the analysis in fsQCA [46]. However, self-reporting data, particularly when they are related to personal behaviors and subjective perceptions, may be subject to social desirability bias [67] (p. 94).

To address this concern, the Skewness and Kurtosis coefficients were examined. As shown in Table 3, the Skewness values ranged from $-0.573$ to $-1.125$, and the Kurtosis values from $+0.128$ to $+1.811$, falling within the reference of $-2$ to $+2$, indicating no substantial deviation from normality [68]. However, the Skewness coefficient values suggested the slightly left-skewed data distribution, while the Kurtosis coefficient values indicated that the distribution was slightly concentrated around the mean. Following Ragin’s guidance [69], to enhance the precision of fuzzy set analysis, the calibration points for all the condition and outcome variables were re-defined as follows: the 95th percentile for each variable was set as the threshold for full membership, the 5th percentile for full non-membership, and the 50th percentile as the crossover point. For example, for the variable of “student satisfaction”, the score of 5.000 in survey data was calibrated into 1 in the fuzzy set, 2.000 was calibrated into 0, and 3.860 was calibrated into 0.5. With these three anchors, the other scores were calibrated automatically using fsQCA software.

### Table 3. Normality distribution and the calibration criteria of variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Full Membership</th>
<th>Crossover Point</th>
<th>Full Non-Membership</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC</td>
<td>3.75</td>
<td>0.85</td>
<td>−0.600</td>
<td>0.456</td>
<td>5.000</td>
<td>3.860</td>
<td>2.290</td>
</tr>
<tr>
<td>SI</td>
<td>3.69</td>
<td>0.92</td>
<td>−0.573</td>
<td>0.128</td>
<td>5.000</td>
<td>4.000</td>
<td>2.000</td>
</tr>
<tr>
<td>TS</td>
<td>4.16</td>
<td>0.79</td>
<td>−1.125</td>
<td>1.580</td>
<td>5.000</td>
<td>4.170</td>
<td>2.822</td>
</tr>
<tr>
<td>CO</td>
<td>3.96</td>
<td>0.81</td>
<td>−0.930</td>
<td>1.427</td>
<td>5.000</td>
<td>4.000</td>
<td>2.630</td>
</tr>
<tr>
<td>SE</td>
<td>3.97</td>
<td>0.78</td>
<td>−0.986</td>
<td>1.811</td>
<td>5.000</td>
<td>4.000</td>
<td>2.769</td>
</tr>
<tr>
<td>LA</td>
<td>3.70</td>
<td>0.89</td>
<td>−0.767</td>
<td>0.873</td>
<td>5.000</td>
<td>4.000</td>
<td>2.000</td>
</tr>
<tr>
<td>SA</td>
<td>3.73</td>
<td>0.92</td>
<td>−0.618</td>
<td>0.316</td>
<td>5.000</td>
<td>3.860</td>
<td>2.000</td>
</tr>
</tbody>
</table>

Note. ACC = accessibility of online learning resources, SI = student interaction, TS = teacher support, CO = course organization, SE = student engagement, LA = learning achievement, SA = student satisfaction.

4. Results

4.1. Descriptive Statistics

Using SPSS 22.0, the study computed descriptive statistics. As shown in Table 4, the mean value of international students’ satisfaction was 3.73 (SD = 0.92). Specifically, 59.3% of the participants agreed or strongly agreed that they were satisfied with their online CFL courses. In total, 53.9% of the participants agreed or strongly agreed that the quality of CFL courses was not affected by online delivery. In addition, 56.8% of the participants agreed or strongly agreed that their online course met their needs well.
Table 4. Descriptive statistics of student satisfaction for online CFL learning.

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I was satisfied with my online CFL course.</td>
<td>30 (6.8%)</td>
<td>36 (8.2%)</td>
<td>113 (25.7%)</td>
<td>155 (35.2%)</td>
<td>106 (24.1%)</td>
<td>3.67</td>
<td>1.09</td>
</tr>
<tr>
<td>The quality of my CFL course is unaffected by delivering it online.</td>
<td>28 (6.3%)</td>
<td>58 (13.2%)</td>
<td>117 (26.6%)</td>
<td>143 (32.5%)</td>
<td>94 (21.4%)</td>
<td>3.54</td>
<td>1.10</td>
</tr>
<tr>
<td>My online CFL course serves my needs well.</td>
<td>27 (6.2%)</td>
<td>49 (11.1%)</td>
<td>114 (25.9%)</td>
<td>151 (34.3%)</td>
<td>99 (22.5%)</td>
<td>3.61</td>
<td>1.10</td>
</tr>
<tr>
<td>I am satisfied with teaching styles of my online CFL course.</td>
<td>19 (4.3%)</td>
<td>36 (8.2%)</td>
<td>106 (24.1%)</td>
<td>164 (37.3%)</td>
<td>115 (26.1%)</td>
<td>3.77</td>
<td>1.04</td>
</tr>
<tr>
<td>I am satisfied with teaching content of my online CFL course.</td>
<td>17 (3.9%)</td>
<td>18 (4.1%)</td>
<td>103 (23.4%)</td>
<td>188 (42.7%)</td>
<td>114 (25.9%)</td>
<td>3.86</td>
<td>0.96</td>
</tr>
<tr>
<td>I am satisfied with structure and organization of my online CFL course.</td>
<td>24 (5.4%)</td>
<td>28 (6.3%)</td>
<td>105 (23.9%)</td>
<td>171 (38.9%)</td>
<td>112 (25.5%)</td>
<td>3.78</td>
<td>1.03</td>
</tr>
<tr>
<td>I am satisfied with the assessment and examination arrangements of my online CFL course.</td>
<td>17 (3.9%)</td>
<td>23 (5.2%)</td>
<td>99 (22.5%)</td>
<td>182 (41.4%)</td>
<td>119 (27.0%)</td>
<td>3.86</td>
<td>0.97</td>
</tr>
<tr>
<td>Mean of SA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.73</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Note. SA = student satisfaction.

4.2. Analysis of Necessary Conditions

After data calibration, this study performed a necessary condition analysis involving the antecedent variables using fsQCA 3.0. According to Kaiser [70], an antecedent variable is considered a necessary condition for an outcome if its consistency value exceeds the threshold of 0.9. As shown in Table 5, the consistency values of every single antecedent variable are below 0.9, indicating that none of the antecedent variables by themselves constitute a necessary condition for international students’ satisfaction or dissatisfaction with online CFL learning. Thus, it is essential to adopt fsQCA to investigate how combinations of these antecedent variables lead to student (dis)satisfaction.

Table 5. Analysis of necessary conditions based on fsQCA.

<table>
<thead>
<tr>
<th>Antecedent Variable</th>
<th>High Satisfaction</th>
<th>Non-High Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Consistency</td>
<td>Coverage</td>
</tr>
<tr>
<td>ACC</td>
<td>0.855485</td>
<td>0.855458</td>
</tr>
<tr>
<td>~ACC</td>
<td>0.519891</td>
<td>0.526351</td>
</tr>
<tr>
<td>SI</td>
<td>0.769634</td>
<td>0.852614</td>
</tr>
<tr>
<td>~SI</td>
<td>0.591144</td>
<td>0.556789</td>
</tr>
<tr>
<td>TS</td>
<td>0.858835</td>
<td>0.773036</td>
</tr>
<tr>
<td>~TS</td>
<td>0.449574</td>
<td>0.526811</td>
</tr>
<tr>
<td>CO</td>
<td>0.872495</td>
<td>0.840560</td>
</tr>
<tr>
<td>~CO</td>
<td>0.483683</td>
<td>0.522119</td>
</tr>
<tr>
<td>SE</td>
<td>0.855620</td>
<td>0.832284</td>
</tr>
<tr>
<td>~SE</td>
<td>0.495469</td>
<td>0.529156</td>
</tr>
<tr>
<td>LA</td>
<td>0.801197</td>
<td>0.881391</td>
</tr>
<tr>
<td>~LA</td>
<td>0.375608</td>
<td>0.545412</td>
</tr>
</tbody>
</table>

Note. ACC = accessibility of online learning resources, SI = student interaction, TS = teacher support, CO = course organization, SE = student engagement, LA = learning achievement, SA = student satisfaction. ~ indicates the absence of the condition.

4.3. Truth Table Construction and Configuration Analysis

After the necessary conditions analysis, the truth table was established based on the calibrated membership scores with $2^k$ rows, where $k$ represents the antecedent conditions' number. Each row represents a possible combination of conditions. By setting the cutoff threshold of case frequency and the consistency threshold, fsQCA deleted certain combinations of weak consistency and resulted in solutions that represented configurations leading to the outcome. In this study, a case frequency threshold of 3 was set to exclude insignificant configurations, a consistency threshold of 0.80 was set to ensure strong explanatory power, and a PRI threshold of 0.75 was set to avoid simultaneous subset relations [46]. Generally,
fsQCA yields the following three types of solutions: complex solutions excluding logical remainders, intermediate solutions including easy logical remainders, and parsimonious solutions incorporating all logical remainders [46]. Core conditions were present simultaneously in both intermediate and parsimonious solutions, whereas peripheral conditions appeared only in intermediate solutions [71]. An analysis of intermediate and parsimonious solutions identified four paths to high student satisfaction and another four paths associated with non-high student satisfaction (see Table 6), highlighting the multifaceted and complex nature of the factors influencing international students’ (dis)satisfaction with online CFL learning.

Table 6. High and non-high student satisfaction analysis results.

<table>
<thead>
<tr>
<th>Condition</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>N1</th>
<th>N2</th>
<th>N3</th>
<th>N4</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC</td>
<td>#</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI</td>
<td>#</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TS</td>
<td>#</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>#</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>#</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LA</td>
<td>#</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Original Coverage | 0.686907 | 0.670344 | 0.304433 | 0.291442 | 0.641915 | 0.612657 | 0.380214 | 0.360584 |
| Unique Coverage  | 0.055449 | 0.034108 | 0.024420 | 0.025491 | 0.031711 | 0.013841 | 0.050553 | 0.031063 |
| Consistency      | 0.938228 | 0.957589 | 0.818017 | 0.846472 | 0.968296 | 0.969595 | 0.793910 | 0.832513 |
| Solution Consistency | 0.85765 |          |          |          | 0.827433 |          |          |          |
| Solution Coverage | 0.798073 |          |          |          | 0.785334 |          |          |          |

Note. (1) ACC = accessibility of online learning resources, SI = student interaction, TS = teacher support, CO = course organization, SE = student engagement, LA = learning achievement, SA = student satisfaction. (2) • indicates the existence of core conditions, • indicates the existence of auxiliary conditions, # indicates the absence of core conditions, # indicates the absence of peripheral conditions, and blank spaces indicate “do not care”.

4.3.1. Configuration Analysis of High Student Satisfaction

As presented in Table 6, fsQCA identified four condition configurations associated with international students’ satisfaction with online CFL learning during the pandemic. The consistency for the four solutions (hereafter referred to as S1–S4) was 0.85765, exceeding the threshold of 0.8 and indicating that these four paths constituted sufficient conditions leading to satisfaction in online CFL learning [46]. The coverage was 0.798073, showing that these solutions explained 79.8% of the participants’ satisfaction.

Specifically, S1 and S2, with a high coverage of 0.686907 and 0.670344, respectively, demonstrate that a combination of teacher support with student engagement is crucial for satisfaction. In S1, the combination of adequate teacher support and student engagement in online learning, enhanced by accessible online CFL learning resources and well-organized CFL courses, led to online CFL learning satisfaction, regardless of opportunities for online peer interaction or learning achievement. Similarly, in S2, participants’ satisfaction with online CFL learning was subject to the combined conditions that teacher support was adequate and the participants were engaged actively in online CFL learning, enhanced by proper course organization and high self-reported learning achievement, regardless of the accessibility of materials or student interaction.

In addition, S3 and S4 show that teacher support and student engagement, respectively, were core conditional factors, even in the absence of all other favorable conditions, which predicted the participants’ satisfaction with online CFL learning. In S3, adequate teacher support predicted satisfaction in the absence of accessible online learning materials, opportunities for online student interaction, proper course organization, active engage-
ment in learning, or adequate learning achievement. In S4, the participants’ engagement in learning determined their satisfaction in the absence of accessible learning materials, student interactions, teacher support, or learning achievement.

4.3.2. Configuration Analysis of Non-high Student Satisfaction

As shown in Table 6, the fsQCA results revealed four condition configurations associated with non-high satisfaction among international students in online CFL learning. The consistency for these four configurations (hereafter referred to as N1–N4) was 0.827433, exceeding the 0.8 threshold and indicating that these configurations sufficiently explain participants’ dissatisfaction with online CFL learning [46]. The coverage was 0.785334, showing that these four configurations accounted for 78.5% of the participants’ dissatisfaction.

Specifically, N1 and N2 revealed that the combined absence of access to online learning materials and proper learning achievement was the core condition for the participants’ dissatisfaction with online CFL learning. N1 and N2 had high coverage values of 0.641915 and 0.612657, respectively, explaining 64.2% and 61.3% of the participants’ dissatisfaction. In N1, the absence of student interaction, poor course organization, and insufficient student engagement were peripheral conditions leading to dissatisfaction. In N2, the absence of student interaction, teacher support, and proper course organization were peripheral conditions predicting dissatisfaction with online CFL learning.

In addition, N3 showed that the absence of learning achievement was a core factor resulting in participants’ dissatisfaction despite the presence of adequate access to learning materials, well-organized courses, and active engagement in online CFL learning as peripheral conditions. N4 showed that the absence of accessibility to learning materials led to dissatisfaction, even with well-organized courses, active engagement, and adequate learning achievement being present.

4.4. Robustness Test

To ensure the robustness of the configuration analysis results reported in the previous section, the research increased the case frequency threshold from 3 to 5 and the PRI consistency threshold from 0.75 to 0.8 (see also [71]) and then re-examined the condition configurations predicting international student satisfaction and dissatisfaction with online CFL learning. This new configuration was a subset of the original, prior to the threshold adjustments, with the number of paths explaining satisfaction and dissatisfaction decreasing from four to three. Hence, these results indicate that the adjustments did not result in significant changes to the consistency or coverage of the configurations, affirming the robustness of the configuration analysis results [72].

5. Discussion

5.1. RQ1: Characteristics of International Students’ Satisfaction with Online CFL Learning

This study performed descriptive statistical analysis, and the results show that the mean score of student satisfaction was 3.73, between “neutral” (3) and “agree” (4), indicating that the participants tended to feel satisfied with their online CFL learning. This finding was largely consistent with the previous studies on online EFL learning [12,33,35] but different from reports of lower levels of satisfaction in studies on general online learning experiences among domestic students [15,26] and international students in Chinese HEIs during the pandemic [36]. Therefore, further research is needed to explore whether differences exist between international students’ satisfaction with online CFL learning and their satisfaction with learning in their major fields of study and why.

5.2. RQ2: Combination of Teacher Support and Student Engagement Leading to Satisfaction

Using the fsQCA method, this study identified four configurations leading to international students’ satisfaction with online CFL learning. The configurations of S1 and S2 indicate that the combination of teacher support and student engagement predicted the participants’ satisfaction. Previous studies reported significant influences of teacher
support [33] and student engagement [12] on foreign language learners’ satisfaction in online contexts. However, their configurational influences on student satisfaction have not been documented. The findings of the current study suggest that the simultaneous existence of adequate teacher support and active student engagement is critical in fostering satisfaction with online CFL learning among international students in China. These results revealed that the configuration of learning environmental factors and student engagement plays an important role in explaining student satisfaction in online CFL learning.

Additionally, the configurations of S3 and S4 show that either teacher support or student engagement alone could explain the participants’ online learning satisfaction. However, the weaker explanatory power of S3 and S4, compared to S1 and S2, suggests that the combined influences of teacher support and student engagement surpass the separate influences that either of these factors may have in isolation. The results, thus, extend existing research on student satisfaction in online learning settings by demonstrating that the interaction between significant factors, such as teacher support and student engagement, is more influential than their separate impact (see [12,33,35]). These results confirmed the equifinality of online CFL learning from the perspective of complexity and configuration, indicating that different configurations lead to international students’ satisfaction with online CFL learning.

In contrast, this study revealed that the factors previously deemed as influential—such as the accessibility of online learning resources, course organization, and learning achievement—did not significantly influence student satisfaction [33,36]. In particular, the presence or absence of student interactions did not significantly affect satisfaction in the configurations of S1 and S2 despite its previously reported importance in online learning [32,33]. A possible explanation for this is that previous studies have primarily focused on domestic students’ online learning experiences. In the case of international students, contact with host culture and with peers may be limited in online learning [4]. Diverse cultural backgrounds and mother language differences may hinder the participants’ interaction with other students in online courses [33]. The low levels of peer interaction may explain its limited influence on international students’ satisfaction with online CFL learning [34]. For the same reason, international students may prioritize their interaction with teachers for emotional and academic support and rely more on themselves than on peers, investing more time and energy into learning.

5.3. RQ2: Inaccessibility of Learning Resources and Absence of Learning Achievement Leading to Dissatisfaction

This study revealed four configurations leading to international students’ dissatisfaction with online CFL learning. The results highlighted the significant negative influences of the lack of access to online learning resources and inadequate learning achievement on the dissatisfaction experienced by the participants. In particular, the configurations of N1 and N2 emphasized the combined effect of these two conditions, which accounted for a substantial proportion of international students’ dissatisfaction. Additionally, the configurations of S1 and S2, and of N1 and N2, demonstrated that satisfaction resulted from a combination of teacher support and student engagement, whereas the absence of these two variables did not lead to dissatisfaction. The results suggest that the antecedent conditions for student satisfaction may not simply be the reverse of those leading to dissatisfaction, thereby indicating causal asymmetry between the paths to satisfaction and non-high satisfaction. The research also showed that the environmental factors and the factors related to learning behaviors and learning achievement are not isolated from each other but rather interconnected, with the impact of each factor on levels of satisfaction dependent on its interaction with other factors, in line with the principles of the complexity theory (see [13]). The results confirm the asymmetry of online CFL learning from the perspective of configuration. The paths leading to international students’ satisfaction are not the opposite of those leading to the absence of their satisfaction (i.e., international students’ dissatisfaction).
6. Conclusions

The COVID-19 pandemic imposed unparalleled challenges on China’s international higher education, prompting a swift shift to online education. Emergency remote learning has reshaped higher education across the world, providing new perspectives for its ongoing and future development. For example, hybrid learning combining online and offline modes has been proven as a promising and feasible approach in the post-COVID-19 era [73]. In addition, the use of technology in teaching to support language learning [74] is expected to continue [73]. Consequently, although universities have gradually returned to offline teaching, even for international students in China, the challenges faced and insights gained in online learning during the pandemic are valuable (see [75]), aiding policymakers and instructors to create flexible and adaptable teaching modes to meet individuals’ learning needs in dynamic environments in the post-pandemic era ([73,75]).

This study investigated the online CFL learning satisfaction of international students in China, examining influencing factors from a configuration perspective. This study considered a set of antecedent conditions, including the accessibility of online learning resources, student interaction, teacher support, course organization, student engagement, and learning achievement. The results indicate that the combined effect of teacher support and student engagement plays a crucial role in generating high satisfaction levels in international students’ online CFL learning. In contrast to previous research that highlighted the significance of material accessibility, student interaction, course organization, and learning achievement, these factors did not emerge as influential in the current study. Furthermore, this study revealed that a combination of insufficient accessibility and inadequate learning achievement resulted in dissatisfaction. Theoretically, these findings expand research on online learning satisfaction. The results reveal the important role of the configuration effect played by the online learning environment and students’ learning behaviors in explaining international students’ satisfaction with online CFL learning. Meanwhile, these findings confirmed the equifinality and asymmetry of causal mechanisms in determinants of online CFL learning satisfaction among international students in China. This study contributes to the literature on environmental and individual learning factors influencing satisfaction in online CFL learning. It also contributes to research on online education by confirming the appropriateness of using the fsQCA method in data analysis. This method provides a holistic perspective for examining the causal mechanism of complex phenomena via configuration analysis. Future research can adopt the concept of the fuzzy set for data treatment and use the QCA method to identify configuration patterns, thereby further understanding CFL learning experiences among international students in China.

Practically, this study holds implications for the sustainable development of online CFL education for international students in China and beyond. Given the significant influences of teacher support and student engagement on satisfaction, instructors and institutions are suggested to enhance these two aspects, preferably simultaneously, in online CFL courses. It is recommended that host teachers provide adequate academic, social, and cultural support and create and maintain close relationships with international CFL learners, transforming the online space into a supportive and nurturing environment for foreign language learning. Meanwhile, it is suggested that host teachers and institutions collaborate to motivate international CFL learners to devote more time and energy to their online studies, thus enhancing their engagement. The enhancement of both teacher support and student engagement would likely increase international students’ satisfaction with online CFL learning. Moreover, it is recommended that host institutions ensure that rich CFL learning materials are easily and flexibly accessible online whilst teachers and institutions implement strategies to improve students’ online CFL learning achievement. By addressing simultaneously these two critical issues, i.e., the inaccessibility of online materials and low learning achievement, international students’ dissatisfaction with online CFL learning can be effectively mitigated.

Furthermore, this study provides implications for exploring the development of adaptive instructional systems. First, the adaptive system design is suggested to prioritize
easy access to multimedia and interactive online learning materials, properly using digital
technologies to encourage students’ CFL acquisition through interaction with the mate-
rials. It is also suggested that the online materials cover comprehensive CFL learning
content and be interesting, relevant to real-life experiences of international students, and
culturally appropriate. This is crucial to arouse and sustain CFL’s learning effectiveness
and ultimately promote satisfaction. Second, an adaptive system design is suggested to
enhance online teacher support. It is suggested that the adaptive system incorporates
well-designed real-time communication tools for live lectures and synchronous feedback
in Q&A sessions. Discussion forums or chat platforms should also be designed to enable
asynchronous teacher–student communication. The adaptive system may also allow teach-
ers to arrange virtual office hours during which teachers can meet international students
in person, providing timely, personalized support not only for language learning but also
for academic and social adaptation in the online intercultural learning space. Third, the
system design should integrate peer collaborative learning tools, for example, enabling
international students to share and edit documents synchronously. By supporting student–
student interactions, adaptive instructional systems could help build a sense of an online
learning community. The significance of an online learning community goes beyond aca-
demic support; it enriches international students’ overall intercultural learning experiences
and fosters a sense of belonging and connectedness, which can, in turn, boost learning
engagement and satisfaction.

This research is subject to the following limitations. Given the scope of the investiga-
tion, this research explored a limited number of variables influencing international students’
online CFL learning satisfaction. Future research could expand this by incorporating in-
ternational students’ demographic variables to further explore the factor configurations
that underpin satisfaction and dissatisfaction. Secondly, the data collection was conducted
at the end of 2021 and may be considered outdated. Nevertheless, as one of the first
large-scale surveys on international students’ online CFL learning satisfaction and its in-
fuential factors, this research enables critical reflection on the strengths and weaknesses
of online CFL education and, hence, can support the sustainable development of online
CFL learning during and beyond the pandemic. Moreover, the results may not represent
international students’ perceptions at other stages of the pandemic. Additionally, partici-
pants in this study tended to report satisfaction with their online CFL learning, a finding
that contrasts with previous research on online learning satisfaction in other disciplines.
Future research could conduct comparative analyses of international students’ satisfaction
with online CFL learning versus their major fields of study to explore any differences and
their underlying causes.

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