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Sustainable Transition to Studying Abroad Online during the COVID-19 Pandemic: An Ecological Perspective

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Abstract: In response to the COVID-19 pandemic, study abroad (SA) programs have undergone an urgent transfer to the online format. Although SA online has many merits toward sustainable international education in the post-COVID era, assuring the quality of these programs and sustaining students' learning motivation have been key issues of concern. Moreover, there is still a lack of evidence derived from in-depth qualitative inquiries. To address these gaps, this study takes a close look at an individual's story using a narrative approach to data analysis and employs an ecological perspective focusing on intentionality as the theoretical framework for exploring how the participant conquered the challenges when they transitioned to SA online. Successful plots identified include setting up the online learning environment, optimising the benefits of online learning, and sustaining students' motivation to study. Several obstacles remained unsolved, such as the loss of interpersonal connection and empathy in online communication. This study concludes that the participant's successful and unsuccessful encounters in enacting the affordances of online education were manifested by developed or undeveloped intentional actions as a result of individual-environment mutuality. Some implications are offered for constructing sustainable online SA environments that can diversify and innovate future international education experiences.

Keywords: studying abroad online; emergency remote teaching; COVID-19 pandemic; sustainable international education; ecological perspective; affordance; intentionality; narrative inquiry

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1. Introduction

The outbreak of COVID-19 has profoundly changed the landscape of international education, especially of study abroad (SA) programs. Many such programs have been suspended due to travel restrictions and health considerations. In response to this devastating situation, these programs underwent an urgent transfer to the online format. 'SA online' has become the 'new normality' [1] of international education worldwide.

Assuring the quality of these programs and sustaining students' learning motivation have been key issues of concern [2,3] due to their crisis-responsive nature. Although online learning is not new, the courses that temporarily shifted to an online mode in response to COVID-19 are different from those initially designed to be implemented online [4]. Many instructors lacked experience in teaching remotely, and they had to cope with additional challenges related to technology management and teaching content modification [2,5]. Faculties that developed in-country programs also have little prior experience in virtual programs and, therefore, many programs during the pandemic were developed 'in patchwork fashion' [6]. Moreover, a high level of self-regulated learning skills is required from students engaged in online courses to overcome disincentives to learning [3].

Scholars have called for increased research on students' experiences during the pandemic crises and cautioned about 'students' reduced satisfaction with, decreased motivation for, and increased disengagement in online education' [2] (p. 3). However, although there

has been a growing body of literature on emergency remote teaching since the outburst of COVID-19, it has mostly been focused on general students, with limited attention given to international education contexts [4]. As such, this research contributes to the current literature by presenting an in-depth case study of an international student's experience during the pandemic. Following a descriptive-interpretative qualitative research tradition, data were collected through interviews and monthly reflective journals, and a narrative approach was used to analyse the data. The focus is on how a student solves various challenges when transitioning to online learning.

The case reported in this study is representative of the experience of abrupt transition from normal physical SA to the virtual format in an emergency situation. The subject of this study is an Australian student who participated in a one-year master's program in China in the 2019–2020 academic year. Since the spread of COVID-19 in early 2020, the host institution was shut down and the student had to fly back to Sydney and complete their course remotely for the second semester.

An ecological perspective is employed to explore how the student perceived and utilised (or did not utilise) the resources afforded by the online learning environment. This perspective can provide a deeper understanding of the reciprocal and mutually constitutive relationship between student and environment in which the student develops learning practices agentively. Furthermore, this perspective will inform the construction of a sustainable learning environment for promoting international students' learning motivation and quality in the online SA context. The notion of sustainability in this article is in alignment with its definition in the Cambridge Dictionary, that is, the ability to continue over a period of time [7], which is also the focus of this Special Issue: How online learning can be transited and sustained in various learning environments. Therefore, this study aims to provide implications for how online SA is viable and productive for future use.

Now that a return to cross-border mobility is promising in many countries thanks to the widely used vaccines [6,8], some scholars are speculating whether virtual SA will continue to serve as a legitimate form of SA program even after the pandemic [6]. Therefore, this study will inform not only preparations for future unexpected situations, but also the value of continuing the burgeoning online virtual programs in normal times. The lessons learned from the pandemic time will inspire how to leverage resources for sustainable virtual programs to diversify and innovate international education experiences.

2. Literature Review

2.1. Technology Integration in SA

There are two main strands of research concerning the integration of technology in the SA contexts, namely, the use of technology to enhance traditional SA in-person, and the use of technology for remote intercultural learning 'at home' in-virtual SA programs.

In the traditional SA in-person context, there has been a heated debate regarding the influence of technology on the language and cultural immersion of SA participants. For instance, some believe that the Internet and social networking sites can ruin SA [9] since surfing the Internet in one's first language and contacting friends and family back in one's home country may limit sojourners' engagement in the local communities and culture. Some scholars and SA guidebooks recommend a media pledge (i.e., a pledge for students to not use their digital resources and technology) for SA programs or minimised use of the Internet and mobile devices [10]. However, other scholars argue that technology can be beneficial during SA if students are provided with appropriate guidance and support [11]. Evidence supporting this argument can be found in studies on how Internet connections to home communities can support social and psychological adjustment to a foreign culture [12,13], how online exchanges can help build relationships and develop cultural awareness [14,15], and how technology can be used to foster learning of pragmatics through online feedback and digital ethnography [15,16]. In sum, there is increasing agreement on the value of technology during SA, which is seen as part of the affordances of SA environments.

Another strand of research considers the use of technology for remote intercultural and international education or virtual international exchange (VIE), which is a technology-based educational approach that allows students around the world to have meaningful international exchanges directly from their homes or campuses [17]. Some studies investigate how collaborative online international learning (COIL) has been adopted as an innovative pedagogical approach in the past few years to offer students global learning opportunities 'at home' [18,19]. COIL courses are developed and taught collaboratively by teachers from two countries, with students often participating in online group projects [20]. Studies have shown that students in COIL courses performed better on their coursework compared to those in regular, non-COIL course settings [21]. Other VIE activities include virtual tours of international locations and internationally focused virtual speakers and book clubs [22]. DeWit [23] suggested that the advantages of these VIE initiatives lie in the increased number of opportunities to gain global competencies, enhanced student interest in education abroad, improved collaboration between partner institutions, exposure to new cultures and pedagogies, and reduced administrative costs.

Although these studies provide useful information about the potential of technology for enhancing student practices and experiences while studying abroad, either in person or online, transitioning online during the pandemic differs from these programs due to its emergency nature. The following section reviews the recent literature focusing on the transition of SA programs to the online environment during the chaos of the COVID-19 pandemic.

2.2. SA Online during the COVID-19 Pandemic

Recent studies have explored the impact of online SA programs on international students' learning experiences during the COVID-19 pandemic. Some studies have examined students' perceptions of changing from in-country to online study. For example, Liu and Shirley [5] redesigned a traditional in-country course into an online course, which integrated a variety of online activities, including virtual tours supported by virtual reality (VR) technology. Their study showed that students were satisfied overall with the course. The authors suggested that traditional SA courses can be redesigned as fully online programs, but such programs cannot replace a full immersion and more meaningful and subject-related web VR activities are needed. Ashida and Ishizaka [3] investigated the influences of changing from on-site to online classes, with a particular interest in international graduate students' help-seeking behaviours. Their study found that the students enrolled before the pandemic who had already experienced in-country classes were likelier to seek help from teachers and peers online. The authors suggest that a sustainable learning environment should be maintained by ensuring sufficient online/virtual spaces for teacher-student communication.

While the two studies above are primarily drawn on numeric or quantitative data with supplementary qualitative accounts, Dong and Ishige [4] offered a more qualitatively oriented inquiry. They examined international graduate students' perceptions and experiences of remote learning during the pandemic with data collected via reflective journals. The study found that teaching presence facilitated by learner agency was pivotal to the participants' understanding and experiences of remote learning; the participants also demonstrated mixed emotions in the learning process—while many of them expressed feelings of frustration, they also displayed an appreciation and thankfulness mindset, as well as an isolation-connectedness emotional trajectory.

Apart from the perspectives of international students, Fischer and Cossey [22] investigated the community college staff's perceptions of transitioning to virtual international education. Unanticipated positive consequences included the development of programmatic offerings, improved faculty and administrator support, professional development, increased partnerships and networks, and the ability to leverage existing campus resources. Nevertheless, challenges were spotted in the areas of technology procurement, new partnership development, and lack of faculty capacity. The study highlighted the need to provide

staff with autonomy, resources, and support to explore innovative strategies for sustaining virtual international education.

Particularly related to the case of this study (i.e., SA in China), some studies have reported the experiences of international students in China during COVID-19. Zang et al. [24] explored students' perceptions of and motivation towards online Chinese learning in intensive Chinese courses. They identified poor internet connections, technical issues, and unsatisfactory pedagogical preparation among teachers as the main challenges of emergency online education. Yu and Xu [25], on the other hand, reported a positive online learning status and positive perceptions among participants. Autonomous learning was found to be a critical factor influencing students' online learning processes.

In addition to empirical studies, Upson and Bergiel's theoretical article argued for the value of virtual SA by comparing it with traditional in-country, short-term SA programs [6]. The authors explicated that although virtual SA certainly has its limitations (e.g., lack of travel and limited cultural exchange), its advantages in cost, risk, flexibility, and inclusion allow it to be a legitimate substitution for short-term SA. After the travel restrictions are lifted and physical mobility resumes, traditional short-term SA can evolve into a hybrid mode wherein more virtual elements are included.

Summing up the literature reviewed above, despite the mounting challenges posed by the pandemic, SA online has many merits that can be leveraged for a more sustainable international education in the post-COVID era. Table 1 summarises the main advantages and disadvantages of SA in person and online.

Table 1. Main advantages and disadvantages of SA in person and online.

	SA in Person	SA Online
Advantages	• Physical travel experiences and the arousal of senses (e.g., touch, smell and taste) • Community bonding with peers and foreigners • Immersion in and interaction with foreign cultures	• Little or no cost above tuition • Little risk of travel, health, and student behaviour issues • More flexible time, planning and location choices • More inclusive to non-traditional students (e.g., reduced concerns about cost, discrimination, physical disability, etc.)
Disadvantages	• Costs for flights, housing, meals and the need for other financial aids or loans • Risks of travel, health, and student behaviour issues • Bounded time, planning, and location choice • May not be accessible to non-traditional students (e.g., concerns about poverty, discrimination, physical disability, etc.)	• Lack of physical travel experiences and the arousal of senses (e.g., touch, smell and taste) • Lack of community bonding with peers and foreigners • Lack of immersion in and interaction with foreign cultures

The challenging conditions under the pandemic can be an opportunity to reshape higher education and foster sustainable international education. However, the current literature still lacks evidence that can explain individual trajectories, developing processes and subjective perceptions using more in-depth qualitative methods.

This study will contribute to the literature by taking a close look at an individual's story using the case study method. Three questions are addressed in this study:

1. What challenges did the participants encounter when transitioning to SA online?
2. How did the participant conquer these challenges?

3. What influenced the effects of conquering these challenges?

3. Theoretical Framework

An ecological perspective on human development underscores the relationship between individual actors and the physical and social environments within which they act [26]. Therefore, a student's learning process cannot be fully investigated by simply emphasising either the person or the environment—both should be examined simultaneously, with special attention given to the interaction between the two [27]. Gibson [28] proposed the ecological concept of 'affordance' to explicate human-environment mutuality which explains how the environment offers species-specific action possibilities. For instance, a tree might induce the climbing action of a monkey, but not of a dog. In human psychology, how the affordances in an environment are picked up by an individual is subject to whether the individual finds the affordances relevant. An educational implication of affordance is that the design of a learning environment should consider the creation of affordances that can be easily detected and picked up by students.

The term affordance has been constantly developed further by later researchers since its inception. Young et al. [29] recently contributed to the theorisation of affordance by explicitly highlighting the notion of 'intentionality.' Instead of focusing on affordances as stable and inherent properties of the environment, intentionality points to a focus on the constitutive role of the ongoing behaviour of an intentionally driven agent perceiving and acting on the affordances [29]. Three main constructs underpin Young et al.'s conceptualisation of intentionality: individual-environment mutuality, intentional dynamics and dynamics of intentions.

3.1. Individual-Environment Mutuality

One major contribution of Young et al. [29] and those who built on their research [26,30] is the explicit acknowledgment of the agentive activities of intentionally driven individuals in the environment, that is, individual-environment mutuality [26]. In this mutuality, affordances-effectivities and perception-action should be understood as duals [29], since 'affordances are located neither in the environment nor in the learner. Instead, they are intended to capture the units of analysis that refer to both the environment and the learner in a complementary way' [31] (p. 35).

Effectivities in the affordance-effectivities dual represent the shared capabilities of a specific category or class of agents to act [32]. An example offered by Young et al. [29] is that a doorknob has the affordance of being turnable but only for agents who can turn it; it is not turnable by a dog that does not have hands or an infant who has insufficient strength.

Furthermore, Young et al. [29] elucidated the importance of the perception-action dual, with an emphasis on the action/control side. The authors explained that 'doing of some actions enters [into] the situation model as an entity' and that 'the occurrence of this behaviour would then lead to a recursive process in which the affordances would now be re-defined with the emergence of a newly "tuned" perceptual system.' [29] (p. 59) Therefore, action can tune the attention of learners to allow them to detect extra affordances in the environment. A concrete example is that different note-taking actions (e.g., writing down keywords strategically versus everything said by the lecturer) would enable diverse trajectories of detecting affordances.

In short, a full analysis of affordance should acknowledge the individual-environment mutuality so that both the perceived properties of the environment as well as the effectivities and actions of the agent are addressed explicitly. This mutuality is illustrated in Figure 1 as adapted from Stelma and Fay [26] and Stelma [30]. This diagrammatic representation does not intend to separate and bound environments from individuals; it aims to clearly illustrate how a person's development is influenced by the interaction between the two as mediated by the person's intentional actions.

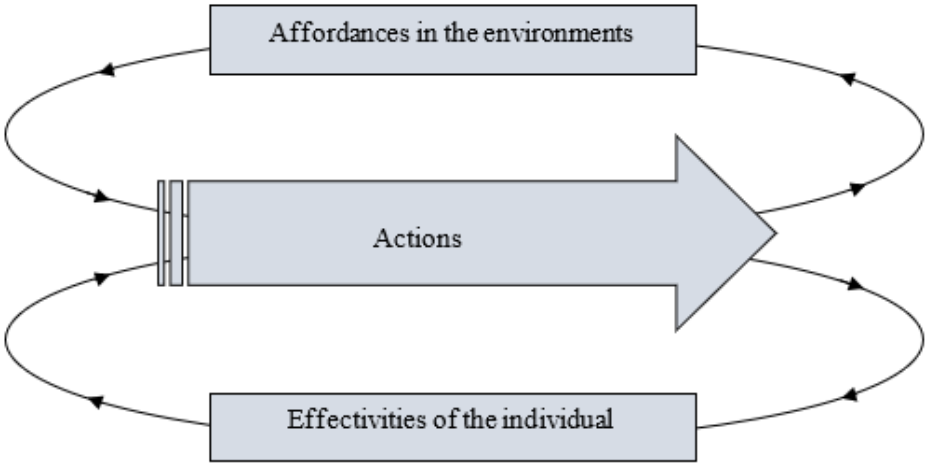

Figure 1. Model of individual-environment mutuality.

3.2. Intentional Dynamics

Supplementing the individual-environment mutuality, the construct of intentional dynamics [29,33] refers to an ongoing unfolding of behaviours of an intentionally driven agent as they perceive and act on environmental affordances and move towards their currently adopted goal. Young et al. [29] adopted an ontological descent to illustrate the cascading constraints in the environment on degrees of freedom to adopt certain goals and actions. Due to the constraints on different hierarchical levels, 'degrees of freedom are gradually squeezed out from all possible actions to only those that meet the constraints of the moment, given the intentions of the learner, the learner's particular abilities to act (effectivities) and the affordances of the current environment' [29] (p. 52).

Along this line, Stelma [30] further defines intentional dynamics as the 'shaping influences' of different layers of environments, which are expressed in the form of intentions communicated by others acting on behalf of different parts of the environments. The intentions of these other people 'create resources and expectations that cascade through the system to shape' [30] (p. 372) the individual's ecology of activity. These intentions in the environments become perceived 'expectations' [26] (p. 524) that are either directly communicated or indirectly present, further interacting with the individual's own intentions to shape the situations in which they take actions to achieve their goals. In Stelma's research for instance, the intentional actions of doctoral students are influenced by their perceived expectations in the environment, including those from important others, supervisors, institutions or even national/international contexts.

Integrating the intentional dynamics element in Figure 1 results in the updated model in Figure 2.

3.3. Dynamics of Intentions

In addition to the intentional dynamics of an individual's ongoing activities towards their goals, Young et al. [29] also suggested that the individual, as a complex system, can be driven to pursue multiple intentions simultaneously. The construct of 'dynamics of intentions' denotes that each individual has 'goals that change in priority as they interact with their environment' [29] (p. 53).

Concrete examples of dynamics of intentions are provided in Stelma and Fay [26] for research education. They found that profession-oriented master's research students struggle to balance the intentionalities of conducting research (i.e., responding to research questions as adequately as possible with sufficient evidence), developing researcher competence (learning about and from conducting research), and professional development.

It should be emphasised that there is also a time dimension involved in the dynamics of intentions, as seen in Young et al.'s [29] (p. 53) explanation of the term as 'changing goals'.

An individual may prioritise a certain goal on a specific occasion among all possible ones, and new goals are able to be introduced by, for instance, teachers or engaging environments.

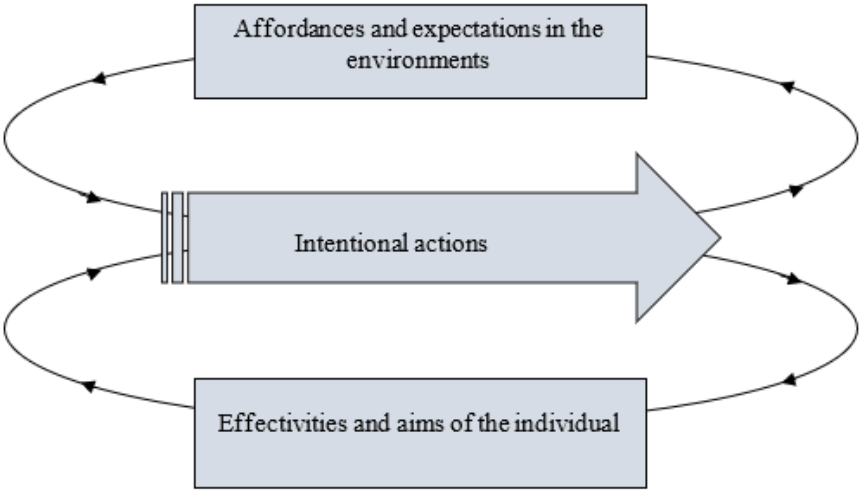

Figure 2. Model of individual-environment mutuality integrating intentional dynamics.

Since the plural forms in Figure 2 already indicate the multiplicity of dynamics of intentions, Figure 3 only adds the time dimension to the model. This mode now represents the full theoretical framework adopted in this study as inspired by the ecological perspective. This figure was entitled 'ecological model of intentionality' which encompasses all the three constructs discussed above.

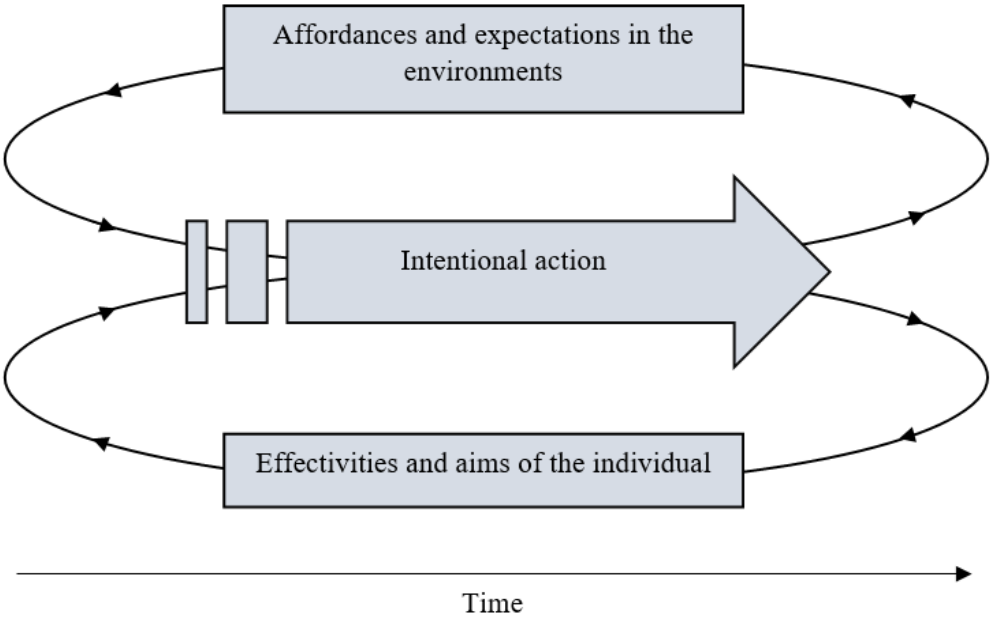

Figure 3. Ecological model of intentionality.

In sum, understanding a learning situation using the ecological model of intentionality should entail the interpretation of the three constructs below:

- Individual-environment mutuality, consisting of: (a) the affordances-effectivities dual which concerns the joint effect of the environment and individual properties on the individual's action, and (b) the perceptions-actions dual which focuses on the actions side and concerns the re-tuning effect of the individual's actions on the environment.
- Intentional dynamics. It captures how an individual's use of environmental affordances is affected by intentions at different levels. It focuses on the shaping influence

of the individual's perceived expectations in the environment on their actions as they strive to achieve their own aims.

- Dynamics of intentions. It denotes the multiplicity of an individual's goals, or a change of prioritised goals and an emergence of new goals across time.

This framework guided the interpretation of data in this research.

4. Materials and Methods

A case study method was adopted to develop an in-depth understanding of a particular situation—that is, a student's experience of transitioning to SA online during the pandemic. This method will contribute to a sophisticated picture of SA online in emergencies by offering nuanced information and fine-grained interpretations.

4.1. Research Participant and the SA Program

DM (pseudonym) was a male Australian anglophone who applied for a scholarship with a top university in China for a one-year postgraduate study in Beijing. Before that, he obtained his bachelor's degrees on international relations and languages at a world-class university in Sydney. His Chinese reached an intermediate-advanced level, and he had passed HSK (Hanyu Shuiping Kaoshi, or the international standardized test for Chinese proficiency) Level 4. DM was motivated to learn Chinese by an awareness of the significance of Australia-China relations and the position of China on the global stage. He hoped to take an active part in improving the Australia-China relationship, and always had the ambition to work in China someday or on China-related issues.

The SA program in which DM participated was an interdisciplinary master's program for Chinese studies offered by S Academy (pseudonym) at the host university from the autumn semester in 2019 to the spring semester in 2020. Aiming at cultivating global citizens with a deep understanding of China and connecting China with other countries, the Academy recruited scholars from around the world. While the content courses were taught in English, there were also Chinese language courses for international students.

DM completed the 2019 autumn semester in Beijing but had to leave China at the end of January 2020 due to the spread of the coronavirus. Thus, he finished the spring semester courses, assessments, and the major thesis remotely in Sydney. Several platforms were used by the host university to deliver online courses, including Blackboard, Canvas, ClassIn and Zoom. Most lectures were recorded and uploaded to Canvas, considering the diverse time zones of international students. The courses were structured in almost the same way as when DM was attending them in person—a weekly class lasting two hours and weekly homework assignments throughout the semester. Apart from having online classes, DM was also focusing on hunting for a job related to Chinese affairs.

4.2. Data Collection and Analysis

We tracked DM's experience for one year with data collected through a pre-departure interview (June 2019), eight monthly reflective journal entries (from September 2019 to May 2020, see Table 2 for submission dates), and an end-of-program interview (June 2020). The pre-departure interview ascertained DM's background information and previous intercultural and language learning experiences. For the reflective journals, broad guidelines were provided, although we encouraged DM to write down whatever experiences or perceptions were salient to him. The end-of-program interview further collected more in-depth information about his holistic SA experience, with special attention given to the online learning period. While the analysis of this study primarily focused on the data about DM's online experience in Entries 5–8 and the end-of-program interview, other journal entries also provided an important context in which the findings were interpreted.

Table 2. Reflective journal entries.

Journal Entry	Submission Date	SA Mode
Entry 1	27 September 2019	In-country
Entry 2	27 October 2019	In-country
Entry 3	3 December 2019	In-country
Entry 4	29 December 2019	In-country
Entry 5	27 January 2020	Online [1]
Entry 6	2 March 2020	Online
Entry 7	1 April 2020	Online
Entry 8	1 May 2020	Online

[1] Although DM had not left China and started online learning when he submitted Entry 5, he mentioned the influence of COVID-19 on Chinese universities, the postponed commencement of the new semester, and how he felt heavy hearted when he was advised to leave China. In this sense, Entry 5 represents the beginning of the transition to a mode that differed substantially from a normal SA experience.

We followed a descriptive-interpretative method [34–36] for qualitative data analysis. We first described and classified what was presented in the data; then, we interpreted the data using the theoretical framework of this study. To rearrange the meaning units in the data and allocate them into interpretative themes, this study adopts a narrative approach that concerns the unfolding of a story [37]. We identified distinguishable plotlines in DM's narrative through the sequential and temporal ordering of events that are configured into a whole and 'governed by a logic of transformation [38], wherein an initial state of equilibrium is transformed by actions that bring about a second state of equilibrium' [39] (p. 366). Because individuals' stories often involve disruptions and disturbing occurrences [40], narrative analysis was used to investigate international students' development in turbulent times [41]. It is suitable for this research, focusing on an individual's experiences of conquering the challenges of transitioning to new situations.

To describe what was presented in the data, we sorted out the following elements of a narrative [42] in each of the plotlines identified:

- A cast of characters. We identified people who appeared in DM's story.
- A precipitating breach of expectations (i.e., complications). We identified how transferring to online learning affected DM's SA experience and the challenges he encountered.
- The resulting actions by which the characters change or come to terms with the breach. We identified how DM and other characters dealt with the new situation.
- A resolution. We identified whether an event represented a successful enactment of the affordances of the online format of SA or whether there remained challenges to be solved.

These narrative elements allowed us to describe the process of solving the challenges that emerged in the transition process. In the following sections, we first report successful and unsuccessful stories of DM's experiences, describe the narrative elements in these plots, and, then interpret the findings for each plot using the ecological model of intentionality.

5. Results

5.1. Successful Enactment of the Affordances of SA Online

Overall, DM was satisfied with the transition to the online mode. He mentioned several times that 'online education is actually almost works too well' (Entry 7) and that 'the benefits of online classes far outweigh the challenges' (Entry 8). However, achieving a successful enactment of the affordances of SA online requires intentional actions to conquer a variety of challenges. Three plotlines were identified in DM's narration of how these challenges were successfully addressed.

5.1.1. Setting up the Online Learning Environment

Technical issues brought about by the abrupt move online posed only minor challenges in DM's case. In fact, he was 'impressed by how quickly and seamlessly [the university]

adapted to online learning. While there were some minor teething issues for setting-up the requisite software, it was a fairly simple transition.' (Entry 6).

Setting up different platforms to deliver online courses was indeed confusing at the beginning, as DM described:

At the start of the semester, it was rather confusing, and I had the impression that a lot of decisions were being made without consideration of how to streamline the user experience for students. For example, all students can access a 'Blackboard' profile via the student portal, but most classes are actually held on a platform called 'Canvas', which is not accessed through the student portal. Another piece of software, ClassIn, has been used for several classes but has ongoing technical problems. While classes are mainly organised via Canvas (e.g., distributing course resources, submitting homework), the classes are conducted via Zoom and are then recorded and uploaded to Canvas (Entry 7).

Despite the initial confusion, the institute and the cohort gradually sorted out the most effective way to adopt these digital platforms:

While the semester had begun with multiple modes of delivery for online classes, some of which seemed redundant or conflicting, it was gradually streamlined to only three main channels.

Firstly, WeChat became a more prominent fixture in classes, as questions, homework, assignments, and notices were shared on class and cohort-wide WeChat Groups.

Secondly, Canvas became the main 'profile' for students, as it contained almost all coursework materials and official notices.

Thirdly, a loosely defined group of ad-hoc solutions were found by students, teachers, and other faculty alike. For example, every student in my cohort was asked to provide a monthly update on their recent interactions with their thesis advisors. . . using free online survey software (WenJuan.com, accessed on 14 October 2022).

While the lack of consistency requires some adjustment, I think it shows how innovative some people are becoming with their approaches to applying digital solutions to new problems (Entry 8).

In this plotline, a cast of characters included DM and his teachers and peers who actively explored the uptake of software. The complication was that the program had to shift to a new online mode that no one was familiar with, which inevitably caused some difficulties. Thus, this shift resulted in the cohort accepting certain software while abandoning others, based on their deepened knowledge about the affordances of each type and their own educational aims. They also explored the unanticipated use of technology, as seen in the example of the online survey software. The success of the process of setting up the online learning environment depended heavily on the constant exploration of the appropriate use of different software available.

Interpreting the data relating to the ecological model of intentionality helps explain why DM could successfully set up an online learning environment.

- Individual-environment mutuality. In this case, the learners' adoption of certain software for online learning was co-influenced by the affordances of different platforms (e.g., instant communication, information storage, tracking progress, etc.) and the learners' abilities to navigate and coordinate the functions of these tools, corresponded to the affordances-effectivities dual. In particular, the learners' increased familiarity with the functions of different platforms played a critical role in their enhanced choice of software. As for the perception-action dual, which emphasises the action side, the learners' constant exploration of the appropriate use of software retuned the technological environment, causing it to be friendlier than it was at the beginning.
- Intentional dynamics. DM's intention was to transition to online learning smoothly using the software available. His choice of software was facilitated by a perceived expectation in the learning community of how different platforms should be adopted appropriately and how creative approaches can be used to 'apply digital solutions to new problems'.

- Dynamics of intentions. DM developed clearer goals for using each kind of digital platform. This facilitated a more structured and efficient online learning environment.

5.1.2. Optimising the Benefits of Online Learning

Apart from describing his experiences of solving technical issues, DM also depicted how he managed to take advantage of online learning, the first benefit of which is flexibility:

I also appreciate the newfound flexibility this arrangement has afforded me. Previously, I spent 10 h per week commuting to university; however, this is now free time that I can dedicate to other tasks and my studies. It also allows me to pursue other projects, independent research and focus on job hunting (Entry 6).

I can speed up the recordings of my lectures to double-speed, allowing me to spend half as much time 'in class' (Entry 7).

In addition, DM also found the courses to be better organised:

I've noticed that my courses have been better structured in terms of having a clear plan for the semester's course matter, readings and assignments. This is best reflected in the detailed posts on Canvas that contain this information well in advance. Conversely, when we had in-person classes, my professors would often change course material or assignment requirements at unpredictable times (Entry 7).

He was also impressed by how responsive the professors, teacher assistants, and university staff were online during the pandemic:

I've noticed that my professors and TAs [teaching assistants] are actually more responsive now because they have to be contactable via email or WeChat…I'd have to follow them up 10 times to get a due date for an assignment or something. And this time around, it's like you send them a WeChat message and you get a response straight away (End-of-program interview).

When asked if DM preferred having classes online or in person, DM said:

I personally really like online classes, I think it also means that you could work at the same time as studying. But maybe an in-country, in-person portion of the study is good. I had a semester to build a global network and meet some incredible people. If I had done everything online, it would've been a shame to have missed all of that. So, it would be nice to have a bit of both. But if I had to choose one, I'd go online (End-of-program interview).

It is interesting that, even acknowledging all the benefits of in-country SA, DM, nevertheless, would prefer studying online. However, situating his perception in his holistic SA experience suggests that staying in China for one semester contributed a great deal to his positive attitude to online learning and successful transition. As he mentioned:

My networking with [expatriates] in China has helped me discover professional opportunities in China … but I would likely not have found these opportunities if I had not been based in China already (Entry 6).

DM's case resonates with Ashida and Ishizaka's finding that students who had already gone abroad before the pandemic adapted to the online education mode more easily than those who participated in SA completely online after the travel bans [3].

The cast of characters in this plot includes DM and the university staff. In the face of the complication of transferring online in an emergency, the university staff changed their actions, which were positively perceived by DM as being more organised and responsive. DM took advantage of the newly perceived affordances and took proactive moves to maximise online learning. Since he did not prioritise in-person immersion in the second semester as he did in the first semester, his strategy was to study at preferred time and pace, allowing more time for self-initiated projects and job hunting. The resolution is that DM not only solved the challenges of online learning but also developed an accepting attitude towards SA online.

An interpretation of the data using the ecological model of intentionality more thoroughly explains how DM managed to optimise the benefits of online learning:

- Individual-environment mutuality. DM's utilisation of online resources was influenced by both technological affordances (e.g., information accessible anywhere and

anytime) and his own abilities in terms of time management as well as the use of these digital tools. While this online environment afforded flexibility, responsiveness and structured learning content, DM's own skill in monitoring his learning process enabled him to take advantage of these affordances (i.e., affordances-effectivities dual). His customisation of online learning activities to his own preference reflexively shaped the environment to become both relevant and beneficial (i.e., perception-action dual).

- Intentional dynamics. The people who interacted with DM (university staff, professors, and teaching assistants) contributed to a shared expectation of the new online environment as flexible, organised, and responsive. Therefore, DM's intentional activities (his pursuit of self-initiated projects, focus on job hunting, speeding up of lecture recordings, and contacting professors on WeChat) to maximise the online experience were promoted by perceived flexibility and responsiveness in the environment.
- Dynamics of intentions. Since DM had already experienced China in person in the first semester, his main goal changed from full immersion to job hunting in the second semester. This change of goals allowed him to identify the relevance of online learning to his current pursuits, thus, optimising his experience.

5.1.3. Sustaining Motivation to Study

DM was a highly motivated learner, which can be seen from his pre-pandemic journals. He mentioned that he '[wished] to validate or address gaps in [his] understanding of the course materials and [is] achieving a high level of results in each assessment'. (Entry 3). In fact, he 'scored "A" in every course' (Entry 6). Even as a highly self-regulated student, DM encountered the challenge of sustaining motivation in online study:

[Keeping motivated] was initially a major challenge, as my current situation does not have any of the routine, structures or scheduling of a normal in-person semester. The biggest challenges so far have been keeping engaged with my studies and replicating the feeling of a full-time student workload. (Entry 7).

However, he managed to develop regulated online learning behaviours with effort:

I try to remain disciplined by keeping a disciplined study regime and organising my various tasks as I would if I were attending classes in person waking up at the same time as if I were starting the work/study day. I have a regular midday break to eat lunch, precisely for the same duration as when I had in-person classes last semester.

I also employ the 'carrot and stick' approach to staying motivated, such as by buying myself a present when I finish a major assignment. When I feel like I've had enough for the day. I can simply close my computer and pick it up later when I feel refreshed and can re-engage with my studies. Conversely, I've set countdown timers on my desktop to track the deadlines for assignments . . . This approach helps me stay oriented and use my time more effectively. (Entry 7).

In this story, DM was the main character and the precipitating breach was the disruption of DM's normal routine as a highly motivated student. The resulting actions were DM's strategies to keep himself disciplined. The solution turned out to be effective—he received an 'A' grade in every course. DM's strong motivation to achieve high grades and high self-regulating abilities are crucial for sustaining motivation in online learning.

This plotline can be interpreted from an ecological perspective as follows.

- Individual-environment mutuality. DM's efforts to sustain his study motivation were not only affected by the affordances available in the environment (online course materials that were accessible at any time) but also his own high self-regulating abilities. His regulated learning behaviours, in turn, fed into his environment, making its positive affordances more detectable and usable for DM. These same flexible features of online learning might be hindrances for students lacking self-discipline strategies.
- Intentional dynamics. It has been mentioned that DM perceived a shared expectation of the new online environment being flexible, organised and responsive. This perception was linked to DM's strong intention to achieve high grades in the program and encouraged him to maintain a good study routine.

- Dynamics of intentions. DM always intended to achieve high grades in his studies. However, in response to the transition to online, his specific goal of replicating the scheduling of a normal in-person semester emerged, which further promoted his self-regulated learning activities.

5.2. Unsolved Obstacles to SA Online

While DM's overall transition was positive, he encountered obstacles that remained unsolved until the end of the program, even after putting in effort. Two plotlines were identified in his narrative.

5.2.1. Losing Interpersonal Connection

DM mentioned several times that an 'important' or 'real' value of the program (see in the quotes below)—interpersonal connection—was lost in the online format:

In addition to the learning and research components of the program, the equally important value of my program is the networking and intra-cohort dialogue that can only be entered into when in person. Online classes [are] devoid of the relationship-building, networking and discussion-based learning that takes place in in-person classes. (Entry 6).

The real value of a program, the one I was on, is the networks, the intercultural skills that you learn from networking with people from around the world. You can't really do as well via online means. I don't think it's a lower quality education. If anything, it might actually be a bit better, but in that specific aspect, the value isn't the same. (End-of-program interview).

For DM, interpersonal connection was the most valuable thing gained from the SA program, even though online learning 'might actually be a bit better' in other aspects. Therefore, he hoped to maintain these relationships. Despite the perceived challenges, he attempted to keep in contact with his networks via Zoom, along with some extra help:

I felt that I needed to make a more concerted effort to bridge the geographical divide and maintain relationships with my peers without the usual touch-points of sharing a classroom, cafeteria, dorm or field trip . . . To address this issue, I scheduled Zoom calls with different peers every week. Additionally, our Residential Assistants scheduled group calls for members of our cohort, which was also helpful in maintaining our connections. (Entry 8).

However, these efforts did not lead to a satisfactory resolution. DM's final journal brought this plotline to a pitiful end:

As I conclude the first year of my Master's degree, I feel this semester has come to a rather bittersweet end. I've certainly gained a lot of new knowledge. However, as previously mentioned, a significant element of the Master's program I am undertaking is interpersonal relationship development, discussion and cultural exchange. Despite efforts to facilitate this, online coursework is an insufficient substitute for the interpersonal factor. (Entry 8).

The characters in this plot include DM, his networks established in China with whom he lost connection, and the residential assistants as the 'helpers'. Although DM tried to reconnect with his networks, he had to accept that online coursework is insufficient, which suggests that the obstacle was not successfully removed. SA online is limited in supporting possible intentional actions involving interpersonal contact.

Interpreting the data from the ecological perspective provides additional insights into why DM felt that his attempts to reconnect with his networks were unsuccessful:

- Individual-environment mutuality. The affordances-effectivities dual suggests that whether an individual utilises the affordances in the environment is contingent on both the affordances available and the individual's effectivities. On the one hand, DM perceived that the online mode was limited in affording interpersonal contact compared to in-person SA. On the other hand, he confessed that SA online required more 'concerted effort to bridge the geographical divide', implying his own effectivities were not sufficient to address the technological limitations if no external support was

provided. Limited opportunities for interpersonal interactions resulted in the lack of possible affordances for efficient online interaction (e.g., multimodal features) that were detectable for DM.

- Intentional dynamics. How an individual utilises the resources in the environment is also influenced by the expectations communicated in the environment and the individual's own aims. Since DM had a strong intention to build interpersonal connections during SA, as well as an expectation of promoting online interaction was communicated in the environment (e.g., help from residential assistants), DM managed to take action and organise online meetings. However, he nevertheless perceived these efforts to be insufficient, since the resources available could not meet DM's prioritised goal, as explained below.
- Dynamics of intentions. For DM, a salient goal of the SA program was networking and establishing relationships with like-minded global talents all over the world. Therefore, DM prioritised maintaining these relationships, especially in the second semester, when he sought a career related to China. Towards the end of the program, he had to accept that the available resources in the online environment were still limited to meet this goal.

5.2.2. Lack of Empathy in Online Communication

The lack of empathy is another obstacle that permeates DM's narrative. It brought about the experiences of disengagement and misunderstanding in online communication. First, because of the lack of empathy, many students (who were actually high-talented students, as they were recipients of scholarships) became less engaged in class:

Class conversations are less robust because some of the empathy is lost in teleconferencing. Instead, many students are simply silent during class, while others parrot each other and agree unequivocally with the professor. (Entry 6).

During the end-of-program interview, the interviewer (one of the researchers) asked what DM would do in class. He said that he would feel more reserved due to the perceived lack of empathy:

Interviewer: Do you think you would be different in online communication? Do you feel more, how to say, relaxed?

DM: If anything, I probably feel a bit more reserved just because I think. . . you don't have the same sort of empathy that you have with somebody in person. If you're having a disagreement with a classmate about a particular point. I want to be able to read their body language, read the tone of their voice. There's so much more to interaction than just seeing them on the screen. . . And people often are a little bit less engaged in the online classes. . . People are probably watching Netflix on the other screen, so they don't want to engage in a heated debate.

According to DM, online communication means that you cannot tell if someone shares the mindset to engage in a debate. In other words, expectations in the environment were ambiguous. Consequently, an in-depth exchange of thoughts was missed.

As the semester progressed, DM observed a downward trend in the frequency of online discussions:

As I approached the end of the semester, I noticed that the limited interpersonal interactions and discussions that took place early in the semester became less frequent. (Entry 8).

These utterances show that although technology facilitated the continuity of distant communication, the content discussed was not in great depth or of satisfactory quality.

Second, the lack of empathy also led to misunderstandings in communication, as seen from the narrative below:

I recently had an unfortunate incident of unsuccessful communication with a professor. The grade I received for an assessment was lower than what I had hoped for, so I politely asked the professor for feedback. The professor seems to have interpreted this as me questioning their judgement, and email does not allow me to show the empathy, respect

and politeness that I would have had if the conversation had taken place in person. This particular professor now sends very rude and abrasive messages and provides condescending feedback on my weekly homework submissions. Perhaps this situation could have been avoided if a better relationship had been developed through in-person classes. (Entry 7).

From DM's perspective, his polite request for feedback was interpreted by his professor as him questioning their judgment. However, it was also possible that DM misinterpreted the professor's responses as 'condescending'. Either way, the lack of opportunity to show empathy using non-linguistic clues (e.g., smile, eye contact, and tone) in email communications introduced misunderstanding.

The cast in this plot included DM, his professor, and his classmates. In the face of the complication of moving to online learning, people retreated from engaging in class discussion or failed to show empathy in communication. The resolution of the situation was that DM became more reserved in class discussions and requesting feedback online.

Interpreting the data using the ecological model of intentionality explains in greater detail how in-depth discussions were prevented by a lack of empathy in online communication:

- Individual-environment mutuality. Regarding the affordances-effectivities dual, this example suggests that both the perceived drawbacks of online communication and DM's lack of abilities in communicating empathy online resulted in his reserved behaviours. DM's reserved learning behaviours, in turn, became part of the reality of the learning ecology, corresponding with the perception-action dual.
- Intentional dynamics. DM had a strong intention to engage in in-depth discussion, as can be seen from his proactive interactions with professors and his goal for high achievements. However, the expectations communicated by others interacting with DM in the environment did not encourage the in-depth exchange of thoughts. This tension between DM's own aims and the expectations in the environment led to his reserved attitude in online discussions.
- Dynamics of intentions. As mentioned, DM prioritised interpersonal interactions and exchanges of thought during SA online. However, as the semester progressed he realised that such a goal could not be fully achieved in the online SA environment. This may have resulted in decreased intention to seek in-depth discussion opportunities in the online program.

6. Discussion

A full analysis of the context of technology-facilitated learning from the ecological perspective, as Young et al. contended, must acknowledge 'the complex nonlinear dynamics that unfold as an intentionally-driven learner interacts with a technology-based purposefully designed learning environment' [29] (p. 48). From the three plots concerning DM's successful enactment of the affordances of SA online, we can identify the opportunities provided by the new environment for developing his intentional actions for sustaining learning quality and motivation during the COVID-19 pandemic. The constant development of the intentional actions interacted reciprocally with both the affordances and expectations in the environment, as well as DM's aims and effectivities. This reciprocal and mutually constitutive cycle of developing intentional actions is illustrated in Figure 4.

Similarly, the two plots concerning unsolved obstacles to SA online provide insights into the missed opportunities for more intentional actions that might contribute to an improved SA online experience. The perceived negative affordances and expectations in the environment were at odds with DM's strong intention to build networks and exchange thoughts, as this conflict was combined with DM's lack of capacity in certain aspects of online communication. These factors jointly led to the loss of some intentional actions, including building more interpersonal connections and engaging in more in-depth online discussions. Although he tried to fix these challenges by proactively engaging in class and contacting his networks via videoconferencing, DM noticed a declining situation in terms of the challenges he encountered, and he could only helplessly accept that SA online fell short in helping him achieve important goals he prioritised (among others, such as

completing online lectures), that is, in-depth exchange of thoughts and building networks for his future career. A vicious cycle to illustrate how opportunities were missed in SA online is represented in Figure 5.

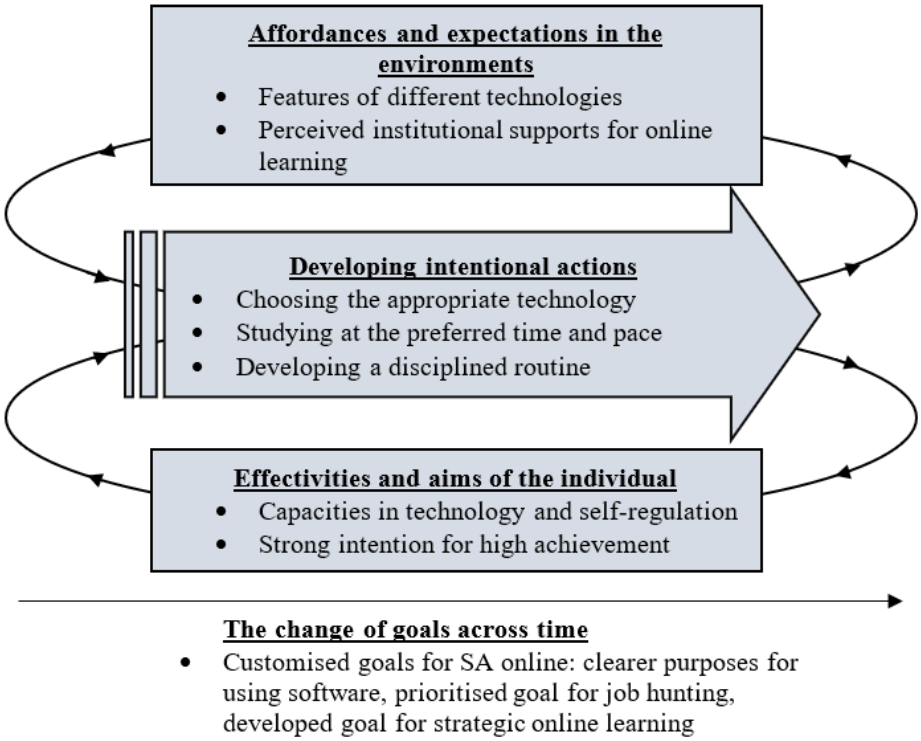

Figure 4. Reciprocal cycle of developing intentional actions in DM's case.

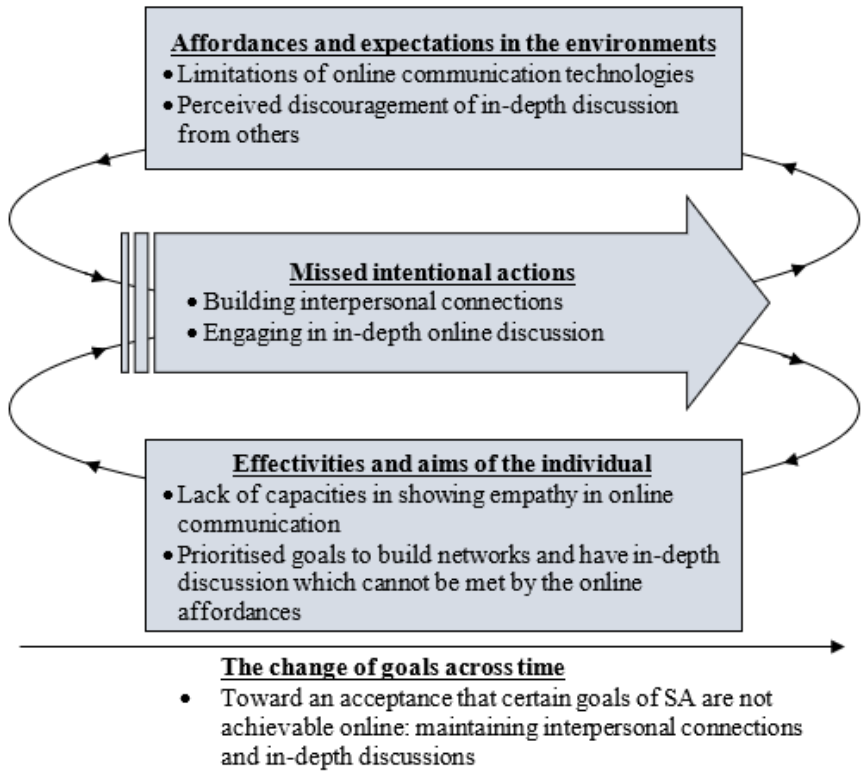

Figure 5. Vicious cycle of missed intentional actions in DM's case.

While a supportive environment and positive personal traits jointly promote individual development, the identified lack of development cannot be simply attributed to negative environment features and personal traits. As our data illustrated, even supportive environments (e.g., assisted Zoom meetings) and positive personal traits (DM's strong motivation) cannot solve the obstacles to the development of intentional actions. The main reason for this was that the affordances in the environment did not match DM's prioritised goal for the SA program. In other words, the environmental resources might be enough if DM's prioritised goal was to complete online courses rather than building networks for his future career. Therefore, the lack of development should be interpreted as a mismatch between affordances and expectations in the environment and the effectivities and aims of the individual.

Inspired by an enriched understanding of affordance-focusing intentionality, this study provides additional details about how and why the student used certain affordances of the environment to address the challenges of online learning and why certain obstacles remained unsolved.

A key finding in previous studies that this study supports is that SA online has many advantages but cannot fully replace traditional in-person education [5,6]. An additional contribution of this study is that instead of simply identifying the benefits and challenges of SA online, it focuses more on international students' agentive responses and offers more sophisticated explanations of their actions and perceptions. In the previous literature, Ashida and Ishizaka [3] found that students' pre-pandemic, in-country experiences would contribute to their active engagement in the online mode of SA because they were already familiar with the teachers. Dong and Ishige [4], by contrast, found that teacher presence was a key factor influencing the participants' online experiences. Yu and Xu [25], additionally, suggested that autonomous learning was critically important for online learning. While agreeing with the findings of these studies, this research further argues that none of these factors can work alone to shape the participants' online SA trajectories. Rather, environmental and individual factors are mutually influential, co-shaping and reflexively shaped by the individual's intentional actions.

Understanding SA online from an ecological perspective can shed new light on its affordances. For instance, the challenges of technical difficulties and lack of motivation reported in previous studies [3,22,24] are interpreted differently in this study. Instead of understanding them as static deficiencies inherent in the environment or the individual, this study found it more appropriate to define them in relation to the individual's ongoing development of intentional actions, evident in the unfolding of his narrative. Thus, these initial challenges were successfully addressed, or even turned into opportunities, through the reciprocal interaction of individual and environment. In contrast, while autonomous learning [25] and student agency [4] were reported to be critical factors to the success of SA online, this study further illustrates that even highly regulated students may encounter unsolvable obstacles due to the mismatch between perceived expectations in the environment and their own intentions, which may further lead to their reserved behaviours. These arguments add richness and depth to the current understanding of the opportunities and challenges of SA online.

7. Conclusions

Since assuring the quality of online SA programs and sustaining international students' learning motivation and engagement during COVID-19 were widely concerned by scholars [2,3], more nuanced knowledge about international students' experiences and perceptions through in-depth qualitative inquiry is necessary. This qualitative case study helps address this gap. In contrast to other qualitative methods (e.g., grounded theory) that focus on disaggregating individuals, the narrative approach adopted in this study refers to the entirety of a person's account. It emphasises that the nature of an event or a belief is only found as it is placed within the context of the whole narrative in relationships with other events in a broader interpretive framework [43]. Therefore, DM's responses to

the transition online were not understood as context-free behaviours, but part of a whole plot that unfolds from the emergence of challenges to their resolution. This provides a more detailed picture of the unfolding process of DM's enactment of the affordances of SA online.

One limitation of this study is that the focal student can only represent a case of a highly self-regulated and motivated student. It is also imperative to investigate the experiences of less self-regulated students whose online SA experiences may undergo distinct trajectories. Understanding how these students perceive and act upon the affordances of SA online can help them develop more sustainable learning behaviours and motivation. While case studies have traditionally focused on single cases [44,45], some scholars believe that multiple cases may strengthen the findings [45,46] and improve the applicability of research [40], although the latter also has its disadvantages (e.g., the loss of details and the possible lack of comparability among cases). In addition, although this case study can provide more nuanced details than the quantitative method, we also acknowledge the value of the latter approach in providing more generalisable implications. Future studies can address these issues and complement the findings of this study by offering alternative research designs.

By employing an ecological framework following Gibson's [28] concept of affordance and its recent development focusing on intentionality [26,29,30], this study has found that the focal student's successful and unsuccessful encounters in enacting the affordances of the online mode were manifested by developed or undeveloped intentional actions as a result of individual-environment mutuality. The constructs of intentional dynamics and dynamics of intentions were found to be useful in interpreting the shaping influences that drive the individual's actions on different levels and timescales. This study contributes theoretically to the ecological perspective on affordance, since the recent development of intentionality has rarely been employed in contexts other than research education [26,30]. Another theoretical contribution of this study is that it expands the discussion of how intentional actions may not be fully developed using the ecological model of intentionality. In Stelma and Fay and Young et al.'s original development of the model [26,29,30], increased effort was given to conceptualising how intentional actions are positively developed. The empirical material in this study adds to the theoretical discussion on the mechanism of the lack of development, further illustrating that the lack of development is not simply a result of negative environmental or individual factors, but a mismatch between affordances and expectations in the environment and the effectivities and aims of the individual. This can help explain why supportive environments and highly motivated students cannot successfully enact the affordances of online SA in certain circumstances.

One theoretical limitation of this study that may direct future research is that the theoretical model downplays the direct influence of other people's behaviours on the person's development process, although it encompasses perceived expectations from others. This point is important because our data have shown that DM's efforts alone could not change the situation for the better if other people did not take a more active part in it. Future studies may improve the model by integrating Gibson's ecological perspective on affordance (which is primarily concerned with perception [47]) and other ecological models that pay more explicit attention to the proximal processes occurring between the developing individual and other role players in the environment [48].

The findings of this study can offer practical implications for SA providers, program organisers, teachers and international students. First, the successful transition to SA online illustrated in this study informs us of the reciprocal and mutually constitutive relationship between environmental affordances and individual factors. Program designers and teachers can construct a better online learning environment by customising the technological affordances and improving the flexible organised and responsive feature of the online program. Students can also take advantage of these benefits to align with their goals for study. Thus, the challenges of SA online may develop into new opportunities. Second, the unsolved obstacles identified in this study sensitise us to the factors that might prohibit

students' engagement and restrain the value of the program. More effort should be put into helping international students to maintain connections with each other, with their professor and with their fellow students, since this is perceived as a real value of SA. Both teachers and students should have the mindset that since much empathy was lost in online communication, they should develop digital communication skills and be more sensitive to possible intercultural misunderstandings.

Some scholars have noted that COVID-19 had a 'permanent' boosting effect on virtual mobility [49]. Virtual SA possesses some values comparable to or exceeding in-country SA, as shown in the previous literature and the data in this study. However, the overall ecological features of these two forms of SA are essentially different [50]; each has its unique advantages. Therefore, a future task of SA practitioners is the exploration of more diverse and inclusive forms of programs. For SA researchers, emerging questions include how the virtual models could be used meaningfully after borders reopen, how educators can prepare for future catastrophes, and how SA can be made more effective [51]. We contend that the ecological perspective explicated in this study can help address these questions and inspire the construction of a more sustainable environment for future international education.

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