Teaching Academy Groningen
White Paper - Blended Learning with Diversity and Inclusion

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TAG White Paper: Blended Learning with Diversity and Inclusion

1. **INTRODUCTION**

The University of Groningen (UG) along with many other educational institutes has increasingly encouraged the adoption of Blended Learning (BL). The initiative towards a more comprehensive use of BL in all faculties is seen in the UG's current strategic plan. While the UG and TAG documents provide different meanings on BL, there is general consensus about the definition of Blended Learning as: "*the thoughtful integration of educational technology and face-to-face education*". As the university moves forward in this direction, questions emerge concerning how BL might interact with other strategic initiatives. In this paper, we look at the implications of BL on the initiative to address diversity and improve inclusion in the classroom. In particular, we ask:

1) *How does BL impact the student experience and educational outcomes in the classroom?*
2) *In particular, how might BL have different impacts in diverse classrooms?*
3) *And, what do we need to know about BL to provide an inclusive environment?*

To address these questions, this TAG working paper looks at a sample of the most cited research papers concerning these topics. Using Google Scholar, the initial articles (for mode comparison) were located using the search terms: "blended learning", "blended learning student engagement", "blended learning traditional lectures", "blended learning vs online", "blended learning vs. traditional classroom". These articles led to other articles for 27 total papers including several meta-analyses. An additional set of search terms were used for inclusion and diversity topics. These included "blended learning & gender", "blended learning & diversity", "blended learning & inclusivity or diversity", "blended learning & cultural inclusivity", "blended learning & disability", and "universal design for learning & blended learning". These initial articles also led to other articles for a total of 48 papers.

In the first section, we look at the general research addressing the student experience and educational outcomes comparing blended learning to traditional face to face or online only education modes. We then move on to consider this comparison with different student types and the role of psychological factors. We close by considering research on universal design for learning with blended learning.

2. **COMPARING BLENDED, TRADITIONAL, AND ONLINE MODES OF DELIVERY**

Since the mid 1990s, many researchers have compared the different modes of delivery and predominantly focused on comparisons of mode impact on student satisfaction, student learning outcomes, community building, retention and access. In this section, we will consider several comparison meta-analyses followed by studies of specific impacts differences.

Prior to 2014, five meta-analyses have included blended learning environments in studies of learning effectiveness (Zhao et al. 2005; Sitzmann et al. 2006; Bernard et al. 2009; Means et al. 2009; 2013; Bernard et al. 2014). Each of these studies has found small to moderate positive effects in favor of blended learning when compared to fully online or traditional face-to-face environments. As a typical example, the analysis by Means et al. (2009) covered 46 articles from 1996-2008 covering undergrad and graduate students in computer science, teacher education, social science, mathematics, languages, science and business. The results (main effects) showed that BL or online only (OL) produced stronger learning outcomes than solely face-to-face but BL had a stronger effect than OL. Only 2 of 51 comparisons favored the face-to-face mode. The authors mention that advantage for Blended Learning may not be rooted in the method of delivery but rather differences in content, pedagogy, and learning time (more time spent on a learning task).

Another more recent study of medical education by Vallee et al. (2020), considered 56 articles published from 1991-2018 and found that BL groups scored better on knowledge outcomes than traditional groups in 26 of 41 studies. In only 4 studies did traditional groups score better and the rest of the comparisons were insignificant. The authors posit that blended learning's advantage is that it *"allowed students to review electronic materials as often as necessary and at their own pace"*.

In a recent meta-analysis study of the challenges of blended learning, Rasheed et al. (2020) considered 30 studies from 2014-2018. The authors found that student challenges included self-regulation, technological literacy and competency, isolation, technological sufficiency, and technological complexity. While teacher challenges included teachers' technological literacy and competency, technological operation, and teachers' personal belief in blended learning. These challenges have led to studies considering other student outcomes beyond general basic learning outcomes.

Overall, the majority of the *meta-analyses have favored the learning outcomes of BL*. However prior to 2020, many challenges were acknowledged from teacher and student's perspective. One would expect that since that time, educational technology has become more commonplace and that many of these challenges could be diminishing.

General Learning Outcomes
Going beyond the meta-analysis by Means et al. (2009) and Vallee et al. (2020), other recent studies have considered what we call general learning outcomes. This category includes knowledge or conceptual change, analytical skills improvement, and appreciation of concepts. Bazelais & Doleck (2018) considered the level of conceptual change in mechanics courses (Quebec) and the BL group scored higher than face-to-face with equal gain between genders. In a study comparing BL versus face-to-face classes in US communications courses, Broechelman-Post & Pyle (2017) found that learning outcomes (communication and intercultural competence) were the same regardless of delivery although the Asian and African American students performed better in the hybrid (BL) mode. In this case, the authors proposed

that social expectations, constraints, and power relations impact the experiences of different ethnicities. The authors suggest that a hybrid (BL) course might be "*more comfortable for students coming from a collectivist culture (Hofstede & Hofstede, 2013) or for students whose interactions with faculty or other students might be impacted by experiences with racial profiling (Iverson & Jaggers, 2015).*"

Academic Performance
Academic performance is a measure of acquisition of knowledge and mastery of material content typically measured by overall grade, testing, and exam scores. In studies comparing overall academic performance in BL versus face-to-face environments, BL outperformed in: Education courses - China (Wei, 2017), ESL courses - China (Zhang et al., 2018), mechanics courses - Quebec (Bazelais & Doleck, 2018), and Islamic Culture courses - Saudi Arabia (Al-Qahtani et al., 2013). Deschacht & Goemen (2015) compared a large sample of business school students in BL versus face-to-face environments in Belgium and found that while more students dropped out of the BL courses, test scores improved for a net gain overall for BL. In a study of multiple course types and modes, Dziuban et al. (2018) found that BL improved course success rates and reduced course withdrawal over face-to-face and OL. Comparing all modes in US biology courses, Gavassa et al. (2019) found that BL outperformed other modes regardless of gender but there were performance differences where Black and Hispanic students performed best with BL while White students performed best with OL. In this school, the majority of the student population was Hispanic (61% of total). The authors propose several explanations 1) the hybrid format gave more flexibility to the students and reduced conflicts between school schedules and other personal responsibilities, 2) the OL format may have favored White students as it had more team discussions, and 3) physical contact with the instructor and other students had a higher impact for Black and Hispanic students than for White students (Peters, 2005). From their discussion: "*Interaction with other students, such as discussing the course content, has been shown to increase the sense of belonging and improve performance of students from Hispanic backgrounds compared with students from Caucasian backgrounds (Hurtado and Carter, 1997; Savani et al., 2013).*"

General Satisfaction Attributes
Several authors have considered more general satisfaction and emotional measures when comparing BL to other modes. In a study of health courses, Melton et al. (2009) measured student satisfaction on several aspects of learning such as: engagement, fun, boredom, comfort voicing opinion, learning from peers, approaching instructor, would recommend to a friend, etc. The authors found both higher grades and higher satisfaction for the BL group with no difference in satisfaction between genders. Broechelman-Post & Pyle (2017) compared measures of sense of community or belonging. Here, they considered scale items such as: feeling that members have of belonging, feeling that members matter to one another and to the group, sense of isolation (reverse coded), and shared faith that members' needs will be met through their commitment to be together. They also consider measures of both public speaking anxiety and connectedness, and find no difference between BL and face-to-face modes on either concept. Rovai & Jordan (2004) considered connectedness in Education graduate classes in the US and found higher scores for BL over both face-to-face and online.

Conclusion of BL versus Face-to-face and OL

Overall, the vast majority of the comparison studies have shown positive impacts of BL on multiple types of student outcomes in comparison to other modes. BL improves student learning and success, increases retention, increases student satisfaction and connectedness. But, there are caveats when comparing BL with other learning modes. Blending approaches vary widely and include different methods and amounts of these methods in a blend (i.e., discussion posts, learning platforms, assessments, interactive presentations, videos, podcasts, electronic portfolios, asynchronous and synchronous activities, etc.). With the face-to-face part of the blend, there are also different pedagogical approaches like traditional lectures, flipped classroom, discussions, role playing, and more. It would be impossible to find equivalent courses and each discipline has its own unique aspects such as lab work in biology versus discussions in many humanities. This incomparability confounds the results described above.

3.   **Blended Learning, Inclusion & Diversity: Literature on Different Types of Student**

Understanding the characteristics of the group of students in any course is an important element of effective course design. Blended learning techniques offer one avenue for enhancing the learning experience of all students and widening accessibility. In this section we will consider the effect of cultural and psychological factors and how blended learning approaches can support learning in the international classroom, as well as students who are not learning in their first language, and students with disabilities.

In an international classroom and/or through international collaborations, working with peers from different countries and cultures has a positive impact on students' learning experience (Knoblauch, Keßler & Jakobi, 2020). However, this often means that some or all students will not be working in their native language, and synchronous sessions in a second language can be the cause of increased student stress (Magnier-Watanabe, Benton, Herrig & Aba, 2011). To counterbalance this potential stress, research has indicated that international collaboration and learning in a second language works well in blended learning environments when students are offered the independence that online course elements can facilitate, such as autonomy in class preparation, in combination with the opportunity to share perspectives and develop knowledge in an intercultural context (Knoblauch, Keßler, & Jakobi, 2020).

In addition, the outcomes of the BL system experienced by students are shaped by cultural factors. There is evidence that Hofstede's cultural indices, high power distance, short-term orientation, and high uncertainty avoidance can predict challenges in adopting the BL system and a preference for traditional classrooms (Tempelaar, et al., 2013; Alsaif, 2021), with the results on collectivistic orientation and masculine gender roles being mixed. The role of these cultural factors imply an advantage to the independent, active and self-directed learner in the BL environment. To remove cultural barriers, it has been suggested that in conceptually rich domains (e.g., statistics or mathematics) BL environments should integrate components that differ strongly in their requirements with regard to self-regulation skills. This   allows support for

all students (not just those with already strong self-regulation skills) transitioning to university (Tempelaar et al., 2013). It has to be noted that the effect of the schooling system can interfere with the effect of culture. Awareness of the students' level of self-regulation skills stemming from the schooling system and the presence of various cultural orientations in the classroom form important input for designing BL environments.

For students with disabilities, BL has the potential for both beneficial and negative effects, underlining the importance of intentional accessible design, sufficient teacher training, and wider institutional support (Ashraf, Tsegay & Meijia, 2021; Villalon, 2017). Challenges may be amplified by subject-specific elements, for example the prevalence of field work and symbolic notation in STEM fields (Pearson, Lister, McPherson, Gallen, Davies, Colwell, & Collins, 2019). The flipped classroom approach, in which content like lectures might be recorded and shared as preparatory material to create more time for discussion in the classroom, might also create greater challenges for students with audio or visual impairment when learning independently. However, if assistive features are included in these online learning moments, such as subtitles and other accessibility options on videos, all students can benefit from some of the commonly cited advantages of online course elements: revisiting materials frequently, moving at their own learning pace, accessing materials in diverse locations and through specialized adaptive software, etc. (Andujar & Nadif, 2020).

Another important aspect of effective course design implies taking learner-specific and psychological variables into account. BL techniques have the potential for accommodating the variation in learner profiles and stepping away from a "one-size-fits-all" approach. We will review evidence on how psychological variables relate to perception and effectiveness of BL approaches with implications for inclusion and diversity in mind.

From the perspective of the learners' readiness to successfully navigate BL environments self-regulation plays an important role (Tempelaar, et al., 2013). Possibly due to their stronger self-regulation, graduate students have been shown to benefit more from online and blended instructions compared to undergraduates (Yu, 2021). Self-efficacy in computer skills (for female students only) positively contributed to students' satisfaction toward the BL environment (Dang, et al., 2016).

Design of blended approaches can be optimized by taking into account differences in learner personalities, and implementing flexibility to adjust to such differences. Doing so can further support diverse student groups (Yu, 2021). Exploring the role of personality, conceptualized as the Big five personality traits, indicated that agreeableness, conscientiousness and openness to experience positively contribute to learning outcomes in BL. Introversion seems to contribute positively to learning outcomes, and to a preference for asynchronous online elements (Yu, 2021; Bhagat, Wu, & Chang, 2019). With a broader range of modalities and tools available in BL, teachers can cater for learners with different personalities.

The role of emotional factors is often overlooked yet important in understanding user acceptance of blended models and use of technology in learning. For example, perceived

playfulness has a direct influence on positive attitudes in females, whereas in males the relationship is mediated by perceived usefulness (Padilla-Meléndez, del Aguila-Obra, & Garrido-Moreno, 2013).

Intentionally adapting courses for diverse student groups often involves lowering barriers to engagement, something for which BL techniques are especially well suited. Indeed, research has compellingly suggested that increased regularity of student engagement with blended course materials has been positively correlated with student achievement (Hayward, Mousavi, Carbonaro, Montgomery, & Dunn, 2020). Identifying and understanding learner personalities and preferences, while maintaining a degree of flexibility to meet these needs, can further support successful blended approaches that also benefit diverse student groups (Tempelaar, Rienties, Giesbers, & van der Loeff, 2013; Yu, 2021). In summary, the above research demonstrates that BL and inclusion can be highly complementary, because increasing accessibility and lowering barriers to engagement with course materials ultimately benefits all students.

4. BLENDED LEARNING AND UNIVERSAL DESIGN

The challenges of pivoting to online and hybrid models of education, such as BL, during the Covid pandemic have also revealed multiple opportunities for higher education. However, much of the immediate information for instructors was focused on digital tools rather than digital instructional approaches (Rao et al, 2021). It is, of course, desirable to consider best practice when applying new approaches on a broad scale, in order to consider unintentional barriers to accessibility, inclusion and active learning. Our students range across many dimensions, including ability, language skill, cultural, socio and economic backgrounds. It is imperative that educational approaches do not serve to widen the gap between those students who can achieve in a BL environment and those who will struggle. Presupposing that active learning strategies are always immediately accessible is one such pitfall (Fovet, 2021). A robust, evidence-based model of education design that can be applied in a BL context is critical. Such a model is Universal Design for Learning (UDL), which can be used to ensure equal learning opportunities for all people (Al-Azawei et al, 2016).

UDL, an approach developed at the Center for Applied Special Technology (CAST, 2018), aims to address inflexibility in the learning environment that can present challenges for individual learners. Essentially, this means reducing barriers at the curriculum design stage, rather than the reactive approach of addressing individual learners' needs after they begin the course. In this way, UDL is distinct from differentiated instruction (Hayward et al, 2020). UDL takes the starting point that a curriculum and subsequent learning environment can present unintentional barriers to learning, which are an inherent feature of the curriculum design rather than of the individual student (CAST, 2018). The UDL approach introduces multiple means of accessing the curriculum content through representation (the "what"); action and expression (the "how"); and engagement (the "why") (CAST, 2018). These modes aim to address the difficulties of a "one size fits all" approach to curriculum design.

Through consideration at the design stage, instructors already begin to design for learner motivation, engagement, and success. Multiple means of action and expression may take the form of a choice in the mode of assessment, which can lead to learners' perceptions of deepening the skills that matter most individually (Mangiatordi, 2018). Indeed, learners' perceptions across the study experience appear to be improved by the UDL approach, reporting high levels of satisfaction, attitude, and engagement (Al-Azawei et al, 2016) as well as self-efficacy (Mangiatordi, 2018). These factors can translate into higher rates of academic success and course achievement (Hayward et al, 2020). Notably, this may be especially true for lower performing students, whereby the UDL approach offers co-regulation and structural support towards accessing course content (Hayward et al, 2020). Application of UDL has already been shown to be significant in designing effective BL courses (Al-Azawei et al, 2017).

When considering the application of UDL in a BL environment in order to lower cross-cultural and linguistic barriers in particular, it is important to note the limitations of current research, which is heavily focused on North America (Al-Azawei et al, 2016). In addition, time is needed before the effects of the Covid era on education design in BL can be fully perceived. Finally, it should be noted that there is some indication that UDL can result in a significant time investment for instructors, both in initial training and subsequent course design and implementation (Al-Azawei, 2016). Nevertheless, UDL represents a powerful tool for faculty (Fovet, 2021).

5. CONCLUSIONS AND RECOMMENDATIONS

While the literature review revealed a fair amount of empirical research on blended learning relative to the other modes of delivery, there are several issues that are of concern. First, there is too much variability in blended learning delivery particularly in the earlier research so comparing delivery methods is very difficult. Future research should consider the quality and quantity of methodologies used in the blended learning design relative to the face to face or online delivery. Second, the research addressing diversity issues and UDL is generally prescriptive with very little grounding in empirical studies comparing courses that are designed in different ways for different audiences. There is a need for significantly more research to examine the effectiveness of approaches for specific audiences as well as the general audience. Third, the overall quality of the research is not clear. *Many of the papers are in inferior journals and the methodologies do not seem particularly rigorous*. Clearly education research of implications of blended learning for specific learner groups is needed. As the university sets strategic goals related to blended learning and diversity and inclusion, clearly there must be more attention paid to research on the effectiveness of different modes to insure the intended outcomes are met.

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