Do instructor beliefs and attitudes matter? Understanding associations between beliefs, attitudes and practices

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A mixed-method approach was used to examine the relationship between university instructors' practices in blended courses and their epistemological and pedagogical beliefs, and their attitudes towards technology. The study drew from a socio-constructive perspective and applied Fishbein and Ajzen's belief and attitude theory to a conceptual framework. Data were collected using an online survey of 71 instructors, semi-structured individual interviews with 24 instructors and one to four classroom observations of 15 instructors. The interviews were audio-recorded, and the classroom observations were collected via hand-written notes. Data were analysed via NVivo 12 and SPSS. Findings highlight strong associations between instructors' beliefs around knowledge, hard work and student self-regulation skills, and to instructional strategies and involvement of students. The study also reviewed instructors' use of different technologies in blended courses; the findings show a significant relationship between their comfort with technology, attitudes and practices around experiential learning. This study, thus, offers guidance to academic leaders, instructors, developers and policymakers and has several implications for research and instructor development workshops.

Implications for practice or policy:

- Instructors can offer individualised support to low-achieving students on online and in-person platforms to help develop their self-regulation skills and improve their grades.
- Instructional designers can offer a safe space for instructors to reflect on their beliefs and practices.
- Instructional designers can offer a collaborative space to instructors to try technologies and understand how they are using technologies.
- Instructors can purposefully integrate hands-on activities, offer experiential learning and involve students in designing courses.

Keywords: epistemological and pedagogical beliefs, technology attitude, instructor practices, blended and online courses, mixed-methods design

Introduction

Blended learning, a combination of in-person and online modalities, has become the "new normal" of higher education in the post-COVID era (Chen et al., 2018; Halverson et al., 2017; Norberg et al., 2011, p. 207; Vo et al., 2017). Blended courses have benefited students, instructors and universities (Owston et al., 2013; Park et al., 2016), and research in this field has focused predominantly on the design and delivery of blended courses.

As higher education institutions continue to increase their blended course offerings, they focus on ways to better teaching and learning and integrating technologies within (Malhotra, 2021; Vo et al., 2017; Wong et al., 2014). Researchers exploring this area have mainly focused on capturing student perspectives such as their engagement, motivation, satisfaction, learning and grades, but have not focused much on understanding instructor-related aspects including their beliefs and attitudes and how they may affect their practices (Arbaugh, 2014; Asarta & Schmidt, 2017; Lee & Bonk, 2016; Owens, 2012; Page et al., 2017; Spanjers, et al., 2015). Although, many K-12 studies have focused on teachers' beliefs, technology integration and practices, (Abukari, 2014; Ertmer & Ottenbreit-Leftwich, 2010; Haggins & Moseley, 2011;

Kim et al., 2013; Lee et al., 2013; Malhotra, 2014; Pajaris, 1992; Schommer, 1998; Tondeur, 2020), only limited research has focused on instructors' beliefs, teaching and technology practices and attitudes around technology in higher education (Brown, 2016; Moskal et al., 2013; Napier et al., 2016; Owens, 2012; Scott, 2014; Siciliano, 2016).

This study examined instructors' beliefs, their attitudes towards technology, as well as their practices in blended courses. It focused on two main beliefs – epistemological and pedagogical – to answer the following research questions:

(1) How are instructors' epistemological and pedagogical beliefs related to their practices in blended courses?
(2) How are instructors' attitudes towards technology related to their blended practices?

Understanding these relationships is important for institutions to direct their investments in technologies, online and blended learning, and their efforts in professional development. This study may benefit teaching and learning centers to help instructors design their blended courses.

Literature review

Instructors' epistemological beliefs

Beliefs about the nature of knowledge, knowing and learning are known as epistemological beliefs (EB) (Schommer, 1998). EB, our core beliefs, comprise four dimensions: beliefs about innate ability, beliefs about the certainty of knowledge, beliefs about simple knowledge and beliefs about quick learning (Schommer, 1994).

According to Hofer (2001), EB influence how teachers teach and how students learn. Researchers have focused on educators; EB and practices, and student EB and learning (Lee et al., 2013; Mataka et al., 2019). When instructors believe in knowledge from authorities, they are likely to focus on complex knowledge transmission in their practices. On the contrary, if instructors believe that knowledge is negotiable, they will likely make knowledge simple and understandable (Mataka et al., 2019). Interestingly, traditional EB can transform into complex EB through training and by showing instructors new learning (Chai, 2010; Prestige, 2012; Soulios & Psillos, 2016).

Instructors' pedagogical beliefs

Educators' beliefs about teaching and learning, that is, pedagogical beliefs (PB) determine their classroom behaviour and practices (Bandura, 1977). Instructors hold two main PB: teacher-directed or student-centred (Freire, 2014). Teacher-directed beliefs focus on traditional teaching methods where they give knowledge to students who reproduce then this knowledge (Liu, 2011). Instructors with this conception of teaching believe in transmitting knowledge to passive students and are more likely to offer non-interactive, lengthier lectures (Owens, 2012). Alternatively, instructors with student-centred beliefs shift their role to being a facilitator and emphasise on using strategies that actively engage learners with instructors and peers, leading to better grades (Comer & Lenaghan, 2012; Owens, 2012). Most researchers believe in this dichotomy of PB; however, a few believe that PB fall on a range of five dimensions (power balance, course content function, teacher and student ratios, the responsibility of learning, and assessment purposes and processes) or on a range of multiple beliefs in between (Wright, 2011)

Studies have confirmed that PB affect instructor practices; thus, to study any changes in their practices, it is essential to understand and influence their PB (Lee et al., 2013) and focus on professional development. However, holding a belief does not always mean one is practising it, which further emphasises the need for continuous training and reflection (instead of one-time workshops) (Brinkley-Etzkorn, 2018; Ertmer & Ottenbreit-Leftwich, 2010).

Instructors’ attitudes towards technology

Instructor preferences and attitudes and comfort with technology is visible in how they access, experiment and engage with technologies in their courses, develop their techno-literacy skills and use technologies to instruct, collaborate and reflect (Levin & Wadmany, 2008; Scott, 2014; Ure & Raban, 2001). These preferences and attitudes also carry forward in their blended instructional practices (Brown, 2016). Thus, instructors averse to technology may not be comfortable with technology or be less motivated to adopt new applications (Georgina & Hosford, 2009). Although technology is inevitable in the post-COVID era, instructors vary quite a bit in how they use and integrate technologies in the design, instruction and assessment pieces of their online and blended courses (Sahin et al., 2021).

Relationship between beliefs, attitudes and practices

There are several views on how core EB influence peripheral beliefs and practices (Chan, 2004; Ekinci, 2017). Some argue that EB affect educators’ ontological view (what knowledge they should offer and how and if students are capable of learning) to influence students’ EB and learning (Hofer, 2001); others argue that educators’ EB influence their related beliefs (PB) and their practices (Lee et al., 2013).

EB, being core beliefs, are difficult to change, while PB are considered workable (Hofer, 2001). Even within PB, instructors with student-centred beliefs are more open to change and willing to experiment with their pedagogies and technologies and are more likely to successfully implement their blended courses (Bruggeman et al., 2021).

Theoretical framework

The conceptual framework for this study was drawn from a socio-constructive perspective and Fishbein and Ajzen’s (1975) belief and attitude theory.

Socio-constructive perspective

Vygotsky (1930/1978) argued that students interact with their environments (technology, peers and instructors), and cognition (knowledge and belief) to mediate learning and development. Thus, instructor differences in the use and integration of technology offer different environments to students to further influence their learning.

Fishbein and Ajzen’s belief and attitude theory

Cognition (one’s knowledge, opinion, belief and thoughts about an object), along with affect (one’s feelings and attitude towards the object), directs connotation, determining a person’s intentions and actions (Fishbein & Ajzen, 1975, p. 12). An instructor could hold a strong belief about the effectiveness of blended learning yet have a favourable or unfavourable attitude towards online teaching with technology, and this could influence their blended practices. This theory highlights the need to measure both (belief and attitude) in relation to practice instead of just one.

Conceptual framework

We used the following conceptual framework (Figure I) to explore educators’ beliefs (EB and PB), attitudes towards technology and practices in blended courses and explore their relationships. The framework is drawn from Hofer’s (2001) working model and tests Lee et al.’s (2013) model for higher education blended classrooms.

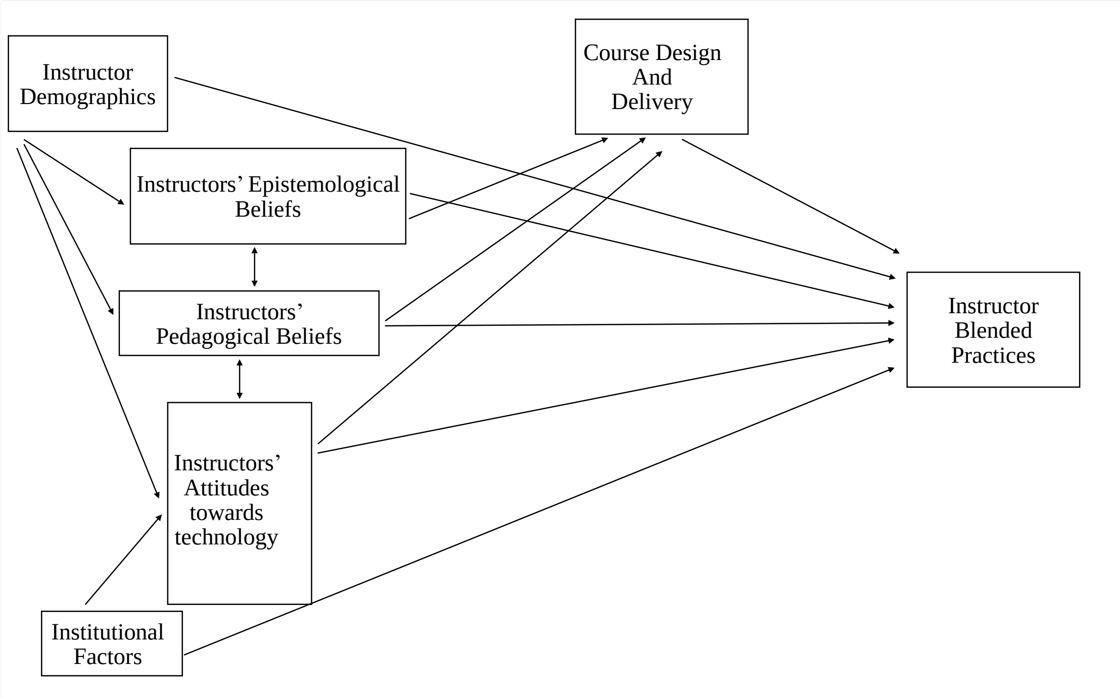

Figure 1. Conceptual framework

Method

Context and participants

The participating university is in South-Western Canada comprising 42,000 full-time and part-time students across science, technology, engineering and mathematics (STEM) programmes (e.g., engineering, mathematics, sciences), and non-STEM programmes (e.g., fine arts, languages, social studies). Approximately 22% of their undergraduate and 40% of their graduate students are international, comprising diverse cultures, abilities and interests. Instructors across faculties and departments of this university were the potential participants.

Instruments

This mixed-method study comprised instructor data: 71 online surveys, 24 semi-structured interviews with instructors and 15 classroom observations. Below are the details of the instruments used.

The online Qualtrics survey consisted of multiple-choice 5-point Likert scale and open-ended questions. The questionnaire was drawn from the validated surveys of Lee et al. (2013) and Admiraal et al. (2017).

Exploratory factor analyses of scales measuring beliefs, attitudes and practices helped form revised scales for the final survey. The final survey consisted of four final scales of the Epistemological Beliefs Questionnaire (Table 1); four scales of the Pedagogical Beliefs Questionnaire (Table 2); two scales of Attitudes towards Technology Questionnaire (Table 3) and five scales of the Instructional Practices Questionnaire (Table 4).

The reliability of each of the scales related to EB, PB, attitudes and practices was above .5, which is acceptable in the field of education (Lee et al., 2017) (see Tables 2, 3, 4 and 5).

Table 1
Factor loadings and reliability coefficients for Epistemological Beliefs Questionnaire items

Epistemological Beliefs Questionnaire (8 items)		**Factor loading**
	Innate or Fixed Ability (3 items) (Cronbach's alpha = 0.72) (N = 70)	
1	Some people are born good learners, others are just stuck with limited abilities	.874
2	Some children are born incapable of learning well in certain subjects	.804
3	The really smart students do not have to work hard to do well in school	.742
4	There is not much you can do to make yourself smarter as your ability is fixed at birth	
	Learning Process or Effort (1 item)	
1	If one tries hard enough, then one will understand the course material	---
	Doubt Expert Knowledge (2 items) (Cronbach's alpha = 0.72)	
1	I often wonder how much experts really know	.87
2	Sometimes I do not believe the facts in textbooks written by authorities	.87
	Certainty of Knowledge (2 items) (Cronbach's alpha = .569)	
1	If scientists try hard enough, they can find the truth to almost anything	.836
2	Anyone can figure out difficult concepts if one works hard enough	.836

Table 2
Factor loadings and reliability coefficients for Pedagogical Beliefs Questionnaire items

Pedagogical Beliefs Questionnaire (16 items)		Factor loading
	Teaching Scale (5 items) (Cronbach's alpha = 0.624)	
1	Students learn more when instructor checks whether they understand the subject matter sufficiently	.422
2	It is important for me as an instructor to pay a lot of attention to correcting students	.665
3	It is important for me as an instructor to determine the sequence of learning subject matter	.817
4	It is important for me as an instructor to check whether students make sufficient progress during working on tasks	.631
5	Students learn more when they receive detailed feedback how to improve their assignments	.596
	Learning Scale (3 items) (Cronbach's alpha = 0.726)	
1	Students learn more when an instructor instructs them exactly what they have to do	.761
2	It is important for me as an instructor to ensure that students know exactly how they should approach a particular task	.858
3	It is important for me as an instructor to tell students what they are able to do	.793
	Self-directed Learning Scale (3 items) (Cronbach's alpha = .537)	
1	Students learn more when they search for solutions themselves	.605
2	Students learn more when they plan their learning activities themselves	.822
3	It is important that students organise their own work as much as possible.	.727
	Self-regulated Learning Scale (5 items) (Cronbach's alpha = .679)	
1	It is important that students themselves indicate which parts of the subject matter they do not understand	.401
2	Students learn more when they reflect on their performance	.845
3	Students learn more when they have to check the planning of their own learning process themselves	.679
4	It is important that students think about the way they approach a particular task successfully	.530
5	Students learn more when they reflect on their way of learning	.858

Table 3
Factor loadings and reliability coefficients for Attitudes towards Technology Questionnaire items

	Attitudes Towards Technology Questionnaire (13 items)	Factor loading
	Attitudes towards Use of Technology (6 items) (Cronbach's alpha = 0.858)	
1	The use of technology improves my teaching	.831
2	Because of the use of technology my teaching becomes more efficient	.748
3	The use of technology makes my work more satisfying	.851
4	I like to use technology in my teaching	.901
5	Students are more motivated for my teaching when I use technology	.699
6	I feel challenged to teach with technology in an effective way	.557
	Knowledge of and Comfort with Technology (7 items) (Cronbach's alpha = 0.891)	
1	I am able to use technology in class in an effective way	.788
2	I can teach with technology without the help of others	.778
3	I have difficulties with helping students if they have technology-related questions	.707
4	I learn to use technology in teaching quite fast	.796
5	Teaching with technology comes easily	.801
6	I doubt whether I have enough skills to use technology in my teaching	.743
7	I am able to handle technology in class	.861

Table 4
Factor loading and reliability coefficients for Instructional Practices Questionnaire items

	Instructional Practices Questionnaire (11 items)	Factor loading
	Active Learning (1 item)	
1	Students learn best when they are actively involved in exploring ideas, inventing, and trying out their own approaches to problem-solving	----
	Experiential Learning (3 items) (Cronbach's alpha = 0.593)	
1	If students can't apply what they learn to the real world, they don't really understand it	.717
2	In order to learn complex material, students need information presented to them in several different ways	.650
3	It is important that students study real life problems that they are likely to encounter outside of the classroom	.856
	Student Involvement (2 items) (Cronbach's alpha = 0.527)	
1	I regularly incorporate students interests into lessons	.824
2	Students should help establish criteria on which their work will be assessed	.824
	Focused Instruction (3 items) (Cronbach's alpha = 0.53)	
1	I am able to monitor the progress of all my students to my satisfaction	.705
2	I maintain a rapid pace of instruction in my classes	.771
3	Disruptions of instructional time are minimised	.676
	Flexible Grouping Practices – Collaboration (2 items) (Cronbach's alpha = 0.503)	
1	I frequently group students according to different level of academic ability	.818
2	Student groupings in my class depend on student need	.818

The interview questions were drawn from a validated questionnaire by Topcu (2013) to capture instructors' EB missed in the survey, and included questions on course design, delivery and instructor use of technology to capture all practices.

Hand-written notes helped document observations, and a matrix captured specific observations about instructor practices including instructor talk-time and activity details. One to four lectures or tutorials were observed for each instructor, keeping in mind that we did not conduct any observations in the first few days and within or before the exam periods.

The three modes (survey, interview and observations) helped triangulate the data. Five-point Likert scale questions of the survey contributed to the quantitative data. Open-ended survey questions, interviews and observations contributed to the qualitative data.

Procedure

The data were collected after ethics approval from the host university and our university. Department liaisons of the teaching and learning centre emailed the survey link to all instructors. Survey participants were requested to voluntarily participate in interviews and observations.

The instructors signed their consent letters (including project details, anonymisation and safety of the data and options to withdraw before publication) before participation. I read the information letter to the students before the first observation, and the instructor posted it on the learning management system.

Overall, 71 instructors completed the online Qualtrics survey, 24 instructors participated in audio-recorded semi-structured individual interviews and 13 instructors permitted classroom observations. I observed one to four non-participant classrooms via hand-written notes.

SPSS version 26 helped analyse quantitative data from the surveys, and NVivo 12 helped analyse the qualitative data from surveys and interviews. Relationships between instructors' EB and PB, attitudes and practices were drawn from bivariate correlation and relationships matrices. Stepwise hierarchical regression helped test any causation of instructor beliefs (EB, PB) and attitudes towards the use of technology on instructor practices.

Findings

Demographics

This study consisted of 35.21% female and 45.07% male participants, with 56.34% instructors between the ages of 35 and 45 and 25.35% over 45. Although 28.17% of instructors were tenured, 19.72% were on a tenure track and 30.99% of instructors were adjuncts or on contract.

Table 5
Demographics of participants: Instructor variables

		Total sample	**% of total sample**	**Interviewees**		**Instructor lectures observed**	
		Frequency		Frequency	%	Frequency	%
Overall instructors		71		24	33.80%	13	16.9%
Gender	Male	32	45.07%				
	Female	25	35.21%				
	Missing	14					
Age	35 to 45	40	56.34%				
	Above 45	18	25.35%				
	Missing	13					

A total of 49 instructors (70%) had taught blended courses for more than 2 years and only 5 instructors (7%) were teaching in blended mode for the first time. A total of 48 instructors (67.8%) taught undergraduate courses, and only 7 instructors (17.07%) taught graduate courses. A total of 35.2% instructors offered their courses in small class sizes, 21.13% taught in medium class sizes and 19.72% taught in small class sizes.

Figure 2. Class sizes of participating instructors
Note. X-axis: Class sizes (small = 0–49 students; medium = 50–99 students; large = more than 100 students). Y-axis: Number of instructors.

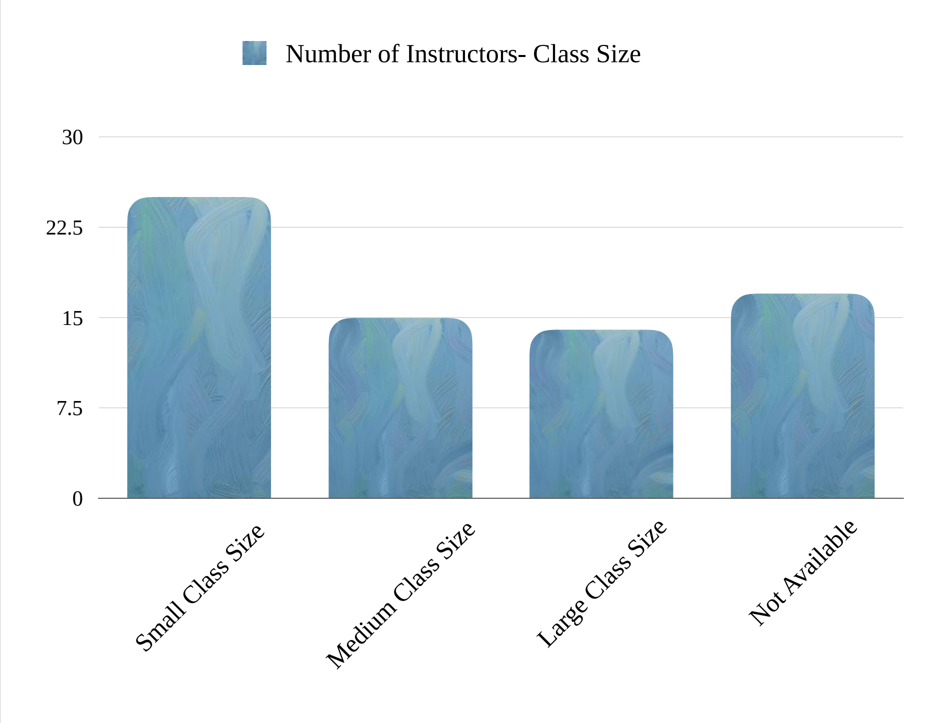

Figure 2. Class sizes of participating instructors
Note. X-axis: Class sizes (small = 0–49 students; medium = 50–99 students; large = more than 100 students). Y-axis: Number of instructors.

EB

The four scales of the Epistemological Belief Questionnaire survey helped measure instructors' EB, that is, their beliefs around knowledge and knowing. Quantitative data offered insights on instructor beliefs on knowledge and qualitative data highlighted its granular nature.

Instructors showed varied beliefs about student learning capabilities: 70% did not believe, but 30% believed in the limited learning abilities and capabilities of their students (Mean = 2.25; SD = .71) (see Tables 6 and 7). The majority believed that students learn when they work hard, but 30% did not believe that all students could learn with hard work, highlighting their lack of belief in student learning abilities (Mean = 2.88, SD = .98) (62% to 82%) (see Table 6).

Similarly, instructors held different beliefs about certainty of knowledge: some felt that knowledge was certain and had a clear meaning (Mean = 2.76, SD = .84) and students could reach that knowledge with hard work (Mean = 2.88, SD = .98) (Table 6); others believed students could reach that knowledge through different paths, and the rest believed in multiple meanings of knowledge based on student interpretations (see contradictory quotes below).

> We have one definition of … that we've used since in about 1860. We all agree to that definition … it's very hard for students to parse that definition. (View 1)

> So, there is some theoretical background that we base on, and that is regular to define and has a clear answer to it, but then the design space is flexible that they can be multiple designs that can reach the same solution. So, the solution we know it, it's correct, but reaching it can take multiple paths. (view 2)

> No. I'd say definitely most of the principles are pretty unclear. … there's a lot of what the process of the course is navigating uncertainty and ambiguity. (View 3)

Instructors had diverse beliefs on knowledge ownership: Some believed in the black-and-white nature of knowledge, trusting traditional sources such as experts, scientists and books; others doubted expert knowledge and welcomed non-traditional sources such as media, texts and students to disrupt knowledge and question its nature.

> Part of my approach as a scholar is the trouble concepts and open them to different interpretations, different ways of knowing, different knowledges. (View 1)

> It's pretty black and white ... this will be mainly content driven … mainly to make sure students know their terms, … whether you're reading or speaking to someone else, you need to be able to understand that what they are talking about might be the same thing that will be learned here today. (View 2)

PB

The four scales of the Pedagogical Beliefs Questionnaire helped capture instructors' PB, that is, their beliefs around teaching and learning.

Most instructors (*n* = 33) had positive blended teaching and learning beliefs, while others (*n* = 10) were not comfortable. Instructors' beliefs around blended teaching varied quite a bit: More than three quarters believed in ensuring students understood the content (*n* = 56) and the importance of offering feedback (*n* = 59), more than half believed in sequentially laying the content (*n* = 43), and one third believed in correcting their students' mistakes (*n* = 25). Similarly, instructors also held varied beliefs around student self-direction and self-regulation learning (SRL) skills: three quarters believed that students could learn independently and direct their learning (n=54), and that students could regulate their planning and learning process (*n* = 51). Most instructors believed that students could plan, reflect and check their learning, that is, instructors believed in the SRL skills of their students.

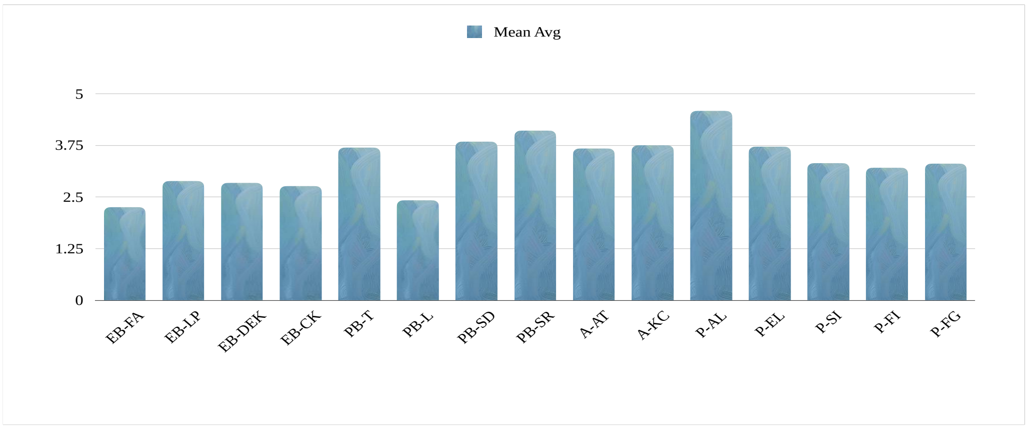

Figure 3. Visual representation of means of all scales measuring instructors' EB and PB, attitudes and practice

Note. X-axis: Instructors' EB and PB, attitudes towards technology and practices (see details below). Y-axis: Number of instructors.

EB-FA: EB on fixed learning ability of students; EB-LP: EB on hard work of students; EB-DEK: EB about doubt in expert knowledge; EB-CK: EB on certainty of knowledge; PB-T: PB around teaching; PB-L: PB around student learning; PB-SD: PB around student self-direction skills; PB-SRL: PB around student SRL skills; A-AT: attitude towards use of technology; A-KC: knowledge of, and comfort with technology; P-AL: active learning practices; P-EL: experiential learning practices; P-SI: student involvement practices; P-FI: focused instructional practices; P-FG: flexible grouping practices.

Attitudes towards technology

Most instructors chose to teach in blended mode; most instructors (*n* = 33) held a positive attitude towards using technology in their courses and enjoyed its benefits, while a few (*n* = 10) experienced challenges such as time constraints and student resistance.

Instructors used different technologies in their teaching (e.g., podium computers, laptops, clickers, document cameras and tablets) for different purposes, such as presenting, projecting their work, testing student learning and problem-solving. Instructors utilised software such as Mobius, Top Hat, PowerPoint with recorded voiceovers, instructional videos, Adobe Connect, Piazza, PebblePad, social media platforms, Akindi, Crowdmark and the Peer Evaluationm Assessment and Review tool to offer content, communicate and engage their students and help with assessment. These technologies help meet various instructional objectives and enhance the teaching and learning experience for instructors and students.

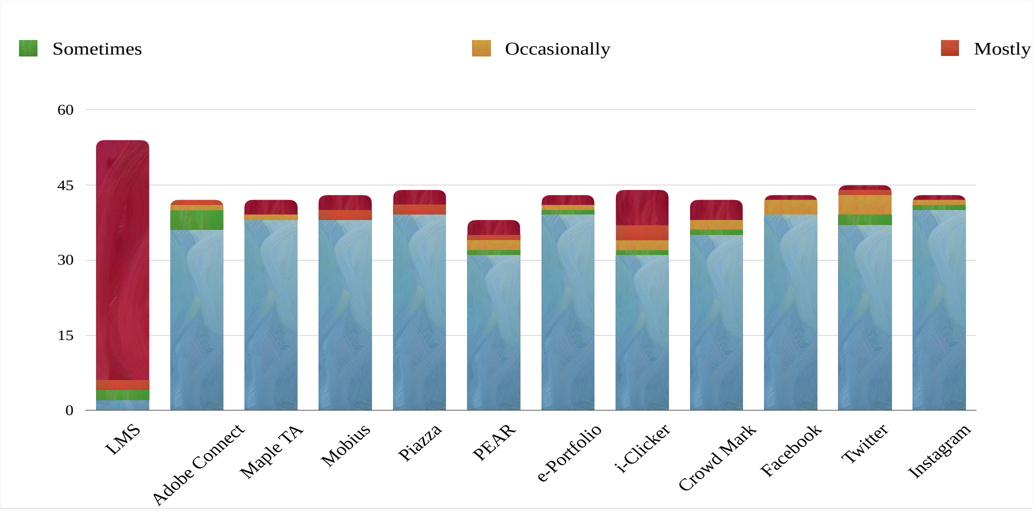

Figure 4. Instructor use of software in their blended courses
Note. X-axis: Different technologies used by instructors. Y-axis: Number of instructors.
Colour shares: frequency of use of technologies (red = mostly used; yellow: used occasionally; green: used sometimes).

Practices

Instructor practices were reflected in online and in-person content and activities, active learning and experiential learning strategies, student workload expectations, their instructional and grouping strategies, and how much (if any) they involved their students in design and setting of assessment criteria.

Of the 47 instructors who used the rotation model (student rotation model or flipped model) – that is, instructional time is rotated between lectures, labs and tutorials in online and in-person platforms – 22 used it in rotating the students from in-person to online platforms periodically and 25 used flipped model where they offered their content online and used their in-person time for problem-solving, active learning and solving questions.

Overall, student workload expectations varied quite a bit. Instructors expected their students to spend 3 to 15 hours per course weekly (online, in-person, labs and tutorials). Some instructors reduced in-person time in lieu of online components, while others did not.

Several instructors included hands-on and experiential components (guest lecturers, social media or field trips) to engage students and offer real-life experiences, but only a few involved students in designing their courses and none involved students in setting assessment criteria. Most instructors used student feedback from course evaluations and only one instructor utilised their last lecture for brainstorming and finalising topics for their future iterations.

Instructors followed different instructional strategies: some allowed considerable space for discussion and student talk, while others had minimal student talk-time and focused on delivering the content. Instructors generally grouped their students based on their perceptions of student needs and abilities.

Table 6
Descriptive for averages of all the scales (N = 70)

Constructs and scales	Mean	SD
Epistemological Beliefs		
Innate or Fixed Ability Scale (EB-FA) – 3 items (n = 70)	*2.25*	*.771*
Learning Process or Effort Scale (EB-LP) – 1 item (*n* = 69)	2.88	.98
Doubt Expert Knowledge Scale (EB-EK) – 2 items (*n* = 69)	2.84	1.02
Certainty of Knowledge Scale (EB-CK) –2 items (*n* = 70)	2.76	.84
Pedagogical Beliefs		
Teaching Beliefs (PB-T) – 4 items (*n* = 66)	3.69	.50
Learning Beliefs (PB-L) – 3 items (*n* = 68)	2.42	.82
Beliefs around Self-direction (PB-SD) – 3 items (*n* = 68)	3.84	.57
Beliefs around Self-regulation (PB-SRL) – 5 items (*n* = 66)	4.11	.47
Attitudes Towards Technology		
Attitudes towards Use of Technology (A-AT) – 6 items (*n* = 68)	3.67	.77
Knowledge Certainty around Technology (A-KC) – 7 items (*n* = 67)	3.75	.73
Instructional Practices		
Active Learning Scale (P-AL) – 1 item (*n* = 69)	4.58	.58
Experiential Learning (P-EL) – 3 items (*n* = 69)	3.72	.72
Student Involvement (P-SI) – 2 items (*n* = 68)	3.32	.67
Focussed Instruction (P-FI) – 3 items (*n* = 69)	3.21	.67
Flexible Grouping Practices (P-FG) – 2 items (*n* = 67)	3.31	.55

Relationship between instructor beliefs, attitudes and practices

Hierarchical regression of the survey data did not suggest any causation (after controlling for class size, blended model, instructor age, gender and years of teaching blended courses, instructors' EB and PB and attitudes towards technology did not cause their practices); however, bivariate correlation and instructor interviews uncovered several significant intertwined relationships (see Figure 5 and Table 7). (Due to space limitations, causality tables are not included. Readers interested in the tables may contact the authors.)

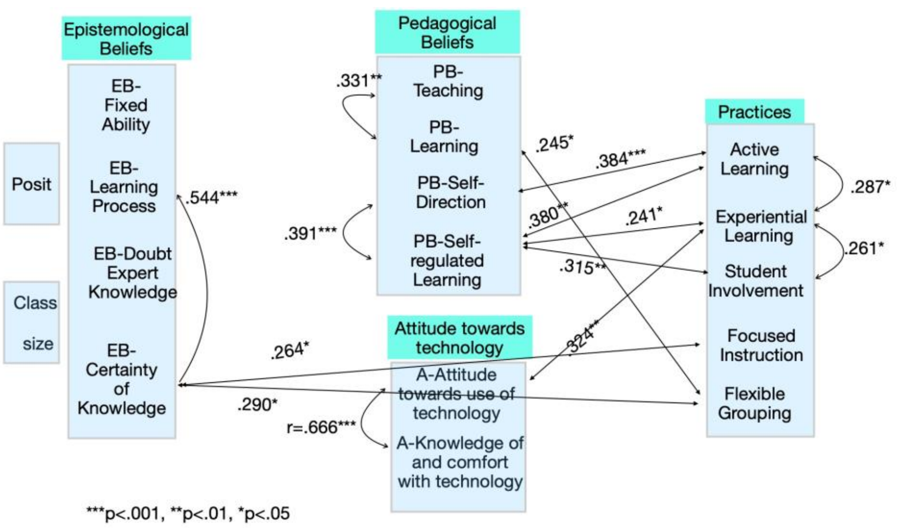

Figure 5. Bivariate correlation between instructor beliefs, attitudes towards technology and practices in blended courses

Table 7

Bivariate correlation between scales of EB, PB, attitudes and practices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Epistemological Beliefs															
(1) Fixed Ability	1.00														
(2) Learning Process	.027	1.00													
(3) Doubt Expert Knowledge	.150	-.045	1.00												
(4) Certain Knowledge	-.102	**.544*** (.000)**	-.074	1											
Pedagogical Beliefs															
(5) Teacher Belief	.065	.005	-.168	.078	1										
(6) Learning Belief	.101	-.124	-.125	.076	**.331** (.007)**	1									
(7) Self-Directed	-.130	-.169	.130	-.023	-.129	.016	1								
(8) Self-Regulatory	-.197	**-.241 (.054)**	.146	-.126	.077	.051	**.391*** (.001)**	1							
Attitudes towards use of Technology															
(9) Attitude towards Use of Technology	.186	.032	-.057	.207	-.070	-.004	.104	.173	1						
(10) Comfort with Technology	.047	.064	.039	.196	-.094	-.076	.171	.149	**.666*** (.000)**	1					
Instructional Practices															
(11) Active Learning	-.045	.000	-.104	-.004	.171	.111	**.384*** (.001)**	**.380** (.002)**	-.004	-.003	1				
(12) Experiential Learning	-.090	.164	.123	.215	.128	.075	.180	**.241* (.051)**	**.324** (.007)**	.155	**.287* (.017)**	1			
(13) Student Involvement	-.228 (.062)	-.023	-.096	.047	-.003	.179	.149	**.315** (.010)**	.097	-.010	.091	**.261* (.031)**	1		
(14) Focused Instruction	.158	.115	.168	**.264* (.029)**	-.100	.144	.223 (.068)	.073	.209	.162	.063	.126	.123	1	
(15) Flexible Grouping Practices	-.001	-.046	.105	**.290* (.017)**	-.119	**.245* (.048)**	.073	.090	.027	.057	.012	-.026	.051	.189	1

*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

For clarity, we will discuss only significant results below. The bivariate correlation suggested a strong relationship between instructor EB around certainty of knowledge (knowledge is certain, and students should reach that level of knowledge in their courses) and learning process or hard work (students can reach a certain knowledge with hard work) (r = .544, p = .000), and their focused instructional strategies (with minimum disruptions by student conversations) (r = .264, p = .029) and flexible grouping practices, where instructors prefer to group students based on their own notions of student needs and abilities (r = .290, p = .017). Overall, instructors who believed in reaching a certain knowledge focused on instructional strategies and activities to ensure students worked hard and reached that level of knowledge.

Instructor PB in student SRL skills were significantly correlated to their active learning (r = .380, p = .002), experiential learning (r = .241, p = .051) and student involvement practices (involving students in the design and assessment of their courses) (r = .315, p = .010). This suggests that when instructors believe students can plan their work, understand problem areas and reflect on their work, they offer hands-on student-led activities, include real-world scenarios and involve students in course design and setting assessment criteria (see Table 7 and Figure 5).

Discussion

Although studies have confirmed that teachers' EB and PB often influence their practices, only a few studies have explored EB and PB together, or their relationship to attitudes towards technology and practices, and none to our knowledge have explored these relationships in blended environments (Admiraal et al., 2017; Lee et al., 2013; Mataka et al., 2019). Below, we examine a few of these relationships.

Vygotsky's theory of learning and development suggests the importance of instructors, peers, and resources in student learning and of scaffolding in the learning process, highlighting how instructors can take students from one learning level to another (Vygotsky, 1994). If student learning is linked to resources and the effect of peers and teacher scaffolding, it becomes necessary to understand what instructors believe about knowledge and teaching and learning.

The findings in this study offer insights into participating instructors' beliefs on knowledge, teaching and learning. Our key findings are discussed below:

Instructors' beliefs about the nature of knowledge

The findings suggest that instructors' belief about the nature of knowledge determines their practices. Instructors who believe that knowledge is certain focus on undisrupted instructional practices and on ensuring students work hard to reach that level of knowledge. Alternatively, we can say that when instructors believe that with hard work, students can reach certain knowledge, they are likely to gear their instructional practices to delivering knowledge, that is, content and ensuring that students learn that knowledge and content and further group their students to reach that goal too. However, reaching a certain level of knowledge, focusing on content, more lecture time, and grouping students of similar academic levels may not imply that students can make meaning of their learning (Brownlee, 2004). Although universities, researchers and course designers advocate learner-centred practices in higher education, this study emphasises the need to understand instructors' beliefs about the nature of knowledge itself before expecting any shift in practices.

Instructors' beliefs about who holds knowledge

Instructors' beliefs on who holds knowledge trickle into their teaching practices, determining whose knowledge they bring into their classrooms, the resources they choose and how much they allow students to bring in other knowledge. Instructors in this study who valued expert knowledge focused on ensuring that students learned that "expert knowledge" and offered less space and time in their lectures to bring in student or outside voices. Other instructors believed in and allowed non-traditional sources of knowledge such as media, blogs, community members and students. Interestingly, this connection between traditional EB of teachers, especially on their beliefs on knowledge and teacher-centred practices, has been well-studied in K-12 but not so much in higher education (Soleimani, 2020).

Instructors' beliefs on student SRL skills

SRL skills are systematically developed thoughts, feelings and actions that help student learning and motivation (Schunk & Ertmer, 2000). Students' SRL skills are important determining factors of their success in blended courses, including their achievement and grades (Bernard et al., 2014; Owston et al., 2013). In fact, students with low SRL and low self-direction skills are more likely to struggle in blended courses (Owston et al., 2019), and thus, it is important that instructors offer an environment that can help students develop their SRL skills.

Findings here have also indicated a strong association of instructor beliefs about student SRL skills to their active learning, experiential learning and student involvement practices. If instructors believe in students' SRL skills, they are likely to offer hands-on, active learning practices and ways to connect their learning to the outside world by bringing experts or community members, organising field trips and involving students in the design of the course and setting assessment criteria. Literature also advises instructors to offer varied instructional strategies and experiences to meet the diverse needs of their students (Kolb & Kolb, 2017).

It is necessary to discuss the implications when instructors do not believe in their students' SRL skills. Instructors with low SRL belief in their students are less likely to give them opportunities to develop their SRL skills; this belief may disadvantage low-achieving students who have low SRL skills who are further negatively affected by blended platforms. This lack of opportunity may lead to an increasing achievement gap between high- and low-achieving students.

Although findings do not offer a clear picture as why instructors' high SRL beliefs are correlated to their student involvement practices, it is worth acknowledging that this act of involving students in design and assessment may be related to instructors' willingness to relinquish their power to control.

Relationship between power and knowledge

The findings highlight a complex relationship between knowledge, belief and practice. Although the study explored instructors' beliefs around knowledge, knowing, teaching and learning, it failed to ask – in a classroom, is knowledge equal to power? If yes, who holds this power? In the theory of knowledge and power, Foucault (1980) stated, "Knowledge and power are integrated with one another, and there is no point in dreaming of a time when knowledge will cease to depend on power" (p. 52). Through understanding the intertwined inseparable nature of knowledge and power in higher education, this power can be seen in instructor practices, for example, in class-time, space and activities (Popkewitz & Brennan, 1997). The notion of who holds power in a postsecondary classroom is likely calculated based on our understanding of different factors such as who designs the course, what resources are chosen, who is allowed to bring knowledge into the classroom, who selects assessment strategies and who dictates how much time students can spend in class discussions or independent works. In this study, some instructors accepted different sources of knowledge while others limited it to traditional sources, that is, experts and books. Instructors mainly involved students in design of activities, limitedly in curriculum design and peer feedback and did not include students at all in designing and assessments. Allowing students to be involved in the design and assessment pieces can be linked to how comfortable instructors are in the release of some of their power; accordingly, this release of power is what eventually decides the role of students: are they active participants and creators or are they just passive receivers of knowledge (Hofer, 2001; Marshall, 1989)?

Limitations

Although the survey instrument was drawn from validated scales, it has only been tested at the K-12 level. This is the first time it instrument has been used in higher education; thus, it needs to be tested at a larger scale for validity and in several universities for generalisability. The study had a low Cronbach's alpha coefficient value measuring instructor practices; future studies could add more items in each of the 5 scales and increase the sample size.

It would be informative to redo this study on a larger scale, also, it would be important to offer a clear range of definitions of blended learning, so instructors don't self-eliminate themselves from the survey.

Conclusion

This study offers implications for theory, research, policy and practice. Findings highlight strong associations between instructors' beliefs about knowledge, its transmission to student learning and instructional strategies. Increasing use of technologies in teaching and diminishing demarcations between in-person and online courses, and in line with Fishbein and Ajzen's (1975) beliefs and attitude theory, it is important to understand these belief-practice relationships and instructors' attitudes and use of technologies in courses.

As one of the first published studies, this study introduces an instrument to measure instructors' beliefs and attitudes in blended higher education in North America and offers a potential to explore these relationships in other universities.

Drawing from educational theorists such as Piaget (1950), Vygotsky (1930/1978), Engeström (2005) and Freire (2014), this study reinstates the significance of dialogic reflection in shaping and reshaping habits and practices. It advocates for teaching and learning centres to critically reflect on instructors' beliefs and practices and improve course designs to better student learning. The paper emphasises the necessity of integrating design and delivery features to offering an environment conducive to building student SRL skills, suggesting a purposeful use of reverse design strategy combatting their lack of belief in student SRL skills.

Overall, we suggest several design and delivery strategies for instructors and designers designing blended courses:

- Offer a safe space for instructors to reflect on their beliefs and practices.
- Offer a collaborative space to instructors to try technologies and understand how they are using technologies.
- Design courses and activities to offer an environment to cultivate SRL skills in students taking blended courses.
- Purposefully integrate hands-on activities, offer experiential learning and involve students in designing courses.
- Offer individualised support to low-achieving students on online and in-person platforms to cultivate SRL skills.

Understanding the intricate relationship between knowledge, belief and attitude is a process, and instructors must align all of these to adopt a new practice or transform an existing one. An important determinant and likely a difficult one is an intentional relinquishing of one's power and willingness to let go without compromising the quality of the course or course outcomes. As we shift from traditional to learner-centred pedagogies in our classrooms, it would be more meaningful to purposefully invest in technologies and training. Future higher education studies should study larger sample size, conduct content analysis and delve into how instructors' beliefs may vary across disciplines.

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Author contributions

Author 1: Conceptualisation, Investigation, Data collection and analysis, Writing – original draft, Writing – review and editing; **Author 2**: Conceptualisation, Review Data collection processes, Review analysis, Writing – review and editing.

References

Abukari, A. (2014). Pedagogical beliefs in work-based learning: An analysis and implications of teachers' belief orientations. *Research in Post-Compulsory Education*, *19*(4), 481–497. https://doi.org/10.1080/13596748.2014.955644

Arbaugh, J. B. (2014). What might online delivery teach us about blended management education? Prior perspectives and future directions. *Journal of Management Education, 38*(6), 784–817. https://doi.org/10.1177/1052562914534244

Admiraal, W., Louws, M., Lockhorst, D., Paas, T., Buynsters, M., Cviko, A., Janssen, C., De Jonge, M., Nouwens, S., Post, L., Van der Ven, F., & Kester, L. (2017). Teachers in school-based technology innovations: A typology of their beliefs on teaching and technology. *Computers & Education*, *114*, 57–68. https://doi.org/10.1016/j.compedu.2017.06.013

Asarta, C. J., & Schmidt, J. R. (2017). Comparing student performance in blended and traditional courses: Does prior academic achievement matter? *The Internet and Higher Education*, *32*, 29–38. https://doi.org/10.1016/j.iheduc.2016.08.002

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Bernard, R. M., Borokhovski, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2014). A meta-analysis of blended learning and technology use in higher education: From the general to the applied. *Journal of Computing in Higher Education, 26*(1), 87–122. https://doi.org/10.1007/s12528-013-9077-3

Brinkley-Etzkorn, K. E. (2018). Learning to teach online: Measuring the influence of faculty development training on teaching effectiveness through a TPACK lens. *The Internet and Higher Education, 38*, 28–35. https://doi.org/10.1016/j.iheduc.2018.04.004

Brown, M. G. (2016). Blended instructional practice: A review of the empirical literature on instructors' adoption and use of online tools in face-to-face teaching. *The Internet and Higher Education*, *31*, 1–10. https://doi.org/10.1016/j.iheduc.2016.05.001

Brownlee, J. (2004). Teacher education students' epistemological beliefs. Developing a rational model of teaching. *Research in Education, 72*(1), 1–17. https://doi.org/10.7227/RIE.72.1

Bruggeman, B., Tondeur, J., Struyven, K., Pynoo, B., Garone, A., & Vanslambrouck, S. (2021). Experts speaking: Crucial teacher attributes for implementing blended learning in higher education. *The Internet and Higher Education*, *48*, Article 100772. https://doi.org/10.1016/j.iheduc.2020.100772

Chai, C. S. (2010). Teachers' epistemological beliefs and their pedagogical beliefs: A qualitative case study among Singaporean teachers in the context of ict-supported reforms. *The Turkish Online Journal of Educational Technology, 9*(4), 128–139. http://www.tojet.net/volumes/v9i4.pdf

Chan, K. W. (2004). Preservice teachers' epistemological beliefs and conceptions about teaching and learning: Cultural implications for research in teacher education. *Australian Journal of Teacher Education, 29*(1), 1–13. https://doi.org/10.14221/ajte.2004v29n1.1

Chen, X., Breslow, L., & DeBoer, J. (2018). Analyzing productive learning behaviours for students using mediated corrective feedback in a blended learning environment. *Computers & Education, 117*(2), 59–74. https://doi.org/10.1016/j.compedu.2017.09.013

Comer, D. R., & Lenaghan, J. A. (2012). Enhancing discussions in the asynchronous online classroom: The lack of face-to-face interaction does not lessen the lesson. *Journal of Management Education*, *37*(2), 261–294. https://doi.org/10.1177/1052562912442384

Ekinci, N. (2017). Examining the relationships between epistemological beliefs and teaching and learning conceptions of lower-secondary education teachers. *İnönü Üniversitesi Eğitim Fakültesi Dergisi*, *18*(1), 344–358. http://doi.org/10.17679/inuefd.307065

Engeström, Y. (2005). *Developmental work research: Expanding activity theory in practice* (Vol. 12). Lehmanns Media.

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, *42*(3), 255–284. https://doi.org/10.1080/15391523.2010.10782551

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research.* Addison-Wesley Publishing Company.

Foucault, M. (1980). *Power/knowledge: Selected interviews and other writings, 1972-1977*. Vintage.

Freire, P. (2014). *Pedagogy of the oppressed*. Bloomsbury.

Georgina, D. A., & Hosford, C. C. (2009). Higher education faculty perceptions on technology integration and training. *Teaching and Teacher Education*, *25*(5), 690–696. https://doi.org/10.1016/j.tate.2008.11.004

Haggins, S., & Moseley, D. (2011). Teachers' thinking about information and communication technology and learning: beliefs and outcomes. *Journal of Teacher Development Studies*, *5*(2), 191–210. https://doi.org/10.1080/13664530100200138

Halverson, L. R., Spring, K. J., Huyett, S., Henrie, C. R., & Graham, C. R. (2017). Blended learning research in higher education and K-12 settings. In M. Spector, B. Lockee, & M. Childress (Eds.), *Learning, design, and technology: An international compendium of theory, research, practice, and policy* (pp. 1–30). Springer. https://doi.org/10.1007/978-3-319-17727-4_31-1

Hofer, B. K. (2001). Personal epistemology research: Implications for learning and teaching. *Educational Psychology Review*, *13*(4), 353–383.-https://doi.org/10.1023/A:1011965830686

Kim, C., Kim, M. K., Lee, C., Spector, J. M., & DeMeester, K. (2013). Teacher beliefs and technology integration. *Teaching and Teacher Education*, *29*, 76–85. https://doi.org/10.1016/j.tate.2012.08.005

Kolb, A. Y., & Kolb, D. A. (2017). Experiential learning theory as a guide for experiential educators in higher education. *Experiential Learning and Teaching in Higher Education, 1*(1), 7–44. Retrieved from https://nsuworks.nova.edu/elthe/vol1/iss1/7

Lee, J. & Bonk, C. J. (2016). Social network analysis of peer relationships and online interactions in a blended class using blogs. *The Internet and Higher Education*, *28*, 35–44. https://doi.org/10.1016/j.iheduc.2015.09.001

Lee, J., Zhang, Z., Song, H., & Huang, X. (2013). Effects of epistemological and pedagogical beliefs on the instructional practices of teachers: A Chinese perspective. *Australian Journal of Teacher Education, 38*(12). https://doi.org/10.14221/ajte.2013v38n12.3

Levin, T., & Wadmany, R. (2008). Teachers' views on factors affecting effective integration of information technology in the classrooms: Developmental scenery. *Journal of Technology and Teacher Education*, *16*(2), 233–263. https://www.learntechlib.org/primary/p/22950/

Liu, S. H. (2011). Factors related to pedagogical beliefs of teachers and technology integration. *Computers & Education*, *56*(4), 1012–1022. https://doi.org/10.1016/j.compedu.2010.12.001

Malhotra, T. (2014). *Integration of technology in kindergarten literacy learning* [Unpublished master's thesis]. York University.

Malhotra, T. (2021). *University instructors' beliefs, attitudes, and practices across STEM and non-STEM blended courses* (Publication Number 29168793)[Doctoral dissertation, York University]. ProQuest Dissertations and Theses Global. https://www.proquest.com/docview/2705372275

Marshall, J. D. (1989). Foucault and education. *Australian Journal of Education*, *33*(2), 99–113. https://doi.org/10.1177/168781408903300201

Mataka, L. M., Saderholm, J. C., & Hodge, T. (2019). Faculty epistemological beliefs and the influence of professional development. *Science Education International*, *30*(4), 364–372. https://www.icaseonline.net/journal/index.php/sei/article/view/157

Moskal, P., Dziuban, C., & Hartman, J. (2013). Blended learning: A dangerous idea? *The Internet and Higher Education*, *18*, 15–23. https://doi.org/10.1016/j.iheduc.2012.12.001
Napier, N. P., Dekhane, S., & Smith, S. (2016). Transitioning to blended learning: Understanding student and faculty perceptions. *Journal of Asynchronous Learning Networks, 15*(1), 20–32. https://doi.org/10.24059/olj.v15i1.188
Norberg, A., Dziuban, C. D., & Moskal, P. D. (2011). A time-based blended learning model. *On the Horizon*, *19*(3), 207–216. https://doi.org/10.1108/10748121111163913
Owens, T. (2012). Hitting the nail on the head: The importance of specific staff development for effective blended learning. *Innovations in Education and Teaching International*, *49*(4), 389–400. https://doi.org/10.1080/14703297.2012.728877
Owston, R., York, D., & Malhotra, T. (2019). Blended learning in large enrolment courses: Student perceptions across four different instructional models. *Australasian Journal of Educational Technology*, *35*(5), 29–45. https://doi.org/10.14742/ajet.4310
Owston, R., York, D., & Murtha, S. (2013). Student perceptions and achievement in a university blended learning strategic initiative. *The Internet and Higher Education, 18*, 38–46. https://doi.org/10.1016/j.iheduc.2012.12.003
Page, J., Meehan-Andrews, T., Weerakkody, N., Hughes, D. L., & Rathner, J. A. (2017). Student perceptions and learning outcomes of blended learning in a massive first-year core physiology for allied health subjects. *Advances in Physiology Education*, *41*(1), 44–55. https://doi.org/10.1152/advan.00005.2016
Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, *62*(3), 307–332. https://doi.org/10.3102/00346543062003307
Park, Y., Yu, J. H., & Jo, I. H. (2016). Clustering blended learning courses by online behavior data: A case study in a Korean higher education institute. *The Internet and Higher Education*, *29*, 1–11. https://doi.org/10.1016/j.iheduc.2015.11.001
Piaget, J. (1950). *The psychology of intelligence.* (M Piercy & D. E. Berlyne, Trans.). Routledge.
Popkewitz, T. S., & Brennan, M. T. (1997). *Foucault's challenge: Discourse, knowledge, and power in education*. Teachers College Press.
Prestige, S. (2012). The beliefs behind the teacher that influences their ict practices. *Computers & Education, 58*(1), 449–458. https://doi.org/10.1016/j.compedu.2011.08.028
Şahin, F., Doğan, E., İlic, U., & Şahin, Y. L. (2012). Factors influencing instructors' intentions to use information technologies in higher education amid the pandemic. *Education and Information Technologies, 26*, 4795–4820. https://doi.org/10.1007/s10639-021-10497-0
Schommer, M. (1994). An emerging of conceptualization of epistemological beliefs and their role in learning. In R. Gardner & P. A. Alexander (Eds.), *Beliefs about text and instruction with text* (pp. 25–40). Lawrence Erlbaum Associates Publishers.
Schommer, M. (1998). The influence of age and education on epistemological beliefs. *British Journal of Educational Psychology, 68 (4)*, 551–562. https://doi.org/10.1111/j.2044-8279.1998.tb01311.x
Scott, K. M. (2014). Taking over someone else's e-learning design: Challenges trigger change in e-learning beliefs and practices. *Research in Learning Technology*, *22*(1), 1–15. https://journal.alt.ac.uk/index.php/rlt/article/view/1504/pdf_1
Schunk, D. H., Ertmer, P. (2000). Self-regulation and academic learning: Self-efficacy enhancing interventions. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 631–649). Academic Press. https://doi.org/10.1016/B978-012109890-2/50048-2
Siciliano, M. D. (2016). It's the quality not the quantity of ties that matters: Social networks and self-efficacy beliefs. *American Educational Research Journal*, *53*(2), 227–262. https://doi.org/10.3102/0002831216629207
Soleimani, N. (2020). ELT teachers' epistemological beliefs and dominant teaching style: a mixed method research. *Asian-Pacific Journal of Second and Foreign Language Education*, *5*, Article 12. https://sfleducation.springeropen.com/articles/10.1186/s40862-020-00094-y
Soulios, I., & Psillos, D. (2016). Enhancing student teachers' epistemological beliefs about models and conceptual understanding through a model-based inquiry process. *International Journal of Science Education*, *38*(7), 1212–1233. https://doi.org/10.1080/09500693.2016.1186304

Spanjers, I. A., Könings, K. D., Leppink, J., Verstegen, D. M., de Jong, N., Czabanowska, K., & Van Merriënboer, J. J. (2015). The promised land of blended learning: Quizzes as a moderator. *Educational Research Review*, *15*, 59–74. https://doi.org/10.1016/j.edurev.2015.05.001

Tondeur, J. (2020). Teachers' pedagogical beliefs and technology use. In M. Peters (Ed.), *Encyclopedia of teacher education* (pp. 1–5). Springer. https://doi.org/10.1007/978-981-13-1179-6_111-1

Topcu, M. S., (2013). Preservice teachers' epistemological beliefs in physics, chemistry, and biology: A mixed study. *International Journal of Science and Mathematics Education, 11*(3), 433–458. https://doi.org/10.1007/s10763-012-9345-0

Ure, C., & Raban, B. (2001). Teachers' beliefs and understandings of literacy in the pre-school: Pre-school literacy project stage 1. *Contemporary Issues in Early Childhood*, *2*(2), 157–168. https://doi.org/10.2304/ciec.2001.2.2.3

Vo, H. M., Zhu, C., & Diep, N. A. (2017). The effect of blended learning on student performance at course-level in higher education: A meta-analysis. *Studies in Educational Evaluation*, *53*, 17–28. https://doi.org/10.1016/j.stueduc.2017.01.002

Vygotsky, L. S. (1994). The problem of the environment. In R. Van-der-Veer & J. Valsiner (Eds.), *The Vygotsky reader* (pp. 338–354). Blackwell Publishers.

Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes.* Harvard University Press. (Original work published 1930)

Wright, G. B. (2011). *Student-centered learning in higher education. International Journal of Teaching and Learning in Higher Education. 23*(3), 92–97. https://www.isetl.org/ijtlhe/pdf/IJTLHE834.pdf

Wong L., Tatnall, A., & Burgess S. (2014). A framework for investigating blended learning effectiveness. *Education + Training, 56*(2/3), 233–251. https://doi.org/10.1108/ET-04-2013-0049

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