Students' Experiences in a Post-Pandemic ICT Integrated Learning Environment

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The educational period of high school and college is critical for adolescents as they experience a greater awareness of their soft skill mastery, which may allow them to become more resilient, efficacious, optimistic, and hopeful in the face of challenges (Aryani et al., 2021). This is likely because well-suited educational environments consistently encourage the acquisition of soft skills, which improves adolescent self-concept and their confidence in their ability to succeed and accomplish challenging tasks (Aryani et al., 2021; Pittman & Richmond, 2007; Zarret & Eccles, 2006). These education environments fall under a constructivist framework, where teachers support students' autonomy, initiative, and higher-level thinking, while also facilitating collaborations so they can learn through interactions (Applefield et al., 2000; Brooks & Brooks, 1999, Part III; Tam, 2000). However, as the traditional learning environments have changed and rapidly adopted online learning technologies during the COVID-19 pandemic, some students have experienced an increase in stress and a decrease in concentration, motivation, and positivity (Besser et al., 2022). While this may be the case, some studies indicate the potential of information and communication technology (ICT) integrated learning to create a constructivist learning environment that benefits students' acquisition of soft skills like autonomy, higher-level thinking, and collaboration (Ganapathy et al., 2017; Tam, 2000). As the educational environment has implemented a wider use of information and communication technology, the conversation on whether or not students continue to experience encouragement to develop their soft skills should continue to be explored.

The Effect of Educational Environments on Adolescents

To understand how ICT-integrated learning environments have impacted student experiences, it is imperative to understand how educational environments as a whole can benefit

adolescents. According to Zarret & Eccles (2006), school environments are one of the factors that may impact the development of adolescent self-concept, which is necessary for their ability to persist in university education. In general, beneficial educational environments are able to cater to student needs, allowing them to feel a sense of belonging and develop academic motivation, interest, and performance (Pittman & Richmond, 2007; Zarret & Eccles, 2006). Furthermore, when students are supported by their school environment, they naturally acquire and develop soft skills due to the fact that they are able to have a positive learning experience and in turn feel more positive about their learning capabilities (Aryani et al., 2021, Pittman & Richmond, 2007). This phenomenon is representative of the Self-Worth Theory which states that "students who judge themselves to be highly capable will select challenging tasks and show the type of high perseverance that ensures success" (Schunk, 1984, p.56).

Beyond high school learning environments, soft skills are reinforced within universities, usually by teachers and professors, which prepare adolescents for young adulthood and future careers by enabling adolescents to practice self-governance, develop skill efficacy, and become confident in acquiring new soft skills (Aryani et al., 2021, Zarret & Eccles, 2006). Thus, the development and practice of soft skills for adolescents are dependent on an appropriate educational environment (Pittman & Richmond, 2007, Zarret & Eccles, 2006), that actively supports adolescent soft skill acquisition and in turn bolsters adolescent confidence in their ability to succeed beyond the learning environment (Aryani et al., 2021; Pittman & Richmond, 2007; Zarret & Eccles, 2006). Therefore, it is necessary to evaluate and consider the factors within an educational environment that allows for this positive development to occur.

The Constructivist Approach

Specifically, a learning environment based on a constructivist framework aims to aid the development of soft skills in students (Brooks & Brooks, 1999, Part I). Since the prevalence of behaviorism in the 1960s, schools have predominantly adopted the objectivist/behaviorist view of education, which conceptualizes learning as individuals gaining mastery of a fixed set of knowledge while excluding unobservable mental processes (Brooks & Brooks, 1999, Part I; Jonassen, 1991; Jones & Brader-Araje, 2002; Tam, 2000). As a result, schools operated on behaviorally observable and outcome-based teaching strategies and emphasized students' ability to reproduce correct answers rather than their genuine understanding of the course material (Brooks & Brooks, 1999, Part I; Jones & Brader-Araje, 2002). However, limited positive effects have been produced by this approach since it fails to recognize the complexity of the teaching-learning process, and students often had difficulties applying course materials to solve real-world problems (Brooks & Brooks, 1999, Part I; Jones & Brader-Araje, 2002).

As a response to the limitations of the behaviorist approach, constructivism alternatively suggests that learners actively construct understanding from prior experiences, and learning occurs during the process of meaning-making by applying previous knowledge to the specific social context to solve a problem (Applefield et al., 2000; Jonassen, 1991; Tam, 2000; von Glasersfeld, 1995, Chapter 1). Consequently, the job of teachers shifts from merely disseminating knowledge to learners to providing them with opportunities to construct context-relevant understanding (Ertmer & Newby, 2013). Under a constructivist framework, teachers support students' autonomy, initiative, and higher-level thinking, and also facilitate collaborations that allow mutually constructed knowledge to be built from collaborative social interactions (Applefield et al., 2000; Brooks & Brooks, 1999, Part III; Sahin, 2003; Tam, 2000).

Furthermore, the evaluation is based on process rather than outcome, emphasizing the quality of understanding and the ability of flexible application (Windschitl, 1999). Constructivism suggests principles for building ICT-integrated learning environments, which are to involve learning in relevant real-world contexts and support collaborative social learning environments (Jonassen, 1991; Tam, 2000). In the following section, this paper will explore how ICT-integrated learning environments incorporate a constructivist framework to facilitate students' soft skills.

ICT and Soft Skills Development

Information Communication Technology within a learning environment "refers to the computer and internet connections used to handle and communicate information for learning purposes" (Ratheeswari, 2018, p. S45). ICT-integrated learning environments are representative of the constructivist framework because it allows learning to become adaptable to individual needs (Chan, 2002; Ratheeswari, 2018). One way in which ICT-integrated learning incorporates a constructivist framework to facilitate students' soft skills is by contextualizing learning within a world-application context where both teachers and learners are able to express their curiosity and engage in interdisciplinary activities that prepare them for future careers (Hanane & Djilali, 2015). ICT acts as a motivating tool as it enhances the teaching process through more interactive applications while also centering an additional independent learning experience around the students – encouraging students to further their own learning capabilities and interests (Hanane & Djilali, 2015; Rinekso & Kurniawan, 2018). Using ICT applications and tools, students can monitor their learning and acquire further insights into themselves as learners (Guerza, 2015), which ultimately builds their self-concept and applies to life-long learning that is not limited to a classroom environment (Ariza & Sánchez, 2013). Furthermore, ICT applications in the learning environment allow students the flexibility for submitting their tasks outside the classroom and

build collaborative learning environments through discussion – fostering independent responsibility and social communication (Chai & Tan, 2010; Rinekso & Kurniawan, 2018). Following this idea, not only does ICT promote student autonomy in their learning, but as a result also reinforces necessary soft skills that increase student engagement, motivation, and professional development (Ariza & Sánchez, 2013; Rinekso & Kurniawan, 2018). Therefore, the integration of ICT in a learning environment effectively adopts a constructivist framework that promotes student autonomy and the development of lifelong skills (Ariza & Sánchez, 2013; Guerza, 2015; Tam, 2000).

Another way that ICT platforms can be used to build constructivist learning environments is to promote higher-order thinking, or HOTs, by engaging students in information synthesis and evaluation, critical thinking, ideas exploration, active discussion, and collaboration (Ganapathy et al., 2017; Ma, 2009; Novakovich, 2016; Zawilinski, 2009). Specifically, the classroom blog/discussion forum that requires students' responses to thought-provoking questions prompts them to synthesize relevant information from diverse sources, evaluate it with critical thinking, and reflect their thoughts based on other students' responses (Novakovich, 2016; Zawilinski, 2009; Zhang, 2009). Moreover, the high levels of interactive discussion offer students opportunities to actively collaborate on co-constructing knowledge, as well as to engage in self-assessment via reflection on critical comments, fostering effective learning and higher-order thinking (Ganapathy et al., 2017; Ma, 2009; Novakovich, 2016; Razak & Lee, 2012). However, it is imperative to note that ICT tools alone cannot guarantee the building of a constructivist learning environment, and the extent to which ICT tools can foster higher-order thinking is contingent on the lesson objectives, teaching methods, and the quality of social interaction and collaboration occurred throughout the lesson (Lim & Tay, 2003; Ma, 2009; Rice & Wilson, 1999;

Sun et al., 2022). Studies also suggest that the lack of relevant technical skills and teachers' scaffolding guidance can pose challenges to students' higher-order thinking development in an ICT-integrated learning environment (Ganapathy et al., 2017; Lim & Tay, 2003; Ma, 2009).

Thirdly, students' collaboration in the meaning-making process is among the central characteristics of constructivist learning, and ICT can be incorporated into education to foster students' development of collaboration (Brooks & Brooks, 1999, Part III; Chai & Tan, 2010; Tam, 2000). To begin with, collaborative learning involves a group of students establishing a common goal, actively communicating and negotiating their ideas, and resolving potential conflicts to accomplish the goal (Chai & Tan, 2010; Laal & Laal, 2012). The key features of this process are "collaborative negotiation" and "social sharing of group meanings," as opposed to cooperative learning where the group is a result of combined individual efforts (Dillenbourg, 1999; Stahl et al., 2006, p.411). The emphasis on social interaction in the joint problem-solving process opens the potential for incorporating ICT tools in the learning environment to support collaborative learning (Chai & Tan, 2010; Ezekoka, 2015). ICT tools enable interpersonal communication regardless of time and distance as students can use synchronous tools (e.g., chats, video conferencing) and asynchronous tools (e.g., email) to collaborate with one another; it also encourages students' active participation, knowledge co-creation, idea-exchanging discussion, and hence negotiation of group meanings via tools such as online discussion forum and co-authoring websites (Chai & Tan, 2010; Ducate et al., 2011; Ezekoka, 2015; Kessler, 2009; Kessler & Bikowski, 2010). However, instructions dictating students to collaborate are insufficient to guarantee their engagement in activities that can promote collaborative learning, and therefore barriers can arise from uneven work division, uncooperative mindset, and

difficulties in establishing meaningful group interaction (Dillenbourg, 1999; Ducate et al., 2011; Kessler & Bikowski, 2010; Said et al., 2013).

Current Study

Empirical research shows that the period of late adolescence is centered on acquiring, applying, and developing soft skills, such as autonomy, higher-order thinking, communication, and collaboration within the education environment of high school and university to prepare students for the workplace (Aryani et al., 2021; Schunk, 1984). The educational environment supports the development of these soft skills by adopting a constructivist approach (Aryani et al., 2021; Jonassen, 1991; Tam, 2000). However, since the pandemic, high school and college learning environments have drastically changed due to the wider use of ICT (Calma-Birling & Zelazo, 2022). Theoretically, under a constructivist framework, ICT-mediated learning environments should help to facilitate the development of soft skills and continue to nurture students mentally and academically (Chai & Tan, 2010; Ganapathy et al., 2017; Hanane & Djilali, 2015; Subran, 2013; Tam, 2000). However, there has been a limited amount of research investigating if students continue to experience the benefits of constructivism in a post-pandemic ICT-mediated learning environment. Therefore, the research question is: how do adolescents experience constructivism and acquire soft skills through ICT-integrated education**?**

Method

Participants

The current study recruited 5 participants who are high school and university students and have experienced ICT-mediated education during the pandemic. These students range in age from 16 to 21 years of age, placing them in middle to late adolescence demographic which we aim to discover more about. Four of the participants are female and one of them is male. The

racial demographics of the participants include Asian American, Caucasian American, and Chinese international students. The participants were recruited through convenience sampling through researchers' personal networks.

Procedure

The current study conducted semi-structured interviews with the participants. Each interview was conducted through zoom with cameras on and lasted around 40 minutes long. Ten open-ended questions regarding participants' experiences in a post-pandemic ICT-integrated learning environment were asked. Questions included the influence of the pandemic on their school life, usage of ICT tools in school, experiences of acquiring and practicing relevant soft skills during learning, engagement with learning content, and suggestions for ways to improve soft skills development. Regarding relevant soft skills development, we ask follow-up questions about the breakdown components of each soft skill to get more detailed information. Examples of questions are: "How does the pandemic affect your school life?", "In what ways do you practice autonomy skills when you use ICT tools?", and "What are some of the ways that you would say can help students cultivate soft skills, and how/why do you think so?".

Transcription & Coding

All interviews were recorded and transcribed via Zoom, and then researchers transcribed the transcripts on the sentence level for accuracy. The current study used grounded theory for coding because there was no existing coding system that would sufficiently capture all the aspects of the research. Therefore, the researchers coded the transcripts on the sentence level and allowed themes to emerge from coding. The two researchers first selected and coded one transcript independently and compared their codes. Both researchers identified three general themes and their codes reached 80% inter-coder agreement. For example, both researchers

identified the code “educational curriculum influence”. Then the three general theme codes were applied to another two transcripts for researchers to code independently and they reached 80% inter-coder agreement on their codes. Finally, the three theme codes were applied to all five transcripts for sentence-level coding and thematic analysis.

Result

The participants reported a wide range of usage of ICT tools in their learning experiences. Generally speaking, all five participants suggested using email and Google Chats for communication, Zoom and Google Meet for the online class and group meetings, Google Class or school-developed websites for classwork management and discussion forum, and Google Slides and Google Docs for group projects. With the analysis of the participants' responses regarding their experiences of the post-pandemic ICT integrated learning environment, the researchers identified four emerging themes.

Depersonalized Communication

In this study, depersonalized communication is operationally defined as the experience of disconnectedness and disengagement with the instructor and peers. Participants reported that they had less initiative to communicate with their teachers and peers, even though it was easier to get in contact through different ICT mediums. For example, one participant claimed: “I think that leading a Zoom meeting, which I've done, is just not as compelling because everyone is like muted…again, small talk is just not as natural”. Participants often find it difficult to naturally conduct classroom conversations through ICT mediums, which often deters them from engaging conversationally in the class. Another participant described the experience of not asking her complicated question during online class because “when it's on Zoom, it always felt very like disconnected… it felt weird to have to ask”. Furthermore, the lack of personable communication

discourages participants from engaging in meaningful learning. In particular, one participant claimed: “I see the professor in person…I don't want to let him down. Whereas if it were like, a bunch of pixels on Zoom, I probably would be more likely to just try and like get through it”.

Participants also emphasize the lack of meaningful communication even in group projects because they tend to complete their assigned parts individually. One participant reported that he felt that “working in the online group project is like individual work” and only “needs to perhaps double check the other person's work”. Furthermore, when being asked about whether they engage in the co-construction of knowledge during a group project, participants respond that having multiple people researching the same thing would only result in ineffective progress and “redundant information”. Additionally, assignments where participants are required to engage with their peers often result in feelings of disjointedness due to the variability of response times. In particular, one participant described: “Discussing or like a discussion board, it's not like immediate interactions, it's responding five hours later or I text and you respond like three hours later”. In summary, learning in an ICT-integrated environment creates barriers to quality communication due to the lack of physical interpersonal conversation and time immediacy, which leads to decreased collaborative work.

Educational Curriculum Influence

Educational Curriculum Influence is operationally defined as the influence of educational or classroom instruction on the participants’ experience of exploring learning content. Specifically, participants explained how the strict instructions in assignments prevented them from exploring their own curiosities aligned with the subject. For instance, one participant expressed: “Sometimes the project is just very specific, and I just have to do what it tells me to do”. Furthermore, another participant expressed how some classes presented the learning

material in a mundane manner that prevents autonomous discovery. This participant claimed: “And the teachers are like well, I have unlimited time, I can just make you watch unlimited videos”.

Recorded lectures and supplemental material in the form of a video were some of the most common ICT mediums in which participants engage with the learning material. While some participants had addressed that this made learning more convenient as the videos could be reviewed at a later time, it was not the most efficient way for them to learn. For example, one participant noted how she “had to review the videos multiple times” independently to understand the learning material. On the other hand, another participant noted how the transition to ICT learning in her Chinese class “felt like so seamless” and that having recorded lectures was helpful because she “could like listen back for pronunciation and tone, which is like helpful in a language class”. Overall, the efficacy of ICT mediums when presenting learning materials is largely influenced by the nature and flexibility of the educational curriculum.

Technological Literacy

Technological Literacy is operationally defined as how familiar students and teachers are with using ICT tools to conduct classroom activities. Participants reported that in instances where their teachers were familiar with the use of ICT tools, learning became much more engaging. For example, one participant said that using an ICT medium called Gather Town to simulate bargaining and trading in an economic class: “was like super cute instead of being in [regular] class”. However, another participant noted how some teachers were not given the support they needed to use ICT tools to conduct learning. The participant described how “some professors were kind of left in the dust if they didn't really understand how zoom worked”, which often meant that the student “wouldn't have a lecture” if their teacher was unable to record or

conduct a lecture. As a whole, technological literacy is an important factor when it comes to conducting engaging learning environments with ICT tools. The lack of support for teachers to adjust from in-person settings to ICT settings results in an inefficient learning environment.

Engagement Effort

Engagement Effort is operationally defined as the perceived amount of effort required to actively reflect and respond to learning materials and activities. Participants reported needing more effort to maintain motivation and focus during class and when completing assignments due to Depersonalized Communication and strict curriculums. One participant said: “I feel less connected to the material, to campus, and the professors… it's more difficult to just learn and have that motivation to pay attention”. One participant particularly noted that because she was distracted during class, she found that she had “to do more on my own to try to catch up [on] what was missing”. To these participants, setting played a large role in how much effort was needed to not be distracted during class. One participant described how having class in person was helpful for her focus because it was her “dedicated time” and that her “body knows to focus at that time”. She expressed that having recorded lectures compared to an in-person class setting “messed up my schedule a lot”. Overall, participants found themselves more distracted during class when ICT tools were unable to allow personable communication and allow engagement with the material.

Discussion

The current study shows that ICT tools are widely used in high schools and universities during the post-pandemic period. However, participants encountered numerous difficulties and struggled to experience the benefits of soft skills development that, as the literature suggests, should have emerged from the appropriate incorporation of ICT in education (e.g., Ariza &

Sánchez, 2013; Ezekoka, 2015; Ganapathy et al., 2017). The reason behind this is two-folded. Firstly, interaction through ICT mediums has yet to allow for the interpersonal connections that are found in face-to-face communication. Secondly, the pressure on teachers to meet curriculum requirements inhibits their ability to apply constructivism through ICT tools.

To begin with, the participants emphasized their experiences of depersonalized communication, and reported that they lacked motivation to actively engage with the learning content and struggled to stay focused during remote classes. This can be due to the negative impacts of online learning on interpersonal communication. The online learning environment can lead to a sense of isolation and disconnection as online communication provides fewer non-verbal social cues that are essential for effective communication, and therefore students are discouraged from participation and engagement (Alawamleh et al., 2022; Boling et al., 2012). Also, previous studies point out the significance of building a sense of community through effective communication that can motivate students' learning and create a good learning environment, while online courses often give students the impression of predominantly individualized learning (Boling et al., 2012; Duta et al., 2015). Besides, students' lack of motivation during online learning can explain their low interactivity and engagement (Xie et al., 2006; Xie & Ke, 2010). The findings of the current study confirm the difficulties of communication effectiveness faced by students during online learning, and the lack of quality communication and meaningful interaction can explain their undesirable acquisition of soft skills such as higher-order thinking and collaboration in an ICT-mediated learning environment (Ducate et al., 2011; Ma, 2009).

Secondly, the participants expressed restraint on their ability to explore their interests within courses due to specific instructions of assignments, which limited their acquisition and

practice of autonomy skills. As the literature suggests, ICT integration can serve as a platform to apply constructivist, student-centered teaching pedagogy, but it does not suffice to guarantee outcomes of soft skill development (Ganapathy et al., 2017; Rice & Wilson, 1999). Therefore, it is imperative to bring in the impact of high school curriculum policy for a more comprehensive understanding. High-stakes testing, as the result of the No Child Left Behind Act of 2001, leads to the emphasis on the impact of test scores on a range of aspects including students, teachers, and schools (Great Schools Partnership, 2014). Studies show that high-stakes testing has a significant influence on curriculum and teaching pedagogy: teachers tend to contract the breadth of the curriculum and devote disproportional time to test-specific content, accommodate teaching structure into more isolated knowledge that directly links to test, and adopt a teacher-centered pedagogy to ensure coverage of test materials (Agee, 2004; Au, 2007; Polesel et al., 2014). Such a shift in curriculum and teaching is in accordance with the current study, as participants described that they lacked the freedom to explore course content and link cross-subject knowledge, which in turn hampers the development of autonomy skills.

The current study implies that while ICT allows for more convenient communication, the quality of communication decreases in a post-pandemic learning environment. Furthermore, the results highlight how ICT should be used to support a school curriculum that is designed to promote students' soft skill development. More importantly, teachers, schools, and education policymakers need to collaboratively establish a constructivist learning environment via ICT incorporation. The curriculum should allow students the opportunity to explore according to their interests, practice critical thinking, and collaborate. In addition, in order for both teachers and students to use ICT tools effectively in the learning environment, schools should provide adequate resources and support. However, we also want to note that our findings are limited to

only 5 participants. Future research should encompass a wider range of student experiences to improve the external validity of our findings. Also, in accordance with our findings, there should be further research that focuses on the nuances between the combination of different ICT mediums and curriculum topics to better promote effective learning and soft skill development.

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