



# Students' learner-readiness empowers their imaginative-capacity as they interact while e-learning

**La preparación para el aprendizaje de los estudiantes potencia su capacidad imaginativa a medida que interactúan mientras aprenden en línea**

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## Contents

1. Introduction
  2. Theoretical framework
  3. Study design and methodology
  4. Results and Discussion
  5. Discussion and conclusion
- Bibliographic references

### ABSTRACT:

Globally, knowledge economies are transforming to creative economies. Similarly, the Middle East region aligned initiatives empowering human-capital with creativity to generate innovation. In the Middle East, the Gulf-Corporation-Council (GCC) countries understand the importance of education to harness creative economies. GCC students continue resisting interacting on e-learning platforms by sharing knowledge even-though this is vital for enhancing imagination. This empirically under researched area in developing countries is assessed by us within a private higher-education institution in the GCC (Bahrain). Research Design: This deductive approach proposes a literature driven conceptual-model, assessing students' learner-readiness (self-directed learning and motivation-for-learning) on imagination-capacity (IC); when interacting to share knowledge during e-learning. Three hypotheses were empirically tested thru an online-survey; with data collected from undergrad-business-students using Moodle at Ahlia University (in Bahrain); and analyzed using Confirmatory Factor Analysis and Structural Equation Modeling. Findings: All hypotheses were supported via a fit model, baring theoretical and practical implications; signifying learner-readiness positively influences quality-knowledge-shared-behavior, and IC; during learner-interaction, with quality-knowledge-sharing-behavior absolutely influencing IC.

**Keywords:** E-learning; Learner-readiness; Knowledge Sharing; Imagination; Higher-education

### RESUMEN:

A nivel mundial, las economías del conocimiento se están transformando en economías creativas. Del mismo modo, la región del Medio Oriente alineó las iniciativas que empoderan al capital humano con la creatividad para generar innovación. En Oriente Medio, los países del Consejo de la Corporación del Golfo (CCG) comprenden la importancia de la educación para aprovechar las economías creativas. Los estudiantes de GCC continúan resistiéndose a interactuar en plataformas de aprendizaje electrónico al compartir conocimientos, aunque esto es vital para mejorar la imaginación. Nosotros evaluamos esta área empíricamente bajo investigación en los países en desarrollo dentro de una institución privada de educación superior en el CCG (Bahrein). Diseño de investigación: este enfoque deductivo propone un modelo conceptual impulsado por la literatura, que evalúa la preparación del alumno (aprendizaje autodirigido y motivación para el aprendizaje) en la capacidad de imaginación (CI); al interactuar para compartir conocimientos durante el aprendizaje electrónico. Se probaron empíricamente tres hipótesis mediante una encuesta en línea; con datos recopilados de estudiantes de pregrado de negocios que usan Moodle en la Universidad de Ahlia (en Bahrein); y analizado utilizando el análisis factorial confirmatorio y el modelado de ecuaciones estructurales. Hallazgos: todas las hipótesis fueron apoyadas a través de un modelo de ajuste, dejando al descubierto implicaciones teóricas y prácticas; significando que la preparación

del alumno influye positivamente en la calidad, el conocimiento, el comportamiento compartido y la CI; durante la interacción del alumno, con un comportamiento de intercambio de conocimientos de calidad que influye absolutamente en la CI.

**Palabras clave:** C

## 1. Introduction

Knowledge economies are now creative economies; with education fundamental for human development. Middle-East (ME) lags behind and its current issues like fluctuating oil prices, undiversified economies and high unemployment; require ME to revamp higher-education systems to provide creative and innovative human-capital for approximately 40 million new jobs; particularly, the Gulf-Corporation-Council (GCC) countries, Bahrain, Kuwait, Oman, United Arab Emirates, Saudi Arabia and Qatar; with Bahrain ranked highest for its investments in higher-education quality, amongst Arab countries (Deloitte, 2017; El-Khoury, 2015; Khorsheengd, 2015; Aubert & Reiffer, 2003). Challenges incur during pursuing of such agendas when setting-up higher-education policies, particularly when GCC embraced e-learning for encourage research and creativity through teaching-and-learning (TL). Though such initiatives are successful, due to a high adoption rate of the digital age by millennial students, those born between 1982 and 2002, GCC faces a challenge. Millennial students prefer blending addicted-towards-social-media with traditional TL; hence intolerant to traditional classroom teaching. Also, GCC students are not keen at interacting during e-learning; thus, calling for education research to recognize flipped-learning (FL) (Elmasry et al., 2016 ; Khorsheed, 2015). GCC's recognition of e-learning led it to invest in ICT infrastructure to adapt FL. So, what traditionally is done in class gets done at home and vice versa (Aubert & Reiffer, 2003 ). GCC students appreciate FL blended with social media: e.g. Khan Academy, Teacher YouTube (Elmasry et al., 2016). In the e-learning paradigm in modern education, an individual's interest motivates learning to pursue knowledge acquiring/sharing for self-directed and motivated-learning (Rotgans & Schmidt, 2017). But e-learning research is vague on how virtual TL cultivates imagination. Though, past research empirically evidences how interest inspires knowledge acquiring/sharing; research is scant indicators reflect how "creative imagination" is cultivated during e-learning. During e-learning, knowledge networks yield knowledge economies. Inspiring interest to acquire/share knowledge is vital for improving knowledge economies: a scant research area in the ME; calling for reviewing ME education policies to embed innovative learning outcomes since e-learning tools harness creativity (Sergis et al., 2018; Nurunnabi, 2017; Forgeard & Kaufman, 2016 ; Liang & Chang, 2014; Liang et al., 2013; Hung et al., 2010; Aubert & Reiffer, 2003).

FL cultivates engagements to facilitate imagination-capacity (IC) during quality-knowledge-sharing (KSQ) behaviors during e-learning. Research lacks addressing challenges learners face when e-learning outside classrooms, especially when learning and participating on social-media. There is no evidence of what is really learnt online: not necessary that knowledge is what that is shared during e-learning. No wonder instructors struggle enriching e-learning with interactions; considering the insufficient quantitative evidence in higher-education e-learning research on how online participations influenced different circumstances (Kunthi et al., 2018; Camarda et al., 2017; Kow et al., 2017; Hwang, 2016; Sohrabi & Iraj, 2016; Yilmaz, 2016). Also, Scholars require deeper research on learner-readiness; a facilitator for e-learning thru brainstorming by sharing knowledge to participate. Once the role of learner-readiness (LR) on participation is understood, thru SDL and MFL, instructors can design curricula encouraging brainstorming for imagination-led learning outcomes. This is possible by aligning e-learning with LR (popular in flipped classes) to learn thru knowledge-shared-participations, to achieve higher IC. However, confirmatory research should investigate how FL can secure better learning thru online engagements (Blayone et al., 2018; Rotgans and Schmidt, 2017; Lin et al., 2016; Hao, 2016; Yilmaz, 2016; Chang et al., 2016; Moylan & Razaque, 2014).

Section 2 critiques TL, KS and e-learning theories to formulate a model with three hypotheses. Section 3: research methodology describes design of study's instrument followed by procedure for data collection and analysis, Section 4; details how instrument reliability and validity was computed, and Section 5: discusses and concludes empirical findings; highlighting implications and future research.

## 2. Theoretical framework

In this section past related literature is reviewed, and hence cretquied to propose the hypotheses expressed in this section.

## 2.1. LR influences KS while e-learning

To align e-learning with students' interests, they should be ready to learn by self-directed learning (SDL) and motivation-for-learning (MFL). LR is inspired when education systems are augmented with e-learning systems. LR is a learner's interest, crucial for the success of e-learning when driven by the act of acquiring and sharing knowledge. Interest is individual (personal interest through interactions with peers) and situational (self-inspired temporary interest). Interest helps achieve desired learning outcomes. Since KS behavior is socially important for effective learning; e-learning context forms a suitable platform to motivate learning for committed participation, in order to learning within e-learning communities. Lack of KS results in a drop-in participation, hence a drop-in learning, hence failure of an e-learning system (Blayone et al., 2018; Rotgans and Schmidt, 2017; Lin et al., 2016; Hwang, 2016).

**LR** is popular in FL; active TL technique favored by millennial students, who resist traditional lecture-style teachings; preferring social-media engagements blended with traditional classroom TL. Such intolerant behavior indorses researchers to re-think traditional TL strategies, and propose more active TL strategies (Hao, 2016). Hao (2016) assessed the role of **FL** using a survey over 84 undergrad-education-majors; thus, revealing that FL is crucial in TL due to its student centered learning approach to achieve learning outcomes; where during FL; students learn facets of knowledge before arriving to class. During class, instructor personalized instructions benefit students thru case-study based problem-solving. Some scholars' report students outperform during FL is applied in classroom; but other scholars worry about the lack of flipped learner-readiness. This reflects e-learning tools as not as effective; due to restricted empirical evidence. Empirical research should empirically confirmation if FL -readiness can help improve interactions for improved e-learning when blended with traditional class teachings (Hao, 2016). In accordance with this research gap, so is our aim to conduct reserch in GCC's higher-education sector (Rotgans & Schmidt, 2017; Li et al., 2016; Khorsheed, 2015; El-Khoury, 2015; Aubert & Reiffer, 2003).

Further, the extent KSQ affects learning effectiveness is empirically unclear in e-learning context; though a rational comprehension (Hwang, 2016). So, the effect of LR can be assessed on KSQ behavior since, at a micro-level of LR research; knowledge and skills are digital competencies from the moderation of technology facilitating online interactions (Blayone et al., 2018; Hwang, 2016). Hwang assessed the extent to which social influence theory affects students' attitude to share knowledge in e-learning platforms. However, as depicted in Figure 1 model, we assess KS behavior from the lens of learners' readiness; since e-learning platforms are support tools. Here online materials are exposed for students to review before class. Unfortunately, utilization of these tools is low since students shy away from interact online. No wonder, instructors report low students' motivations during flipped classrooms. Therefore, SDL, and MFL, is closely assessed by us. Research calls for empirical evidence to understand how SDL, and MFL integrate to enhance the e-learning experience where achieving learning outcomes through self-desired learning. MFL aids an instructor motivate students to use virtual environments (Yilmaz, 2017). Similar are the observations in GCC's higher education flipped classrooms.

As per Khorsheed (2015), research ignored how FL motivates students to self-learn. Sergis et al. (2018) assessed the effect of FL on students' satisfaction and self-determination, thru self-determinant theory. Furthermore, we extend the current knowledge contributions of Khorsheed (2015) enriches existing FL theory by assessing the role of student' learning to investigate how interactions facilitate greater imagination. Learning occurs over self-directed and motivated learning: a psychological experience achieved thru FL, especially during e-learning. FL was proven favorable for low achieving students; an empirically under-assessed topic. But an empirical evidence can prove the power of FL, while interacting during self-directed and motivated during learnings during e-learning. However, assessing the role of LR on KS is an un-chartered territory; if assessed could shed new light on how LR is cohesive with KS to enhance TL; especially in developing countries. Past research, investigating LR to appreciate essential knowledge and skills during e-learning, continues shedding insufficient evidence of the extent to which LR affects KS behavior during virtual discussions (Kow et al., 2017).

GCC should assess the role of LR on KSQ since in this region blended learning is in trend (Chang et al., 2016; Baehr, 2012). Studying students' online participations thru LR can aid creative curriculums in e-learning platforms, once research understands how e-learning activities socially connect learners outside classrooms. Kow et al. (2017)'s interviews of 19 undergrad-media-

students, investigating the extent to which they acquire and apply information in e-learning; revealed that learners experience difficulties attaining and applying information during social-media interactions. Nevertheless, Kow focused on the mediating roles of technologies for developing friendship networks; but not their KS-behaviors to learn. Therefore, research should empirically assess the roles identified in Figure 1 model. An empirical assessment, once generalized over business students of a GCC higher education institution, can reveal variances in findings from Kow et al., who originally generalized over College-of-Arts students. Hence, we propose hypothesis 1: 1a and 1b (Figure 1) i.e., during e-learning: H1: LR positively and significantly effects KSQ.

## 2.2. LR inspires imagination during KSQ behavior

Technology effectively moderates to promote engagements, to create new knowledge during learning. Past education research focused on imagining harnessing dimensions for virtually e-learning; by investigating how technology, in social settings, helps acquire skills during learning; an important higher-education research area demanding more empirical investigation, since for employees seek creative graduates, possess technical skills, and can think outside the box during collaborative problem-solving. Creativity ascends from imagination (mental capacity resonating images during student-centered e-learning: like in Moodle, where, KS is inspired as interests thru self-motivated learners; during interactions to create new knowledge (Kunthi et al., 2018; Yilmaz, 2016; Conklin, 2014; Liang & Chang, 2014; Moylan & Razzaque, 2014; Karolak & Razzaque, 2013). Moderation of ICT has assessed a cultural divide among employers' desired-skills, and educator furnished-skills; a global concern. Creativity and innovation are possible during knowledge-shared-learning once learners are responsible self-directed and motivated learners; thus, driven to self-acquire/share knowledge to learning. Academic institutions adapting innovative cultures succeed to inspire creativity and innovation in learner who can create and implement new ideas from imagination, while they are motivated enough to self-learn by virtually interacting with peers and instructors. Therefore, scholars call for deeper research on learner-readiness; driver facilitating e-learning performance via brainstorming to share knowledge during participations. Understand the role of LR on participation, thru self-directed and motivated-learning, can help educators mandate brainstorming during learning for IC building, using comprehend how curriculums that better utilize ICT's mediation for e-learning (Kidanu, 2018; Yilmaz, 2016; Chang et al., 2016; Moylan & Razzaque, 2014). **IC** drives creative activities that allow learners to construct alternatives to tackle given situations during problem-solving. Scant research innovation in the education systems. We should comprehend the role of LR on IC to better facilitate innovation. Capability to improve **IC** is a budding research and job-market demand; hence, encouraging curricula designed with **IC** building TL strategies (Moylan & Razzaque, 2014; Liang et al., 2013; Camarda et al., 2017).

Past scholars shown interest by applying inquiry approach to harness the power of imagination for TL. Other scholars qualitatively interviewing students; confirming that inspired learners who start to imagine, generate creativity as they interact during collaborative-problem-solving. Also, scholars who quantitatively assessed what role MFL plays on IC; confirmed that motivation predicts imagination (Liang & Chang, 2014). Hence, Liang & Chang highlighted important dimensions inspiring imagination, thus furnished new knowledge on IC. However, such findings were generalizable over science-education-students. What about the dimension of learner-readiness? This needs unconventional clarification, to understand how SDL self-inspires one to learn, once motivated to learn; vital for appreciating the role of LR on IC; for higher-education GCC students. Unfortunately, this dimension was absent from Liang's and Chang's study, and from the current curricula. Such curricula continue neglecting a significantly important dimensions that characterize learning outcomes of for this century; a research gap. The issue is that current studies illustrate circumstances where learners do better; but such circumstances are evidenced by demographics; leaving such studies insufficiently addressing how and why such circumstances influence students' online behaviors (Kow et al., 2017; Conklin, 2014).

Past research assessed LR instruments at a macro-level (organizational or country-level) or at micro-level (students or instructors) by applying unidimensional unreliable readiness scales limited in operational approach, to broadly apprehend how LR blends with traditional classroom teachings. Though scholars explored the goals of self-directed-learning using models correlated with variables; such research is scant to empirically evidence what emotional role-play occurs in self-directed learning; when imagination is an emotional outcome of self-directed-learning. It would be interesting to apprehend the effect SDL has on learners' IC considering the 15% rise in learner performance by blended learning (Blayone et al., 2018; Li et al., 2016; Chang et al., 2016).

Hence; hypothesis 2: 2a and 2b (Figure 1) i.e., during e-learning: H2: LR positively and significantly effects IC.

### 2.3. Students' KS behavior encourages IC

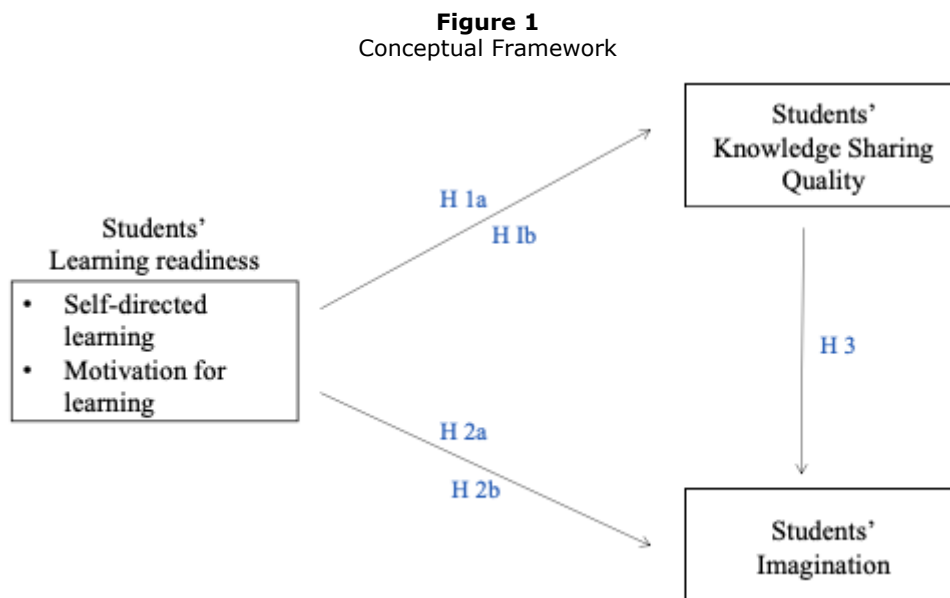
E-learning environments, moderated by ICT, incubate a learning culture for social learning to exchange knowledge and experiences during cooperative learning; to generate imaginations. Imagination occurs through discussions, when reasoning is debated to formulate ideas as imaginations that are reality if acted on. Such a learning culture is also incubated in FL classrooms. In FL research, which initiated since 2007; termed such a form of active learning as "*peer-assessed learning*" as such form of student-centered learning is only possible during peer interactions. This is an instructional method that is aimed at engaging learners during their learning processes, such that during a FL experience, wisdom is reached from interactions when knowledge is acquired and shared during problem-solving. During FL students think, learn and participate while e-learning, to generate imagination; and in turn spawn creativity. Here, abstract properties integrate with concrete rational; over crystallized images of abstract ideas. Bottom line, imagination occurs during analogies where learners learn through transformation when applying multiple fields of shared knowledge (Camarda et al., 2017; Moylan & Razzaque, 2014; Liang et al., 2013; Baehr, 2012).

KS is vital to imagine ideas, that learners should appreciate the importance of communication during e-learning: in order to effectively learn. This way, that their imaginations will generate creativity and innovation. When learners indulge in a participatory activity, they enrich their learning experiences, such that during interactions their semantic memories converge for divergent thinking. Thus, generate new ideas by integrating the memory retrieval system of past knowledge and experiences, blended with others' discussed knowledge. At this stage relevant knowledge is strategically searched out by knowledge-seeker to guides mental simulations, viable for further outcome evaluations. Such processes work together to forge novel and creative ideas, which is deemed useful and original. Creative ideas get recalled from memories, as ideas are not created on the spot through discussion, but creative ideas are revealed when recalled from memory while knowledge is shared, during a discussion, as per the human brain behavioral analysis (Benedek et al., 2018). 70% of TL occurs in traditional classrooms, blended with e-learning and m-learning. In online courses; interactions occur by text, audio and video messages across time and space; where e-learning further blends in asynchronous and synchronous communications. Synchronous communications are live teachings and learnings in chat rooms with continuous conversation while asynchronous communications are learning occurring despite the breaks in interaction in virtual discussions (Baehr, 2012).

Alternative channels (instant-messages, forums/blogs and virtual-conferences/learning) support learning, inside and outside classes. Social-media platforms, e.g., Facebook or WhatsApp, enhance virtual-learning by interactions by assure KS, for cooperation for new knowledge for MFL and SDL. Research has not investigated the challenges learners face when e-learning outside classrooms, when learn socially while participating in social platforms. Through social engagemnets interactions are not underpinned by knowledge or skill. There is no evidence of what is learnt online. Research does not have enough evidence explaining how learners develop skills while interacting with attained information; though learners have a high tendency to spend ample time online. Therefore, instructors struggle enriching interaction in e-learning thru KS. Past research identified various demographics related with learners' information usage; such empirical findings remain insufficient. Such evidences express what demographically occurs better or worse, while scant in evidencing why, or how, online behavior gets influenced in different circumstances. On the bright side, knowledge management research has evidenced how KS is vital for e-learning; or else such environments are endangered to discontinue. In such scenarios, social-media platforms become vital for enhancing interactions. This is where their popularity should be taken advantage of; such that social-media platforms should be merged with e-learning platforms, such as Moodle, since students are addicted to social-media platforms. Hence, such platforms could moderate, to promote interactions while students TL while e-learning (Yilmaz, 2016; Kunthi et al., 2018; Kow et al., 2017). E-learning is also important for "*Learning organizations*" that value KS, acquisition and diffusion: to compete. During e-learning, knowledge-shared communications allow organizations to access others' experiences, through which unique knowledge is created to facilitate learning and innovation. However, higher-education and e-learning research continues to testify a lingering and limited empirical evidence, which is vital at this stage. An evidence that can explain why learners continue to remain reluctant to participate; though invited by their

instructors while e-learning to interact, to exchange knowledge, in order to learn so to inspire their imagination capabilities for creativity and innovation (Hwang, 2016; Razzaque & Karolak, 2014). Such reluctance to interact in e-learning tools was also observed in the GCC institutions, by the author of this article. Based on the argument we propose hypothesis 3 (Figure 1) i.e., while e-learning; students’:

H3: KSQ -behavior positively and significantly effects IC.



### 3. Study design and methodology

Critiqued past literaturra revealed three research questions, what is the effect of: LR on KSQ? LR on IC?, and KSQ on IC?, to three hypotheses (Figure 1). This research cross sectionally collected data via an online survey whose five items measuring SDL and four items measured MFL (LR's two independent variables adapted from Kırmızı (2015), five items measuring KSQ (independent/mediating variable adapted from Chiu et al. (2006) and seven items measuring IC (dependent variable adapted from Liang et al. (2013)). All items measuring variables on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). All items were assessed for reliability and validity in past research, though analyzed on different samples and communities. The survey was composed of a cover letter, introducing participates to the research, assuring voluntary and confidentiality from participation, followed by four demographic questions (details depicted in Table 1) and nineteen items pertaining to variables (Figure 1). Survey and hosted on Google Forms (Razzaque, 2018) and all Felds were pre-set mandatory, assuring no missing values. Data was collected in June of 2018 from a sample of 423, of 700 undergrads at Ahlia University (AU)'s College of Business Finance (CBF) during Fall-semester 2018. This sample-size, surpasses the 249 minimum sample size-calculation, based on 5% margin of error, 95% confidence level, 700 being the population size, and 50% response rate (Raosoft, Inc., 2004). Data analysis was performed on SPSS and AMOS, thru Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM). AU is a private university in Bahrain hosting six B.Sc. CBF programs, with Moodle as its primary e-learning platform (Ahlia University, 2018).

A two-step approach was applied in CFA, to assess relations between latent variables and their indicators; to confirm and trim constructs and pertaining items (measurement model); followed by SEM, to assess presence of a relation between items and constructs (structural model); using collected data collected (Karolak, & Razzaque, 2013). Such analysis assesses reliability and validity of the measures. CFA assesses construct validity between four constructs of Figure 1, with each item reflecting its latent construct, so four constructs can co-vary freely in a CFA model. Fitness indices express if a CFA model demonstrates a good-model-fit: Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI); as expressed in the next Section. Also, the scale's convergent validity is verified by: (1) all factor loadings must exceed 0.7, (2) construct reliabilities must exceed 0.8, and (3) each construct's average variance extracted (AVE) must exceed the variance due to measurement error for that construct (AVE must exceed 0.50). Finally, the scale's discriminant validity is assessed using the square root of the construct's AVE, to be greater than the correlation shared between the construct and other constructs in the model; details provided in the next Section. Next, the structural model from

SEM, reflects assumed casually linear relations between constructs, tested using a validated survey. For SEM too, RMSEA, CFI and TLI, are detailed in the next Section.

## 4. Results and Discussion

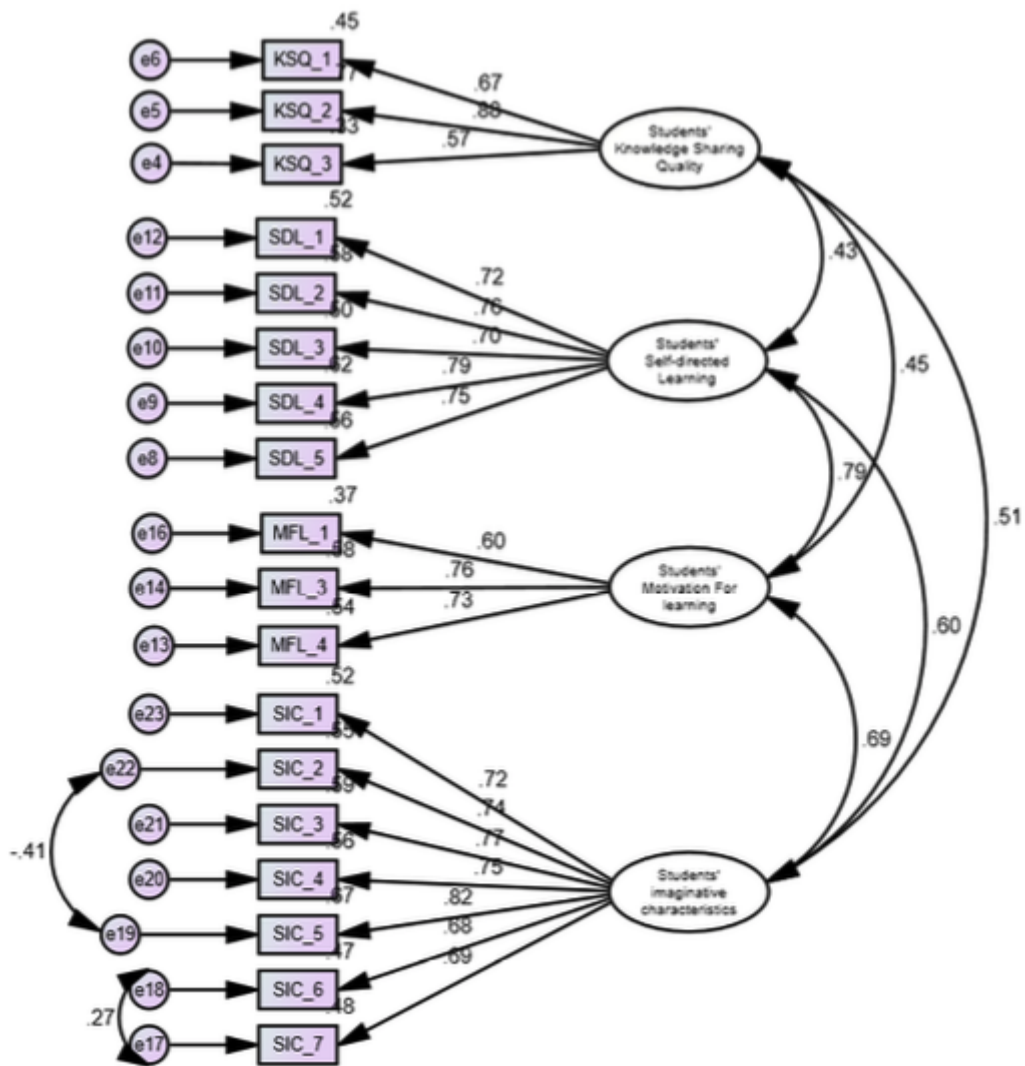
Table 1 depicts 222 males and 201 females (423) respondent profiles evidencing normal sample distribution. Student-level wise, data is normally distributed since freshmen, sophomore, junior and seniors were around 25% mark of responding participants. Student-status wise: majority of students were GCC nationals. AU CBF-programs data is normal distribution; reflecting total count of CBF students.

**Table 1**  
Respondents Profile

Sample Characteristics (n=423)		Frequency	Percent
Gender:	Male, Female	222, 201	53%, 47%
Student Level:	Freshman, Sophomore, Junior, Senior	109, 107, 107, 100	26%, 25%, 25%, 24%
Student Status:	Non-GCC-student	309, 114	73%, 27%
B.Sc. Program Enrolled in:	Management Information Systems, Accounting and Finance, Management and Marketing, Banking and Finance, Economics and Finance	67, 157, 89, 74, 36	16%, 37%, 21%, 17%, 9%

Data screening was performed by SPSS, by deleting records with missing values, and outliers. No missing data were revealed but 94 records (outliers); hence deleted. Next, a measurement-model (4 latent variables with 23 factors/items) was built and run using AMOS; revealing all Composite Reliability (CR) values > 1.96, p values significant at 0.05. But, few KSQ items displayed unacceptable R2 values that should exceed 0.4 for sample size > 150; hence KSQ\_4 and KSQ\_5 were removed. The model was re-run; hence expressing satisfactory R2. For an optimum factored model, the measurement AMOS model was re-assessed for sample correlations till no value exceeded 0.8, and for residual covariances (also) no value exceeded 0.2. To improve model fitness, model indices (MI) were observed for highest value. Two errors, e19 and e22, and e17 and e18, were co-varied, for a satisfactory fit CFA model (Figure 2); RMSEA = 0.044: acceptable value is < 0.08 for good-model-fit, CFI = 0.970: acceptable value > 0.90 indicating a good-model-fit, and TLI = 0.964: acceptable value > 0.90 indicating a good-model-fit, (Kim, 2016; Hung et al., 2010): hence a SPSS driven measurement scales (Table 2), Average Variance Extracted (AVE) and CR were computed for all constructs, with diagonal bold elements, i.e. square roots of AVEs; for discriminant validity diagonal elements > the off-diagonal elements to assure instrument convergent validity, CR values (Table 3) with a SEM fit model (Figure 2): RMSEA = 0.055, CFI = 0.953, and TLI = 0.944.

**Figure 2**  
CFA model



**Table 2**  
Measurement-scale

Construct	Measure	Cronbach's $\alpha$	Mean	Std. Dev.	Loading
<b>KSQ</b>					
KS_1	The knowledge shared between instructor and students in Moodle is easy to understand.	0.742	3.99	0.917	0.671
KS_2	The knowledge shared between instructor and students in Moodle is relevant.		4.13	0.685	0.879
KS_3	The knowledge shared between instructor and students in Moodle is accurate.		4.17	0.704	0.573
<b>Self-Directed-Learning (SDL)</b>					
SDL_1	I carry out my own study plan.	0.859	4.20	0.867	0.724
SDL_2	I seek assistance when facing learning problems.		4.07	0.793	0.759
SDL_3	I manage time well.		4.09	0.858	0.704



SDL_4	I set up my learning goals.		4.17	0.769	0.788
SDL_5	I have higher expectations for my learning performance.		4.26	0.734	0.751
<b>MFL</b>					
MFL_1	I am open to new ideas.	0.73	4.31	0.738	0.605
MFL_3	I improve from my mistakes.		4.23	0.711	0.763
MFL_4	I like to share my ideas with others.		4.25	0.722	0.733
<b>Students'-Imagination-Characteristics (SIC)</b>					
SIC_1	I constantly have ideas towards my designs.	0.893	4.11	0.793	0.724
SIC_2	I am flexible in my thinking & can transfer ideas to multiple fields of tasks.		4.15	0.838	0.744
SIC_3	I often come up with new ideas leading by my intuition.		4.09	0.835	0.767
SIC_4	I often have uncommon ideas compared to others.		4.16	0.848	0.75
SIC_5	I like to explore unknown areas of knowledge & experience.		4.23	0.778	0.818
SIC_6	I often complete my tasks by focusing on effective ideas.		4.20	0.823	0.684
SIC_7	I am good at expressing abstract ideas by using concrete examples.		4.23	0.802	0.692

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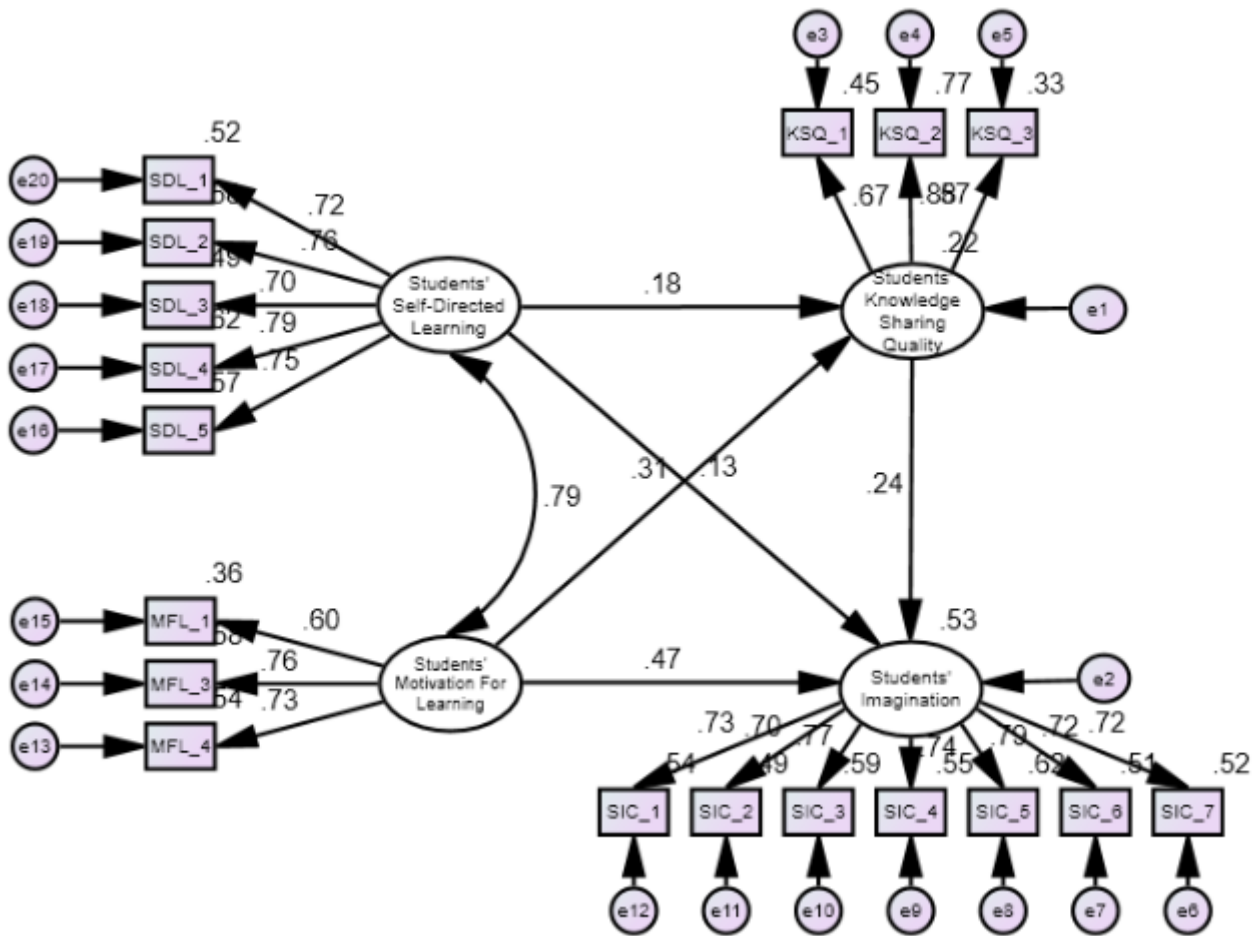
**Table 3**  
Correlation and AVE

	<b>Construct</b>					
<b>Construct</b>	<b>CR</b>	<b>AVE</b>	<b>KSQ</b>	<b>SDL</b>	<b>MFL</b>	<b>SIC</b>
KSQ	0.4091	1.864	3.473			
SDL	0.2804	1.144	0.329	1.308		
MFL	3.2335	0.9222	0.309	0.647	0.85	
SID	-0.326	1.1894	0.401	0.54	0.578	1.415

\*Note: Variables abbreviated in Table 2 and AVE should exceed 0.5. CR should exceed 0.7.

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**Figure 3**  
SEM model



## 5. Discussion and conclusion

### 5.1. Learner readiness and KSQ

Our data analysis reveals from its Figure 3 Structural Equation Modeling (SEM) that learners' is their SDL has a higher impact on KSQ, than motivation-for learning; while MFL is also positively significant on this participatory behavior. This finding indicates that students' SDL during e-learning leads the facilitating reason for learners to share knowledge in order to learn, but this is if they are motivated to doing so. Our findings were also supported by the results of previous research that were carried out in traditional classrooms, though previous research was conducted on different samples and communities; still in general comply with similar findings of our study. Since past research described the role of LR on shared knowledge as an uncharted territory, our study recognized and evidenced the importance of this role. Such assessment was inspired from the challenges faced in blended and FL by GCC students (Blayone et al., 2018; Kow et al., 2017; Rotgans and Schmidt, 2017; Chang et al., 2016; Hao, 2016; Li et al., 2016; El-Khoury, 2015; Khorsheed, 2015; Baehr, 2012; Aubert & Reiffer, 2003). Empirical support of hypothesis 1 confirms that FL in blended learning strategies is effective when knowledge is shared: possible by self-driven and motivated learners during e-learning.

### 5.2. Learner readiness and imaginative capacity

Past research recognizes the empirical investigations' moderating effects of technology in social environments for KS during learning and apply knowledge creatively for virtual problema-solving. Creativity is harnessed thru imagination: thus, rousing innovation. To further understand this, past research asks what effect LR has on IC, while brainstorming during e-learning. Scant research assessed how innovation is harnessed from education as educators struggle blending e-learning with traditional TL. Past inquiry approaches investigating IC in the education sector, expressing an awareness of how IC is harnessed from TL. Past interview analysis confirmed that learners, inspired to imagine, generate creativity thru interactions during analytical thinking. Also, scholars with quantitative assessments on role of MFL on imagination, confirmed that motivation predicts imagination (Moylan & Razzaque, 2014; Yilmaz, 2016; Chang et al., 2016; Liang et al., 2013;

Camarda et al., 2017; Liang & Chang, 2014). We addressed these concerns by integrating past theories to assess hypothesis 2 (LR positively and significantly affects their IC during e-learning). According to Figure 3's SEM, that supported hypothesis 2, indicated that MFL impacts IC more than self-directed-learning; indicating that motivation-to-learn inspires imagination, while supported by the positive role of SDL which also expressed a positively significant role of IC; during e-learning. Based on the SEM, as readiness of learning increases during e-learning so will their imagination as they continue engaging to KSQ with peers. Further, with reference to hypothesis 1, our study can also add that while MFL has the highest effect on imagination building, self-directed-learning is a stronger driver for learners to indulge in participating while e-learning. These findings were supporting evidence of results of previous studies carried out in traditional classroom environments. Though previous research was conducted on different samples and communities; in general, they comply with similar findings of our study. The supporting outcomes of the past research, such as (Blayone et al., 2018; Kidanu, 2018; Kunthi et al., 2018; Camarda et al., 2017; Kow et al., 2017; Chang et al., 2016; Hwang, 2016; Li et al., 2016; Yilmaz, 2016; Conklin, 2014; Liang & Chang, 2014; Liang et al., 2013; Karolak & Razzaque, 2013).

### **5.3. KSQ and IC**

Past research claims that ICT-moderated e-learning enhances cooperative-social-learning while exchanging knowledge within interactions to build IC. Interactions generating ideas, which spawns' creativity and innovation. Past quantitative analysis acknowledged demographical-data empirically assuring importance of shared KSQ for learning, This knowledge insufficiently proves useful in expressing why learners continue being reluctant to participate during e-learning (Camarda et al., 2017; Kow et al., 2017; Yilmaz, 2016; Moylan & Razzaque, 2014; Razzaque & Karolak, 2014; Liang et al., 2013; Baehr, 2012). Hence, hypothesis 3 (Students' KSQ positively and significantly effects IC, in e-learning environments) was proposed. Figure 3's SEM, justified that KSQ absolutely affects imagination during e-learning, thus supporting hypothesis 3, while also evidencing that this phenomenon is possible provide learners are motivated to self-direct themselves to learn, by engaging during e-learning in debates, to order to critically and analytically solve problems. Such findings are also a supporting evidence of \results from previous studies carried out in traditional classrooms (Benedek et al., 2018; Kunthi et al., 2018; Camarda et al., 2017; Kow et al., 2017; Hwang, 2016; Yilmaz, 2016; Moylan & Razzaque, 2014; Razzaque & Karolak, 2014; Liang et al., 2013; Baehr, 2012).

### **5.4. Conclusion**

This article critiqued literature discussing the utilization and challenges of e-learning, globally and particularly in GCC countries. Blended learning is the e-learning trend in GCC students; important for blending face-to-face classrooms teaching with e-learning. E-learning is important for the GCC to become a creative economy facilitated thru IC. Past research claims underpinned by lacking empirical evidences were confirmed by us. I.e., LR (SDL and MFL) absolutely facilitates ICs if s/he interacts with peers during e-learning where SDL helps learner indulge in sharing knowledge while motivation-to-learn inspires imaginative-capacity. Such empirical evidence was generated through collected data via an online-survey from Ahlia University's undergrad-business-students, and analyzing data using CFA and SEM. As per Kow et al. (2017)'s claim, instructors being role models can motivate interactions can be extended with Figure 1 model to assess its viability to appreciate supplementary practical implications once empirically assessed thru AU's Moodle platform; importance since currently we only investigated students', not other stakeholders in TL. Future research should assess mediation of students' KSQ; not assessed in our study to interactions truly aids team creativity. We are uncertain if our surveys items successfully captured concepts over time, i.e. temporal stability; as Lin et al. (2016) recommend a longitudinal assessment as important. Our conclusions provide theoretical implications for learner-readiness, KS and IC during e-learning. The scale's three dimensions (learner-readiness, KS and IC) aims to assess the importance of FL in e-learning-environments to understand the vitality of FL and team-participation for creativity, to develop and implement a personal learning plan, through adrive for self-directed and motivated learning. Our model furnishes practical implication. Educators can promote interations via this framework to facilitate learners learn within online learning-environments; for developing hard/soft skills. Initially e-learning platforms are supplementary teaching strategies; so, to become incubators for low-achieving students to be mentored by instructors.

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