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Quality and Accessibility in Blended Learning and Hybrid Solutions at Higher Education Level: A Word from the Students[1]

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Abstract. The educational quality of hybrid solutions relies upon their capabilities to foster meaningful learning and support collaborative and learner-centred instruction. Higher education faculty's and institutions' preparedness for delivering hybrid/blended instruction is crucial and it has not always passed the test for quality education in the past few years, especially when the Covid-19 pandemic forced the online transition. This study focuses on the educational quality and accessibility provided by hybrid/blended learning solutions (HBLS) at the university level, as perceived by the primary protagonists of education: the students. Six hundred and eighty higher education students completed an online survey on perceived quality and accessibility provided by the hybrid and blended learning solutions activated at their university. A cluster analysis on the participants revealed three patterns of response in terms of quality and accessibility appreciation: a dismissive, an appreciative and an enthusiastic profile. Implications for higher education response to the specific student characteristics are discussed.

Keywords: Distance learning, Higher education, hybrid education, student voice.

1 Introduction

Technology integration can radically change how we teach; how we manage instruction, where and when it occurs; how we relate to knowledge; how we relate to a group; how we interact with students, colleagues and the community [1]. One way to systemically integrate technology in education and realize those changes is through hybrid and blended instruction. There are several ways in which hybrid and blended learning solutions (HBLS) may support learning, ranging from the addition of online activities to a traditional in-person course; to the use of blended learning pathways through specific

[1] Authorship: 1. Introduction, 5. Discussion and conclusions (Marina De Rossi); 2. Literature background, 3. The present study; 4. Findings (Ottavia Trevisan).

platforms as integrated learning environments; to the systematic flexibility in instructional spatial/temporal distribution between presence and distance [2]. According to Kalantzis and Cope [3], adopting online teaching - boosted by the recent pandemic - calls into question the conventional wisdom that face-to-face learning is the gold standard (p.51).

Indeed, there has been a significant shift to online teaching and learning in higher education as a result of the global Covid-19 pandemic, which some authors have referred to as the Great Online Transition [4]. Organizational agility was tested during the pandemic [5], resulting in many institutions and faculty focusing on the rapid transition from physical to digital environments in place of necessarily considering online pedagogical strategies [4;6]. The transition to online learning proved challenging for teachers as well as students due to a widening digital divide [7;8], lack of self-regulation and engagement [9;10], and mental health issues [11]. As a result of inadequate infrastructure, personal circumstances, and institutional/contextual factors, poor quality education provision and inequalities in access to education have emerged on a global scale [12-16].

Despite its pedagogical challenges, online teaching is becoming an increasingly important component of teaching and learning globally [17]. The HBLS is urged to realize effective innovation as a continuous process of designing and developing quality instructional events that promote competence-based, participatory and inclusive learning [18]. This study voices the students' point of view on the quality and accessibility of experienced HBLS in higher education.

2 Literature background

The term hybrid education is commonly used to describe a balance between presence and distance in education. However, technology-enabled hybrid educational solutions not only integrate spatial elements (real or virtual), and communication modalities (synchronous and asynchronous), but also combine teaching strategies, as well as various materials, tools and resources to facilitate individual and/or collaborative learning [19]. The key to hybrid learning solutions lies not so much in the number of technologies utilized or the ratio of presence-to-distance instruction, but rather in how and why they are used [20]. Blended learning is a form of hybrid education that has been gaining popularity in higher education due to its ability to overcome various limitations associated with both online and face-to-face instruction [2]. Many different types of hybrid blended learning courses exist, from adding extra online activities to a traditional face-to-face course to developing the entire course as blended from scratch. In any case, it is imperative that hybrid blended solutions support collaborative, learner-centered instruction, as well as embedded assessment for learning in order to encourage innovative educational practices and meaningful learning [19].

Hybrid and blended learning solutions (HBLS) were boosted in recent times due to the advent of the Covid-19 pandemic. Online teaching, however, was often not the re-

sult of a well-considered instructional design process, rooted in a thorough needs analysis and inspired by the affordances of online education. Rather, this was an expedient response to an unexpected, unusually rapid, and poorly understood public health emergency [12; 14]. As a result, some undesirable effects of ICT adoption were amplified worldwide, such as inequalities in access to education caused by social, economic, and contextual factors [13; 14]. Globally, students in higher education experienced fatigue and concentration difficulties as a result of online education, as well as general dissatisfaction with the overall educational situation [21; 22].

The adoption of HBLS during the transition to online instruction needs to retain the good practices developed over the past decades, emphasizing, for example, flexibility in the teaching methods, assessment strategies, and temporal organization of the instruction [14; 22]. A number of advantages can be derived from HBLS in higher education, for example: addressing the need for flexible, personalized curricula [23; 24], providing differentiated instruction to meet the diversity of students [25], or improving student engagement with learning materials. As a result, HBLS may provide students with the freedom to learn at their own pace, at their own time, and in their own environment [24]. Such flexible approaches to learning are typical of individualized learning, in which students choose learning objectives and activities based on their cognitive and motivational characteristics [26]. Moreover, according to the IMS Global Learning Consortium [27], flexibility in quality education goes hand in hand with accessibility, as "accessibility is determined by the flexibility of the education environment and the availability of adequate alternative-but-equivalent content and activities".

In spite of this, the disengagement and dropout rates in these environments have raised concerns both over the years and in the most recent past [24; 28; 29]. Teachers and institutions should promote students' motivation to reduce dropout rates, starting with the alignment of the pedagogy and instructional environment with the needs and interests of the students, this can be achieved [30].

Accordingly, this study examines students' perceptions of the quality and accessibility of HBLS activated at their higher education institution. The results of this study will shed light on the needs and motivations of higher education students that HBLS should cater to in order to improve the educational experience.

3 The present study

The context of this study is a HBLS initiative in a master's degree course for teacher education, involving 680 student-teachers who attended a total of 21 HBLS courses and 112 HBLS group-based workshops (10% of total academic hours was online – [31], over the past 6 months (academic year 2021-2022). The research questions are:

How do higher education students perceive HBLS to foster accessibility in education?

How do higher education students perceive HBLS to foster quality in education?

3.1 Participants

An online survey circulated among the 680 student-teachers attending HBLS during the academic year 2021/2022, gathering 294 responses. Participation was anonymous and voluntary. Table 1 summarizes the demographics of the convenience sample.

Table 1. Sample characteristics.

Category	Variable	Raw frequency	% over tot (N=294)
Gender	Male	13	4.4%
	Female	279	94.9%
	Other	2	0.7%
Highest title	High school diploma	231	78.6%
	Bachelor's degree	40	13.6%
	Master's degree	22	7.5%
	Other	1	0.3%
Role	Full time student	192	65.3%
	Part time worker	55	18.7%
	Full time worker	47	16%
Attendance at Higher Education institution	First year	68	23.1%
	Second year	93	31.6%
	Third year	62	21.1%
	Fourth year	50	17%
	Fifth year	21	7.1%
HBLS Participation	No participation	7	2.4%
	Partial participation	118	40.1%
	Full participation	169	57.5%

As per Table 1, among the respondents, 95% were female, and their average age was 23.5 years old (mode= 20, range=28). Most participants attended their 2nd year at university (32%), but presence of all years (minimum 5th year, with 7% respondents). Most participants hold a high school diploma (79%) and are full-time students (65%), although a minority is a part-time (19%) or full-time (16%) student-worker. Only 2% did not participate in the HBL activities, while most participated either to part (40%) or all of the available ones (58%).

3.2 Methodology

The online survey comprised five sections:

A. *Demographics*: six multiple choice items on gender, age, year attended at university, role, highest title held, participation to HBLS activities;
B. *ICT integration at university* (Chronbach's alpha: .94): 13 5-point Likert scale items (1= not at all capable; 5= very capable) on the quality and accessibility of HBLS in higher education;
C. *HBLS courses/lectures* (Chronbach's alpha: .93): 12 5-point Likert scale items (1=strongly disagree; 5= strongly agree) and two open ended questions on the quality and accessibility of HBLS strategies realized in the attended higher education courses/lectures;
D. *HBLS workshops* (Chronbach's alpha: .95): 11 5-point Likert scale items (1=strongly disagree; 5= strongly agree) and two open ended questions on the

quality and accessibility of HBLS strategies realized in the attended higher education workshops;

E. Self-efficacy in ICT use (Chronbach's alpha: .91): 17 5-point Likert scale items (1= not at all capable; 5= very capable) and one open ended question on the self-assessed mastery of use of ICTs for HBLS.

The sections B-E were tested for reliability and were found more than acceptable. Moreover, exploratory factor analysis was carried out on the questionnaire to observe possible underpinnings for perceived quality and accessibility of HBLS in higher education. Table 2 shows the factors emerging through EFA, considering Eigenvalue >1; varimax rotation and a principal component extraction method.

Table 2. Exploratory Factor Analysis on the online survey.

Factor	Items	Item example	Cronbach's alpha	Factor loadings
Quality of HBLS workshops	10	In the HBLS workshops, I experienced active, reflective, and collaborative methodological approaches	.95	.66-.77
Quality in HBLS courses/ lectures	11	In the HBLS lectures, the proposed face-to-face and remote activities were coherent and consistent with each other.	.94	.51-.77
Access to HBLS in higher education	14	HBLS organization allowed me to balance study time with private or work life.	.94	.49-.72
Self-efficacy for common ICT	8	I can use browsers like Explorer, Firefox, Chrome, Safari or others.	.87	.63-.87
Self-efficacy for advanced ICT	9	I can use video editing software like Movie Maker, iMovie, Final Cut or others.	.88	.57-.85

Factor 1 (*quality in HBL workshops*, Cronbach's alpha = .95) comprised 10 items that explained 21.97% of the variance with factor loadings from .66 to .77. Factor 2 (*quality in HBL courses/lectures*, alpha = .94) included 11 items that explained 20.48% of the variance with factor loadings from .51 to .77. Factor 3 (*accessibility of HBL in higher education*, alpha = .94) comprised 14 items that explained 20.74% of the variance with factor loadings from .49 to .72. Factor 4 (*self-efficacy for common ICT uses*, alpha = .87) included 8 items that explained 27.36% of the variance with factor loadings from .63 to .87. Factor 5 (*self-efficacy for advanced ICT uses*, alpha = .88) comprised 9 items that explained 29.40% of the variance with factor loadings from .57 to .85.

The five stable constructs resulting from the exploratory factor analysis were tested for reliability and deemed more than acceptable [32].

4 Findings

4.1 HE students' experience with HBLS

Descriptive statistics were run on the five constructs for the whole population (Table 3). In general, participants fairly valued the experiences with HBLS in higher education.

Table 3. Descriptive statistics on five factors, pooled sample (N=294).

Factor	N	Mean	Std. Deviation	Mode	Median	Min-Max
Quality of HBLS workshops	294	3.70	.96	5	3.80	1-5
Quality in HBLS courses/lectures	294	3.49	.92	5	3.58	1-5
Access to HBLS in higher education	294	3.83	.83	5	3.93	1-5
Self-efficacy for common ICT	294	4.35	.58	5	4.50	2-5
Self-efficacy for advanced ICT	294	2.88	.82	3	2.78	1-5

Overall, participants well appreciated the **quality of HBLS in workshops**, with a mean of 3.70 on the 5-point Likert scale (st.d. = .96 – Table 3).
The most appreciated aspects relate to the impact of HBLS workshops on the *organization of attendance* (item 26- mean = 3.97, st.d. = 1.18); and to the *coherence between face-to-face and digital activities* (item 33- mean = 3.88, st.d. = 1.03). Among the least appreciated, but still in the middle of the Likert scale, there is item 30 that reads: *"BL workshop activities facilitating sharing the tasks with peers in the group"* (mean = 3.22, st.d. = 1.09).
Moreover, participants fairly valued the **quality of HBLS in lecture/courses**, with a mean of 3.49 on the 5-point Likert scale (st.d. = .92). The most appreciated aspects concerned the *use of HBLS to challenge one's learning through exercises* (item 2 - mean = 3.83, st.d. = 1.03); and the *chances for collaborative works* (mean = 3.73, st.d. = 1.14). Among the least appreciated in this factor, but still in the middle of the Likert scale, there is item 10, which reads: *"digital environments (e.g. Moodle) help students communicate between themselves"* (mean = 3.21, st.d. = 1.28).
Access to HBLS in higher education scored quite high on the scale, with a mean at 3.83 (st.d. = .83). The items within this factor with the highest appreciation were number 13 ("*knowing how to explore the web helps students to find information useful in developing effectively their own learning"*), with a mean of 4.29, st.d. = .87; and number 14 *("BL experiences help me organize better study time")* with a mean of 3.90, st.d. = 1.18.
The *communication between students and educators* (item 11) was among the least appreciated in this area (mean = 3.50, st.d. = 1.19).
Overall, participants' **self-efficacy** on the use of more common technologies is very good (mean = 4.35 out of 5, st.d. = .58), while they are less confident on the use of more advanced technologies (mean = 2.88 out of 5, st.d. = .82).

4.2 Patterns of HBLS appreciation for accessibility and quality

A two-step cluster analysis was then performed in SPSS(27) to explore patterns of responses among the participants. Three patterns emerged, displaying peculiar perceptions of HBLS in higher education. A first pattern related to those who expressed an *enthusiastic* appreciation of the quality and accessibility of HBLS in higher education, grouping 82 of the respondents (29%). Another 125 respondents (44%) demonstrated a *good* appreciation of HBLS in higher education, while 77 (27%) were *dismissive* of the quality and accessibility experienced (Table 4, Figure 1).

Overall, the three clusters were very different on every construct (ANOVA, $p<.001$). They were most dissimilar on the perception of *access to HBLS in higher education* ($\eta^2 =.70$, beyond large effect size according to [33]); on the *quality of HBLS courses* ($\eta^2=.67$, beyond large effect size); and on the *quality of HBLS workshops* ($\eta^2=.64$, beyond large effect size). They were the least different, although still significantly ($p<.001$), on *self-efficacy for common ICT use* ($\eta^2=.18$, still large size effect according to [33]) and on *self-efficacy for advanced ICT use* ($\eta^2=.25$, large effect size).

Variables such as gender, age, year of attendance, or degree of participation in HBLS activities did not determine the affiliation to one group or another (ANOVA, $p< .05$). In contrast, the highest title held and being a student/worker influenced group membership ($p<.05$).

A description of the individual patterns, i.e. profiles, in relation to the 5 factors of the questionnaire follows.

Fig. 1. Patterns of answers by the three clusters of students' perceptions (means).

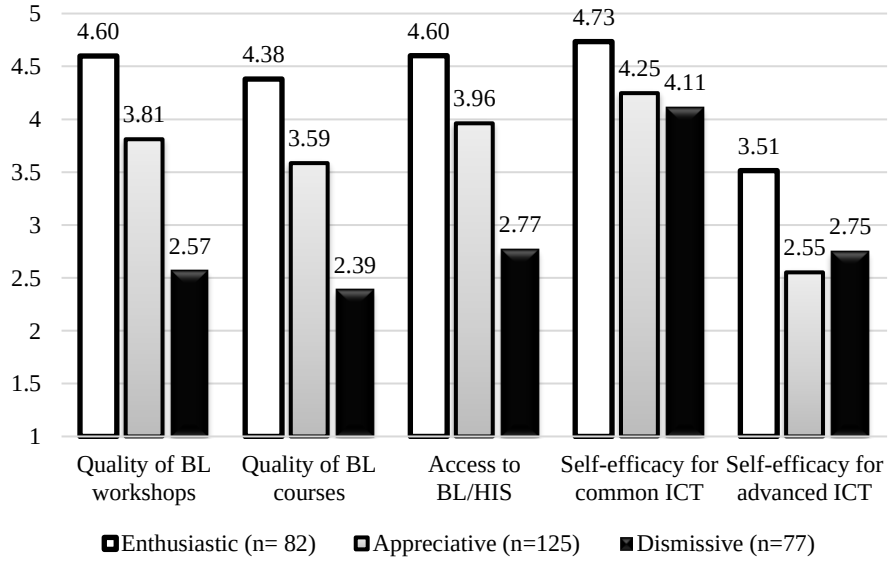

Table 4. Demographics for the three clusters (i.e. profiles) of students' perceptions.

		Raw frequency (% over tot N=294)			Invalid data
Category	Variable	Enthusiastic (n=82)	Appreciative (n=125)	Dismissive (n=77)	(% over tot N=294)
Gender	Male	4 (30.8%)	7 (53.8%)	2 (15.4%)	
	Female	77 (27.6%)	117 (41.9%)	75 (26.9%)	10 (3.6%)
	Other	1 (50%)	1 (50%)		
Highest title	High school diploma	51 (22.1%)	103 (44.6%)	68 (29.4%)	9 (3.9%)
	Bachelor's degree	19 (47.5%)	14 (35%)	6 (15%)	1 (2.5%)
	Master's degree	12 (54.5%)	8 (36.4%)	2 (9.1%)	
	Other			1 (100%)	
Role	Full time student	39 (20.3%)	85 (44.3%)	61 (31.8%)	7 (3.6%)
	Part time worker	21 (38.2%)	26 (47.3%)	7 (12.7%)	1 (1.8%)
	Full time worker	22 (46.8%)	14 (29.8%)	9 (19.1%)	2 (4.3%)
Attendance at Higher Education institution	First year	14 (20.6%)	30 (44.1%)	20 (29.4%)	4 (5.9%)
	Second year	33 (35.5%)	34 (36.6%)	25 (26.9%)	1 (1.1%)
	Third year	21 (33.9%)	26 (41.9%)	15 (24.2%)	
	Fourth year	12 (24%)	25 (50%)	12 (24%)	1 (2%)
	Fifth year	2 (9.5%)	10 (47.6%)	5 (23.8%)	4 (19%)
HBLS Participation	No participation	1 (14.3%)	5 (71.4%)	1 (14.3%)	
	Partial participation	29 (24.6%)	49 (41.5%)	36 (30.5%)	4 (3.4%)
	Full participation	52 (30.8%)	71 (42%)	40 (23.7%)	6 (3.6%)

The first cluster groups 82 students with *enthusiastic* appreciation of the experienced HBLS (Table 4, Figure 1). They are among the oldest respondents (25 years old on average), and mostly female, although a third of all the male respondents gather here too (31% overall). This group also gathered the highest relative percentage of students holding bachelor's (49%) and master's (55%) degrees, as well as the highest relative percentages of part-time and full-time workers (respectively, 49% and 39% of the respondents in those categories). Almost half (40%) attended their second year at university and they were either partially or completely participating to HBLS activities (respectively, 35% and 63%). They displayed a great appreciation of the quality of HBLS courses (mean = 4.38, st.d. = .55) and workshops (mean = 4.60, st.d. = .50), as well as of the accessibility provided (mean = 4.60, st.d. = .39 - see Table 3 and Figure 1). Their self-efficacy for common ICT uses was very good (mean = 4.73, st.d. = .33) and above average for advanced ICT uses (mean = 3.51, st.d. = .77).

The second cluster groups 125 students displaying *medium appreciation* of the experienced HBLS. They are 23 years old on average, mostly female (94%) but still gathering more than half of the total number of male respondents (7, namely the 54%). The vast

majority is a high school graduate (82%), although 36% of the students with previous bachelor's or master's degrees also gather in this group. Similar rates of students in this cluster attended the first (24%), second (27%), third (21%) or fourth (20%) year at university, and were mostly full-time students (85%). Noticeably, half of the part-time students also participate to this cluster (48%). Finally, this group has the highest ratio of students not/partly participating to the HBLS activities (respectively 71% and 43% of the respondents in those categories) to the ones fully participating (43% of the total). They displayed a good appreciation of the quality of HBLS courses (mean = 3.59, st.d. = .48) and workshops (mean = 3.81, st.d. = .57), as well as of the accessibility provided (mean = 3.96, st.d. = .43 - see Table 2 and Figure 1). Their self-efficacy for common ICT uses was very good (mean = 4.25, st.d. = .42) and but below average for advanced ICT uses (mean = 2.55, st.d. = .58).

The third cluster groups 77 students with *dismissive* about the quality of and ac-cess to HBLS in higher education. They are among the youngest respondents (22 years old on average), mostly female (97%). Most of these respondents have a high school diplo-ma as their highest title (88%) and are full-time students (79%) at their first or second of university (26% and 33% respectively). This cluster gathers the lowest ratio of students fully participating to partially participating to HBLS activities (52% to 47%). They displayed the lowest appreciation of the quality of HBLS courses (mean = 2.39, st.d. = .59) and workshops (mean = 2.57, st.d. = .67), as well as of the accessibility provided (mean = 2.77, st.d. = .55 - see Table 2 and Figure 1). Their self-efficacy for common ICT uses was quite good (mean = 4.11, st.d. = .78) and but still below average for advanced ICT uses (mean = 2.75, st.d. = .83).

5 Discussion and conclusions

This study focused on the educational quality and accessibility provided by HBLS at the higher education level, as perceived by the primary protagonists of education: the students. Overall, the surveyed students showed good appreciation for the quality and accessibility of the experienced HBLS (see Table 3) – although we need to account for a certain degree of answer desirability. This is in line with other recent studies like Silletti and colleagues' [21] on student appreciation of forms of distance learning.

Three patterns of response, i.e. cluster profiles, emerged from deeper data analysis. The *enthusiastic*, *appreciative*, and *dismissive* clusters showed peculiar levels of recognition of the quality and accessibility of the experienced HBLS. The degree to which students value HBLS may connect with their motivation and engagement in instruction, and their intention to persist [24; 34].

Moreover, cluster affiliation differed according to the highest title held and being a student/worker, whilst gender, age and seniority at university proved irrelevant to that. This finding suggests different typologies of students with possibly different educational needs and expectations that affect their assessment of the higher education offered. We found that the degree of participation was not significantly different across the profiles, which requires further investigation. A possible explanation for this could

be in the adopted teaching methodologies/strategies: if they were the same face-to-face and remote, it is possible that the HBLS appreciation data would not fluctuate according to participation. This hypothesis is supported by research testifying how many faculty simply transpose analogue teaching methodologies/strategies digitally [12; 14; 22]. Future research could focus on the teaching methodologies and strategies implemented, to possibly better understand this finding.

Teachers and institutions can use the findings to conduct in depth discussions with their students about their interests and perceptions in order to accommodate their needs and improve educational quality and access (see also [24]). In order to support students effectively, institutions should develop a vision and guidelines for supporting them without restricting their flexibility. In order to benefit and support diverse learners, the institution should use the profiles to follow up on students and find out how to improve their education (as suggested by similar studies by, among others, [24]). There may be an opportunity to differentiate attendance modes based on the educational objectives, as suggested by Zucchermaglio and colleagues [22], and to implement more flexible forms of instructional design and assessment.

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