



# Measurement Indicators of Student Engagement and Investigation on Student Engagement in Blended Learning

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## Abstract

With the influx of technology, Blended Learning (BL) has become a new and important teaching method in colleges and universities. Digital technology in BL environment inherently affecting all aspects of the student experience. Superstar platform can increase students' behavioural, affective(emotional) and cognitive (intellectual) engagement in various ways. The identification of influencing factors and measurement indicators of student engagement in blended learning environment are indistinct in current literature. This paper identifies influencing factors and measurement indicators of student engagement in blended learning through analysis, then clarify indicators regarding what should be focused on to improve student engagement and indicate the measurement indicators with Superstar platform. In addition, this paper uses quantitative research to provide analyses and countermeasures of the student engagement in blended learning.

**Keywords:** *blended learning; digital technology; student engagement; measurement indicator; Superstar platform; quantitative research*

## 1 INTRODUCTION

Driven by science and technology, blended learning has become a new and important teaching method in colleges and universities. At present, China has drastically upgraded the settings of higher education institutions by shifting from traditional methods to the next generation of educational practices [6]. Chinese universities and colleges have been able to incorporate many of the latest techniques and technologies to revolutionize their quality of education (Lee and Yuan, 2018). BL is one of the most promising new methods that integrates online and face-to-face activities into a combined form of teaching [5], and it has recently come to be viewed as an effective method better than purely online or face-to-face learning [6] [18].

Under the background of digital technology, many scholars found lectures or traditional teaching are now described as being passive teaching modes because they discourage students from critically filtering the delivered information. At the same time, there are criticisms have been direct towards the BL experiences which lead to students' disengagement: some instances are lack of

experience in facilitation because of no formal training provision. Therefore, it is necessary to improve student engagement in BL as student engagement is a predictor of students' learning outcome and academic success.

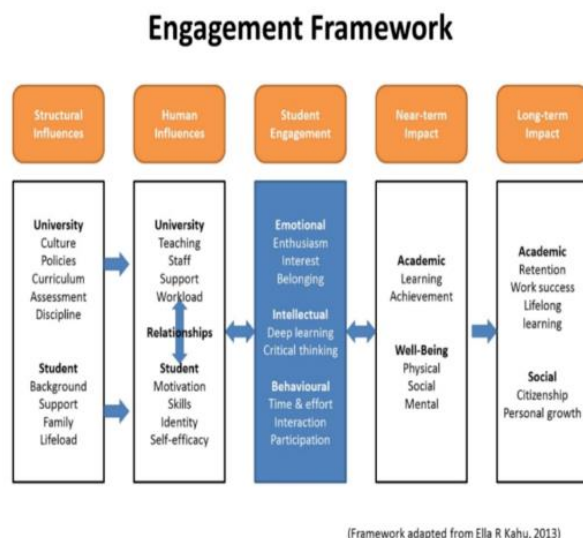
As a predictor of student success in higher education, student engagement has received much attention in the last decade from administrators, practitioners, and researchers [17]. 'Engagement' describes the extent to which students participate in learning-related activities [9]. Student engagement also has important influence on student satisfaction, in-depth learning, and perseverance [2].

This paper will specify the influencing factor and indicators of student engagement in blended learning and clarify influencing factor and indicators in student engagement. Student engagement has been labelled the "holy grail" of education [19]. Engagement has been linked to important outcomes [13] such as grades, persistence, college completion, and mental health (Kuh et al., 2008). Importantly, it is presumed to be malleable through interventions and changing contexts [9].

To improve student engagement, influencing factors and measurement indicators of student engagement should be clarified. Without solving this problem, it will inhibit the possibilities for designing interventions and modifications that could improve educational outcomes.

## 2 INFLUENCING FACTORS AND INDICATORS OF STUDENT ENGAGEMENT

In terms of influencing factor of student engagement, the following engagement framework from Kahu (2013) gave a comprehensive depiction of the influencing factors, including structural and human factors, which is agreed by many scholars. [16]



**Figure 1.** Engagement Framework from Kahu (2013)

There are many factors influencing student engagement, Kahu (2013) gave a comprehensive description of student engagement from a sociocultural angle (Figure 1), the influencing factors include structural influences and human influences, specifically: Culture, policies, curriculum, assessment, discipline, student etc... This figure also helps explain the relationship among factors, engagement, and outcome (impact).

However, this figure did not consider the digital technology, which is a new normal in higher education nowadays. It needs to be updated in the blended environment, the influencing factors also involve technology, learning management system, online resources, peers’ interaction and so on. What’s more, the emotional (affective) engagement indicators, cognitive (intellectual) engagement indicators and behavioural engagement indicators are not clear enough. Teachers may feel confused in fostering student engagement from this framework.

Based on the literature, Bond (2020) identified the ten most often identified student engagement indicators across the studies in blended environment in Table 1. These indicators were evenly distributed over three dimensions of student engagement: affective, cognitive, and behavioural student engagement.

**Table 1.** Top ten student engagement indicators (Studies n=243) [1]

Rank	Student engagement indicators	Frequency
1	Participation/interaction/involvement	118 (49% studies)
2	Achievement	106 (44%)
3	Positive interaction with teachers and peers	100 (41%)
4	Enjoyment	55 (23%)
5	Learning from peers	54 (22%)
6	Deep learning	45 (19%)
7	Self-regulation	39 (16%)
8	Confidence	37 (15%)
8	Positive attitude about learning	37 (15%)
8	Interest	37 (15%)
9	Motivation	32 (13%)
10	Enthusiasm	27 (11%)

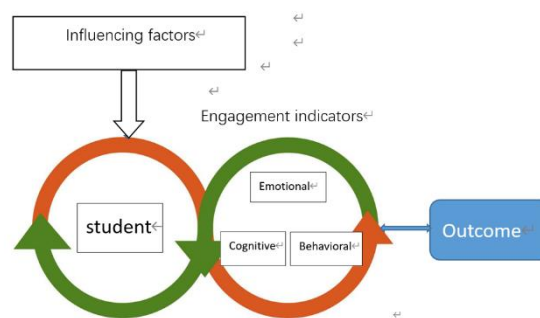
In this table, most items belong to behavioural engagement, emotional (affective) engagement or cognitive engagement indicators. However, achievement should be the outcome of student engagement, which should not be included in student engagement indicators. Achievement here should refer to near-term impact in Figure 1: Engagement Framework from Kahu (2013), according to the engagement framework from Halverson (2019) and Fredricks et al. (2019). [10] [11]

## 2.1 Relationship between the influencing factors and indicators

About the definition of student engagement indicators, Fredricks et al. (2004) described what have become the indicators of engagement: behavioural, emotional, and cognitive engagement, which had also been agreed by Bond et al. (2020) and Teng & Wang (2020). Indicators describe what engagement is or looks like in a given setting, we generally use indicators to measure engagement [14]. About the relationship between influencing factor and indicators, engagement is thought to be a mediator between influencing and outcomes [3] [4] [9], and student engagement is measured through engagement indicators (Figure 2)

According to Fredricks et al. (2004), behavioural engagement includes the observable behaviours necessary to academic success, such as attendance, interaction /participation /involvement, and homework completion. Emotional engagement includes both feelings learners have about their learning experience, such as attitude, motivation, value, interest, frustration, or boredom, and their social connection with others at school. Cognitive engagement is the focused effort learners give to effectively understand what is being taught, including learning strategies, persistence, self-regulation, deep-learning and metacognitive behaviours.

Behavioural engagement includes attendance, participation, homework completion [12], student attentiveness, completing in-class and homework assignments, time on task, academic extracurricular participation [8], effort, asking questions, contribute to class discussion [7]. Cognitive engagement consists of cognitive strategies while solving problems or cognitive processes, persistence, self-regulation, questioning of content or “going beyond the minimum” (e.g., using dictionary or Internet to gain further information), voluntary after-school interaction with teacher [8], metacognitive behaviours, preference for challenge [7], flexibility in problem solving, preference for hard work, positive coping in the face of failure [4]. Emotional engagement includes valuing of school, feelings of acceptance and/or belonging, positive reciprocal relationships with teachers and classmates [8], confidence [11]. About the relationship between influencing factor and indicators, engagement is thought to be a mediator between influencing and outcomes [3] [4] [9], and student engagement is measured through engagement indicators (Figure 2)



**Figure 2** The relationship among engagement influencing factors, engagement indicators and outcome

## 2.2 Engagement Indicators with LMS

Take the Superstar platform, which is a popular learning management system (LMS) in Chinese universities, can play a crucial role in affecting student engagement based on this model. To begin with, the Superstar platform functions such as voting, random check, posting questions for communicating can greatly help foster students' behavioural engagement. Secondly, Superstar platform enable students and teachers communicate before and after class, not just face-to-face communication, which can strength the emotional connection between students and teachers. Furthermore, the group work scheduled in the Superstar platform can also improve students' closeness and communication. Finally, the learning guidelines and rich learning resources can be appropriately utilized to intrigue students' interest and motivation and help students autonomously study.

In blended environment, cognitive and emotional engagement indicators are essential to understanding learner engagement. Engagement is manifest via cognitive and emotional indicators and contributes to desired learning outcomes. Blended learning may diversify the learning pathways available to accomplish a task, but it also requires students to employ greater effort and cognitive strategy use. Cognitive engagement indicators mainly include attention, effort and persistence, and time on task indicate the quantity of cognitive engagement, while cognitive strategy use, absorption, and curiosity indicate its quality. Skinner and Pitzer (2012) labelled emotion “the fuel for the kind of behavioural and cognitive engagement that leads to high-quality learning”. Behavioural engagement indicators do not change a lot as blended learning includes face-to-face learning. However, Behavioural engagement indicators can also be reflected in learning management system and digital tools can enrich behavioural engagement indicators in innovative ways.

### 3 INVESTIGATION OF STUDENT ENGAGEMENT

#### 3.1 Method

This paper uses quantitative research to provide an overall data about the situation of sophomores' engagement in a Chinese private university, including the mean scores, standard deviations of each student engagement variables, and comparing the mean scores, standard deviations among different genders, fields and ages.

This questionnaire chosen aligns with the engagement measurement indicators mentioned above, which is adapted from Yilian Teng & Wang (2021). [20] In addition, a reliability analysis was conducted to test the inter-consistency and the result revealed the Cronbach's Alpha in three dimensions of student engagement, with behavioural engagement, cognitive engagement and emotional engagement 0.939, 0.960, 0.939 respectively, which proved its good reliability. There are 21 items in the questionnaire, and the items are selected by the 5-point self-assessment scale, specifically:

strongly disagree (1), disagree (2), basically agree (3), agree (4), strongly agree (5).

#### 3.2 Overall Situation of Student Engagement

As shown in Table 2, the total score of College Students' learning input is 3.18, and the overall level is above medium. The scores of behavioural engagements (BE), cognitive engagement (CE) and emotional engagement (EE) are 3.25, 3.14 and 3.14 respectively, which are all above the middle level. Among them, the behaviour investment is the highest, it means that the instructor can active students to take part in learning activities. However, students' cognitive engagement and emotional engagement are relatively low, students don't have strong motivation and they don't show much interest or enjoyment in learning activities. From table 3. Only 1.5% of the low engagement group scored less than 2 (including 2); The proportion of high engagement group with more than 4 points is also relatively small, only 9%; The rest are at  $2 < x \leq 4$ , accounting for 89.5%, which further indicates that the overall student engagement of college students is at a medium level.

**Table 2.** Overall situation of student engagement

	N	Total score	BE	CE	EE
Overall	400	3.18+0.66	3.25+0.63	3.14+0.66	3.14+0.70

**Table 3.** Group scores

groups	N	percent	average
$\leq 2$	6	1.5%	1.64
$2 < X \leq 4$	358	89.5%	3.06
$> 4$	36	9%	4.58

It can be seen from Figure 3 that male students' learning engagement in behaviour, cognition and emotion is slightly higher than that of female students, but there is no significant difference, especially in cognition, which shows that they have almost the same attitude and level in metacognition and cognitive strategies towards learning; In terms of behaviour and emotion, the scores of male college students' learning engagement are slightly higher than those of female college students. According to the understanding of students, some male college students do participate in classroom learning actively and complete their homework carefully.

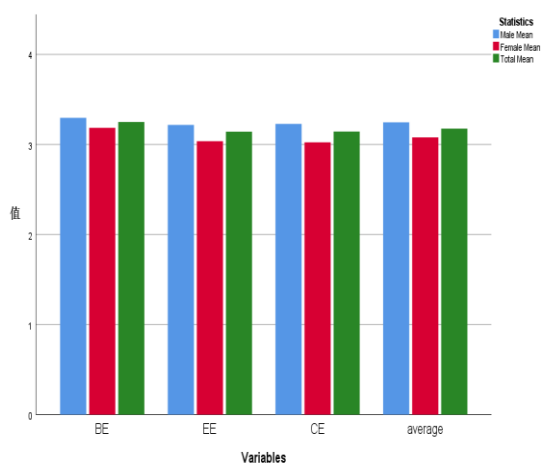


Figure 3. Gender difference of student engagement

As can be seen from Figure 4, there is no significant difference in the scores of cognitions, behaviour and emotion between students majoring in liberal arts and students majoring in science. No matter liberal arts or science students, what supports them to study is their enthusiasm and interest in learning, their attention to academic performance, and so on, but there is no significant connection with their learning field.

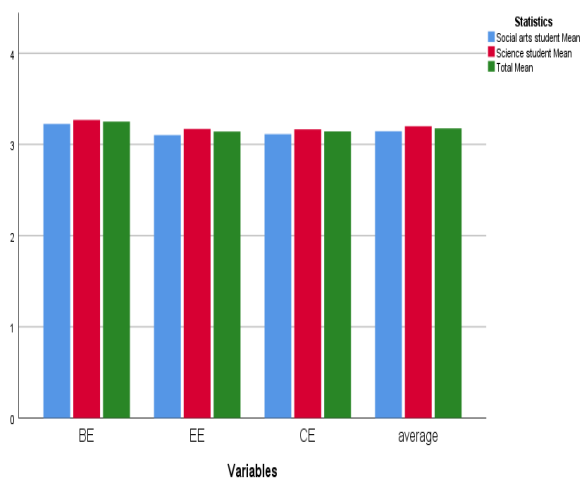


Figure 4 Field difference of student engagement

As shown in the Figure 5, the 18-year-old and 19-year-old students are slightly higher in behavior, cognition and emotion than the students of the same grade, and the 18-year-old to 23-year-old students' learning engagement shows a "high low high" trend. It is found that students aged 18 and 19 are more hardworking, more planned and more active in learning; However, the 23-year-old students, who are relatively older and have some pressure on the future, will start to work hard, but they still lack stamina and spare strength.

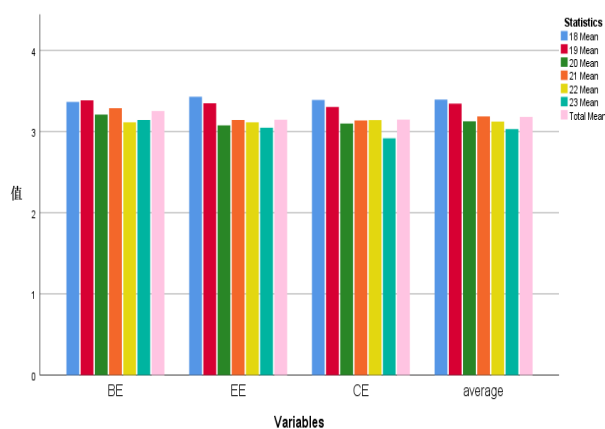


Figure 5 Age differences of student engagement

#### 4 COUNTERMEASURES

According to the findings, this study agrees with Bond et al. (2020) on the importance of students' motivation, interest, self-regulation and deep learning on student engagement. Based on the investigation results, the researchers suggest three major countermeasures:

Firstly, colleges and universities should carry out ambition education to improve college students' life realm and achievement motivation. Pragmatism, consumerism and materialism in modern society have a profound impact on the values of college students. To a certain extent, they have dispelled the "loftiness" of spiritual pursuit. Some college students no longer pursue the height and thickness of life and are satisfied with pleasure and recreation. Some scholars believe that culture is a set of symbolic system containing meaning and carrying value. No matter religion, ethics, philosophy, and art, they all construct the meaning and value system of the world and life in a specific way. The core issue is people's ultimate concern. At the same time, through ambition education, students' achievement motivation is stimulated, students who are lazy and have low learning investment are transformed, most students' medium learning investment is improved, and students with high learning investment continue to make great progress.

Secondly, Advocate college students to establish a learning community and promote the interaction of learning process. In blended learning, the teaching quality lies in students' learning, especially cooperative learning. Studies shows that students with learning partners have greater learning gains and better academic performance [15]. Learning together will increase the overall learning harvest of college students, to improve the quality of higher education.

Thirdly, colleges and universities should carry out education on College Students' career planning, guide

students to formulate college planning and find out their life goals. As what was found in this research, students commonly lack motivation and career planning, which aspects that students are expected to pay attention to. Schools should plan future goals to guide students to correctly understand and grasp their study, life, work, etc. in college. The purpose is to guide students, put students on track and avoid students falling into the lost period of sophomore year, and maximize students' College harvest.

## 5 CONCLUSIONS

Though there are a variety of influencing factors of student engagement, they cannot measure student engagement as engagement indicators do. Researchers should clearly clarify the relationship between them. With the survey which aligns with the engagement indicators, this paper put forward countermeasures accordingly more precisely.

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