eLearning for Students with Special Educational Needs: Illustrations from Two Special Schools

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ABSTRACT— *eLearning enables new forms of education that can combine the strengths of face to face and distance education using technology. It is widely acknowledged that eLearning changes the role of the instructors and students, enabling a more personalized and effective learning environment. But to what extent can eLearning benefit students outside mainstream education? Adopting a mixed-method approach that involved classroom observation, focus group interview and survey, the present research investigated the benefit of eLearning on students with special educational needs (SEN) from the perspectives of schools' management, teachers, students, and parents. Using the Learning Environment, Learning Process, Learning Outcomes (LEPO) framework, our results indicated that eLearning could deliver a wide range of benefits to the LEPO of students with SEN. eLearning facilitates the transformation of traditional classroom into a more interactive learning environment. It also enables a more flexible learning process less constrained by location and time. Students who engage in eLearning were reported to have higher learning motivation. Parents and teachers could better monitor students' learning progress through eLearning technology. Teachers reported improvement on students' discipline-specific and generic learning outcomes, such as teamwork, technological skills, and self-expression ability. Achieving such benefits require careful design and planning. It is hoped that this paper could stimulate further discussion on how eLearning technology can be used to facilitate the learning of students with SEN.*

Keywords— Students with SEN, eLearning, mixed-method approach

1. INTRODUCTION

Special education students are characterized by their heterogeneity. They have many different syndromes and pathologies, ranging from speech and language impairments to mental retardation and psychological disorder. In general, they show varying abilities and exhibit difficulties in learning resulted from their cognitive, physical and sensorial disabilities. Therefore, they require special education and services to achieve their full potential (Florian, 2007; Grant & Dieker, 2011; Hasselbring & Williams, 2000).

eLearning tools can create new ways of learning and teaching and can be a solution to address the needs for these students. Empirical evidence showed that eLearning applications can foster the learning process of these students with customized presentation of learning materials and flexible learning speed (Schelhowe & Zare, 2009; Everhart, Alber-Morgan, & Park, 2011), which enhanced their acquisition of various skillsets, including problem-solving skills (Brown et al., 2011; Groenewegen, Heinz, Frö̈hlich, & Huckauf, 2008), self-management skills (Gentry, Wallace, Kvarfordt, & Lynch, 2010), reading comprehension and pronunciation (Chiang & Jacobs, 2010), mathematics skills, environmental awareness, autonomy, social skills, attention and interest (Fernández-López, Rodríguez-Fórtiz, Rodríguez-Almendros, & Martínez-Segura, 2013). However, an investigation to understand the beneficial effect of eLearning on the learning environment, process, and outcomes of this group of students await further study.

To address this, the present research adopts Phillips, McNaught, and Kennedy (2010)'s Learning Environment, Learning Process, Learning Outcomes (LEPO) framework to facilitate the discussion. This model is chosen because LEPO is a generalized conceptual framework that can contribute to understand the whole teaching and learning environment, and it can be adopted to evaluate the effectiveness of eLearning (Phillips, McNaught, & Kennedy, 2012). According to this model, learning contains three major components with reciprocal influential relationships.

The first one is learning environment—the contexts for learning to take place. It includes not only the physical space but also the course-specific context, such as curriculum, learning objectives, assessment activities, and learning content. The desired learning outcomes inform the learning environment, while the learning environment specifies the design of learning process undertaken by the learner.

The second component is learning process. It refers to how students engage with the learning environment and participate in the learning activities. Learning process can be further conceptualized as two categories – the contextual and cognitive learning process. The former refers to the actual participation, such as interaction with the teachers, students, and learning environment itself. The latter refers to all personal cognitive learning activities that contribute to learning, such as reflection and problem solving. A useful learning environment should be able to support learners to engage in learning activities that will achieve desired learning outcomes.

The third component of the LEPO model—learning outcome—is what is being learned. It covers a wide range of desired learning outcomes to reflect the results of learning, such as discipline-specific learning outcomes that can subsume the learning objectives, or generic learning outcomes that include personally transferable skills outside the academic domain but can be combined with subject-based knowledge to produce the expertise of a student.
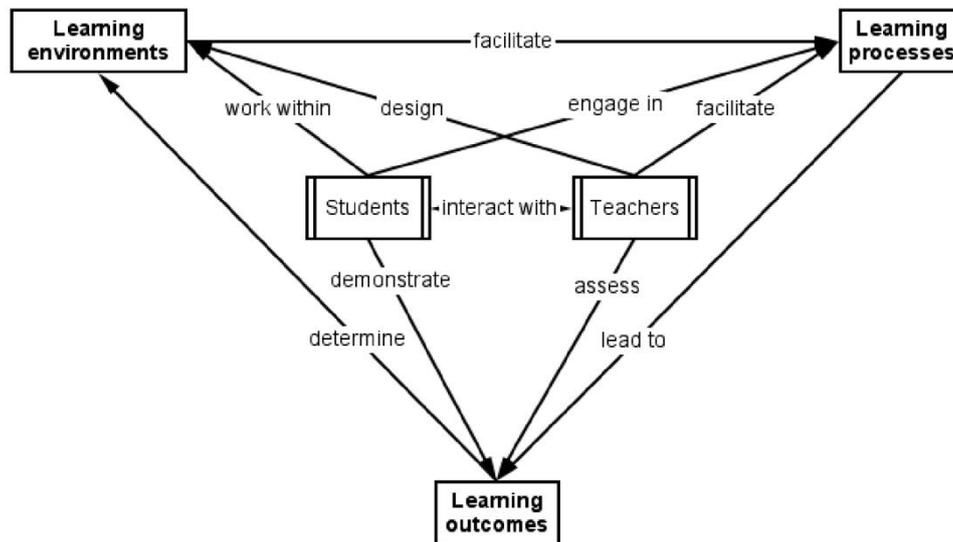
Figure 1: Summary of the LEPO model (from Phillips, McNaught, and Kennedy 2010

Apart from these major components, this framework also considers the individual characteristics of teachers and learners. These individual characteristics are the important contributors to students' involvement of learning and teachers' approaches to teaching. This framework had been applied to investigate the learning environments of ePortfolio (Roberts, Maror & Herrington, 2016), Massive Open Online Courses (King et al., 2014), and wiki laboratory Notebooks (Lawrie, Grøndahl, Boman, & Andrews, 2016), guiding both teacher-practitioners and researchers in the field. However, empirical evidence on the effect of eLearning among students with special educational needs is insufficient. Accordingly, the present research intends to fill this research gap by providing empirical investigation on how eLearning benefits students with SEN under the framework of LEPO.

To accomplish this, the present research adopted a mixed-method approach to understand the beneficial effect of eLearning on the LEPO of students with SEN. Specifically, the present research include (i) classroom observations, (ii) focus group interviews with school management, teachers, students, and parents, and (iii) surveys with school management, teachers, and parents. The perspectives of these different stakeholders can enrich the understanding of eLearning and help identify solutions to facilitate the needs of SEN students.

2. CONTEXT OF THE STUDY

The application of eLearning in special schools needs to be understood within a specific policy context. The official goal of Hong Kong government's special education policy is to help SEN students "develop their potential to the full, achieve as much independence as they are capable of, and become well-adjusted individuals in the community" (Education Bureau, 2019b). As information technology has an increasingly significant role in modern life, eLearning has an important role to play in achieving these goals. Harnessing technology to cater for learners' diversity among students with SEN is listed as one of the overarching principles of the government's strategy in information technology education (Education Bureau, 2015).

The worldwide trend of inclusive education has been adopted by the local Education Bureau. Since 2004, there has been an official mandate to encourage a more inclusive education by putting students with mild SEN in mainstream schools (Wong-Ratcliff & Ho, 2011; Forlin, 2017). Yet there remains a need for special schools to provide support to children with more severe or multiple disabilities (Education Bureau, 2019b). As of 2019, there are 60 aided special schools in Hong Kong (Education Bureau, 2019a). A majority (41) of them specialize in serving children with varying

levels of intellectual disability. Compared with mainstream schools, special schools have a smaller class size a higher teacher-to-class ratio. There are also more specialists to attend to the special needs of the students.

3. METHOD

The present research was conducted between 2015-18 in two special schools in Hong Kong. These two schools mainly serve children with mild intellectual disability, some of which also have other disabilities such as autism and developmental dyslexia. A mix of qualitative and quantitative research methods were used, including classroom observations, focus group interviews, and surveys. The frequency distribution of each category is summarized in Table 1 below.

Table 1: Summary of methodology

	Total
No. of classroom observation sessions	13
No. of school management interviewees	14
No. of teacher interviewees	16
No. of student interviewees	38
No. of parent interviewees	6
No. of school management surveyed	18
No. of teachers surveyed	32
No of parents surveyed	64

3.1 Classroom Observation

A total of 13 classroom observation sessions were conducted in the two special schools covering students from primary to senior secondary level. These observations covered a wide range of subjects, including computer, Chinese language, and mathematics. The number of students per class ranged from 9 to 16. The duration of each lesson lasted around 30 to 45 minutes. All the observations were videotaped for subsequent analysis. In each lesson, two researchers observed the class independently with observation protocol adapted from Smith et al. (2013) in order to record teachers' and students' activities in the classrooms systematically.

3.2 Interview

Schools' management, teachers, students, and parents were invited for either individual or focus group interviews. There were 22 interviews conducted with 85 individuals, including 15 members of school management, 20 teachers, 44 students, and 6 parents. The aim of the semi-structured interviews was to gather different stakeholders' feedback on the effect of eLearning on the LE, LP, and LO. A majority of interviews with teachers were conducted on the same day shortly after the classroom observation, which gave the teacher in charge an opportunity to elaborate the rationale of his or her lesson design to the research team using concrete examples. The interviews lasted around 30 to 40 minutes. The interviews were voice recorded and transcribed. All interviewees were assured before the interviews that the data would be kept anonymous and confidential.

The interview scripts were coded with the NVivo software using a grounded theory approach (Strauss & Corbin, 1990). Recurring ideas were identified, coded, and then grouped into common themes using the axial coding method (Strauss & Corbin, 1990). The themes include: 1) Benefit of eLearning, 2) Implementation method, 3) Teachers' challenge, 4) Students' challenge, and 5) Response to challenge. After the codes were categorized into themes and subthemes, the codes were analyzed using the constant comparative method to look for similarities among themes (Merriam & Tisdell, 2015). The results were analyzed independently by two researchers to reduce potential bias. Any disagreement between the two researchers were resolved through discussion.

3.3 Survey

In order to gather the opinion of different stakeholders toward the impact of eLearning on the LEPO, members of school management, teachers, and parents in the two special schools were invited to complete online surveys specifically

designed for each stakeholder group. A total of 18 members of school management, 32 teachers, and 64 parents have completed the surveys.

4. RESULTS

From the present research, we showed how eLearning can lead to tangible benefits in the LE, LP, and LO for students with special educational needs. The findings are summarized as follows.

4.1 How eLearning transformed the learning environment

Learning environment refers to the context of learning, which should be designed to suit learners' need (Philips, McNaught & Kennedy 2012). From their interviews, many teachers and school management agreed eLearning has brought a positive impact on the learning environment. Specifically, eLearning can bring different constructivist pedagogies into practice. For example, one school management said that promoting student-centered learning and self-directed learning were the key goals of eLearning in her school. Through adopting eLearning technology in various subjects, the school aimed to create a learning environment that encourage students' active participation and increase their sense of ownership in learning. Several other teachers reported that eLearning enabled a more effective differentiated learning environment, in which students with varying ability can participate in the learning activities that suited their ability.

In order to achieve these positive pedagogical results with eLearning tools, the structure of the lessons has to be modified, and changes have to be made at the design phase of the curriculum and the learning tasks (Philips, McNaught & Kennedy 2012). The following observation exemplified how a teacher designed an interactive learning environment mediated by eLearning technology in a Chinese language class.

In a Chinese reading comprehension class with 15 junior secondary school students, the learning goal was to study a passage, which describes different kinds of glass and their applications. In the beginning of the class, the teacher lectured briefly to review what was learnt in the previous lesson and explain the outline of the current lesson. One student helped manage the computer projected to the big classroom screen, freeing up the teacher to interact with other students. The class was then divided into small groups. One tablet was provided for every two students. The students were divided into two groups based on their learning ability and interest. One group used Book Creator—an app for creating eBooks—to make an eBook introducing different kinds of glasses discussed. Another group used Minecraft—an open-world game app adopted for educational use—to explore the properties of the different types of glass. The teacher then guided the students to comment on each other's work, so that they could learn from others' strength. When less advanced students commented on others' work, the teachers took the opportunity to grasp what the students missed and offered specific guidance. During the class, students manged their own learning activities in groups of two, and the teacher walked around to provide specific guidance and support for students in need. Toward the end of the class, two pairs of students selected from the two groups presented their work to the class via the classroom projector.

The example described above illustrated how an interactive learning environment can be constructed by combining eLearning technologies and pedagogical change in lesson design. The teacher only spent the first few minutes of class time giving lecture and instructions; most of the class time was preserved for student individual thinking, teamwork activities, and student presentation. The lesson design and the eLearning technologies used enabled students to take the lead within classroom, thereby allowing a more student-centered learning environment. Teachers took the role of a facilitator during group activities. Technologies also enabled more effective differentiated learning, as students were divided into groups to take part in classroom activities that suited their ability and interest. The teacher had ample time to provide individualized guidance to weaker students. Such lesson design also provided intellectual challenge to more advanced students, as they were able to use their tablet to search for additional information online and design more complex structures using the Minecraft app. Teamwork among the peers also improved as the students worked in teams of two. The game element increased students' motivation. There was a high level of trust between the teacher and the students, as students were given a chance to manage their own learning tasks and to take an initiative to solve hands-on problems. As a result, most students were engaged in learning process. The whole class was well organized and in order. The students seemed confident, happy, and cooperative. The class was a good example of how a teacher adopted eLearning technology to form an interactive learning environment that encourage student-centered learning, differentiated learning, and peer learning.

The role of eLearning in enabling a more interactive, differentiated, and student-centered learning environment was a consensus among teachers in the special schools. An overwhelming majority (91%) of teachers surveyed agreed or strongly agreed that they have used eLearning to "strengthen the curriculum design in order to better cater to the learning needs of different students". A vast majority of the teachers also agreed or strongly agreed that eLearning has (i) "enriched my teaching content" (88%), (ii) "enabled more interaction both between teachers and students and among students themselves in the classroom" (88%), (iii) "led to a paradigm shift in my teaching, e.g., students bearing more responsibility in their own learning rather than having the teacher as the sole authoritative source of knowledge" (81%).

4.2 How eLearning enriched the learning process

Learning process refers to what the learners does in their activities that contribute to learning (Philips, McNaught & Kennedy 2012). Our interviewees suggested that eLearning has enriched the learning process in three major ways. First, eLearning technologies enabled learning outside classroom setting. Second, various mobile applications and learning management system (LMS) allowed teachers and parents to better monitor students' progress. Last but not least, students were more motivated to learn using technology because they liked it and found many of the features convenient.

Ubiquitous learning process

Enabling more flexible learning process without the constraint of time and venue was a major advantage of eLearning reported by our interviewees. For example, several teachers used LMS to distribute class material and collect homework. Students could save their homework on the platform and extend their learning at home. One Chinese language teacher would upload the audio recording of the text and the vocabularies to be learnt on the platform, so that students could listen to them at home and practice with their parents if needed. Students could also read the text aloud and upload their own audio recordings to the LMS for themselves and their classmates. Another teacher said she has seen a student doing homework on a bus using the mobile phone. As some SEN students have to miss some lessons because of the need to attend regular trainings outside campus, some lessons were video recorded for later viewing, so that the students' learning would not be inhibited by limitation of time and location.

Effective monitoring of student progress

More effective monitoring of students' progress was often reported as another contribution of eLearning toward the learning process. One school created an ePortfolio for each student to record students' progress. Through the ePortfolio, teachers could better grasp each students' learning progress, and design learning activities suitable for their level. The use of LMS was helpful in recording and monitoring student progress. One Chinese language teacher pointed out that eLearning tools allowed teachers to see students' improvement easily because students' reading and speaking ability can be systematically recorded across time in the LMS. Voice recording can show objectively which level the student has attained at a particular learning stage. Likewise, students' performance in class can be recorded and shared with parents. Parents could view their children's learning progress via the school's LMS. Student response systems like Kahoot! also allowed teachers to view students' progress instantly in the classroom. This saved valuable class time and enabled teachers to adjust their lesson based on students' feedback.

Enhanced learning motivation

The third benefit of eLearning commonly reported by students, teachers and parents was an improvement of students' learning motivation. Most students interviewed stated that they like using electronic tools to learn for a variety of reasons. Several students expressed that eLearning made lessons less boring. One student said eLearning tools could facilitate collaboration with other students. Another liked drawing mind map using tablets because it was fun and convenient. Students also liked gamified learning tools like Kahoot! and Minecraft because they found them fun. One student liked using Kahoot! to answer questions because it is exciting, and he said he would not feel disappointed even if he got the answers wrong. Having a gamified competition in Kahoot! motivated him to achieve a higher score. LMS like Google Classroom also received positive feedback from students. One student said she liked Google Classroom because they could leave comment to critique each other's work and let others to see their errors. She also enjoyed viewing other classmates high-quality work and liked being praised by classmates via the platform. These positive experiences of the students showed how eLearning technologies can make the learning process more interesting, thereby increasing their learning motivation. The positive effect of eLearning on the learning process was echoed in the survey to parents. Most parents agreed or strongly agreed that eLearning helped enhanced their child's (i) concentration on learning (73%), (ii) learning motivation (72%), and (iii) confidence toward learning (62%).

4.3 How eLearning improved learning outcomes

Discipline-specific learning outcome

Learning outcomes can be broadly categorized as discipline-specific outcomes and generic outcomes (Philips, McNaught & Kennedy, 2012). Many interviewees noticed students' improvement in both areas after eLearning was incorporated in the lessons. In terms of discipline-specific learning outcome, one Chinese language teacher said using eLearning brought improvement to the reading comprehension ability of the students. She found many fifth or sixth grade pupils she taught have achieved a Chinese reading comprehension ability of a Secondary 1 student. She discovered that students were able to describe the reading material more vividly after using eLearning tools. A Chinese language teacher from another school also found students' writing ability improved after using a mobile app that gives students' step-by-step instruction on the proper stroke sequence of Chinese characters. The teacher said the app gave students more opportunities to practice their writing and speaking, so the students were able to recognize more characters and speak more confidently. Another teacher also noticed a rise of both response rate and accuracy rate of students' homework after using eLearning tools.

Transferable, generic learning outcome

In addition, teachers generally believed that the use of eLearning improved multiple personally transferable generic learning outcomes. Many found that eLearning fostered better teamwork, improved students' technological skills, and enabled students to better express themselves.

First, eLearning could improve teamwork because it enabled students to share their work with others digitally. One teacher commented that the use of Google Docs helped facilitate collaboration among students, as they could easily share content with one another to make teaching and learning more effective. One student from the same school also commented that using tablets in small group activities gave him more chance to collaborate with other students. He enjoyed designing questions to quiz other students using mobile application. One mathematics teacher said he encouraged students to post their homework to the class's LMS, so that they could cross-check and discuss each other's work. Among the teachers surveyed, 78% of them agreed that they have "provided opportunities for students to learn using eLearning tools in small groups and encouraged students to participate in discussion actively".

Second, many students and teachers agreed that students' ability to use technology have increased as a result of eLearning. One teacher mentioned that since students had plenty of opportunity to use eLearning technologies across various subjects, they could practice their technological skills. Their skill improved so drastically that some students' familiarity with technology have already exceeded their parents. Some students also reported a higher confident in using computers. Several teachers pointed out that the improved technological skill have a spillover effect to help nurture students' ability to live independently—one of the key aims of special education (Education Bureau, 2019b). For example, some students were able to use apps in their smartphone to look up public transportation information, estimate transit time, and arrange their schedule. Some students would use an app taught in their mathematics class to make a grocery list when they go shopping. These examples show how students with SEN apply what they learn to improve their problem-solving ability in daily live.

Last but not least, students were able to better express themselves using eLearning tools. This benefit in learning outcome is most salient for students with SEN in a Chinese context. For example, students with autism may have high level of cognitive skills but were unable to express themselves effectively. One teacher said that apps like Book Creators gave students with autism a new channel to express their thought with others. A parent of an autistic student noticed that her child was better able to express herself using full sentences after the use of eLearning. Technological tools like voice-based input and advanced handwriting recognition allowed students to input Chinese characters much more easily than writing on a piece of paper or using a traditional keyboard. Multiple students said they prefer writing homework using electronic devices because it is much more convenient than using pen and paper. Such feature marked a significant improvement for students' communicative ability within and beyond school context. Such benefit is especially significant for students with developmental dyslexia who have difficulty understanding and writing text.

The beneficial effects of eLearning on learning outcomes were also manifested in surveys Among the teachers surveyed, a majority of them agreed or strongly agreed that eLearning provided ample opportunities for students to develop their communication skill (78%) and creativity (75%). An overwhelming majority (94%) agreed that students have good performance in their ability in information technology such as using tablets and searching for information online. Also, a majority of parents surveyed agreed or strongly agreed that eLearning have had a positive impact on their child's (i) knowledge and ability in using information technology (75%), (ii), language ability (59%), (iii) ability to cooperate (53%), (iv) communication skills (52%), and (v) problem solving skills (52%). There is a general agreement among teachers and parents that eLearning has led to improvement in a broad range of learning outcomes.

Table 2: Summary of benefits of eLearning to learning environment (LE), learning process (LP), and learning outcomes (LO) as identified in interviews

Category of benefit	Benefit type	No. of instances	Sample reference
LE	Self-directed learning	28	When students encountered a word that they don't know, they will look it up from the electronic dictionary themselves. The learning effect is better than getting a direct answer from the teacher. (S1 teacher)
LE	Differentiated learning	23	Teachers can use different apps to teach and cater to the needs of students with different abilities. If you use only one app it is hard to take care of weaker students. (S1 teacher)
LE	Student-centered learning	12	In the past the teacher always have a leading role in teaching and learning. But now it is trending toward student-

			centered learning, and teachers have taken an assistive role. (S1 management)
LE	Increased classroom interaction	2	For special schools, electronic devices can provide more opportunities for students to do hands-on practice. The school aims to use e-learning elements to increase interaction in teaching and learning. (S2 teacher)
LP	Increased parental involvement	12	Students would write diary using the tablets and then share the content with their family. It enabled more communication between students and their parents. (S1 teacher)
LP	Monitor student progress	11	In a mathematics class, students took a picture of their homework using tablets and uploaded it online for the class. This enabled teachers to know the students' progress. This also allowed students to record their own learning progress for later revision, and let students to cross-check and discuss their work together. (S1 teacher)
LP	Learning outside classroom	9	e-learning has extended the time and location that students can learn by allowing students to study at home. For example, after the Chinese language teacher uploaded the voice recording to the e-learning platform, students can listen and practice at home. (S2 teacher)
LP	Increased student satisfaction	4	Students like google classroom because they can leave critical comment to other students to let them know their mistakes. They can view the high-quality homework by other students. Students also like being praised by their classmates in google classroom. (S1 student)
LP	Improved learning motivation	3	What is the most satisfying is that students' learning mode and attitude have changed. Less motivated students became more eager to learn because of computers. (S2 management)
LP	More feedback to students	2	e-Learning makes it easier for teachers to monitor the class's performance. When students' homework is submitted to the online platform, teacher can see each students work instantly and provide timely feedback suited to students' need. (S2 teacher)
LO	Improved communication skills	15	e-Learning has improved students' ability to express themselves and communicate with others. (S2 management) Students like using tablets to learn because it is easier to write. The tablet can recognize incomplete Chinese characters, so students can write more with tablets. Also, the voice-input function allow students with difficulty writing to input text easily. (S1 student)

LO	Improved academic outcome	7	[With the learning app] Students had more opportunity to read aloud, so their ability to speak and recognize characters have substantially increased. (S2 teacher)
LO	Improved teamwork	6	Google Docs has effectively facilitate both student-teacher collaboration as well as collaboration among peers. It made content sharing easier. (S1 teacher)
LO	Improved technological skills	6	After a few years of using e-learning, most students are very familiar with learning with digital tools. The level of familiarity is comparable with using ordinary stationary. (S1 management)
LO	Increased student confident	6	Students have more confident. In the past teachers have to keep encouraging them to speak up, but now they can stand up for themselves and speak with confidence. […] The use of e-Learning has brought about change in the whole pedagogy. We have student presentation and peer learning in almost every lesson. They are used to speak up in front of the class. (S1 management)

Table 3: Selected results from teacher survey on LE, LP, LO (n=32)

Category	Selected questions from teacher survey	Agree + Strongly Agree	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
LE	I have used eLearning to strengthen the curriculum design in order to better cater to the learning needs of different students	**91%**	3%	88%	9%	0%	0%
LE	eLearning has enriched my teaching content	**88%**	3%	84%	13%	0%	0%
LE	eLearning has enabled more interaction both between teachers and students and among students themselves in the classroom	**88%**	3%	84%	13%	0%	0%
LE	eLearning has led to a paradigm shift in my teaching (e.g., students bearing more responsibility in their own learning rather than having the teacher as the sole authoritative source of knowledge)	**81%**	6%	75%	19%	0%	0%
LP	eLearning helped me explain abstract concepts or complex issues	**81%**	3%	78%	19%	0%	0%
	eLearning provided ample opportunities for students to:						
LO	(i) develop their communication skill	**78%**	0%	78%	22%	0%	0%
LO	(ii) develop their creativity (e.g., propose original ideas, adapt to changing circumstances)	**75%**	3%	72%	25%	0%	0%
	Based on your impression, students generally have good performance in:						
LO	(i) their ability in information technology (such as using tablets and searching for information online)	**94%**	3%	91%	6%	0%	0%
LO	(ii) Using information technology for collaborative learning	**81%**	3%	78%	19%	0%	0%

Table 3: Selected results from parent survey on LE, LP, LO (n=64)

Category	Selected questions from parent survey	Agree + Strongly Agree	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	eLearning helped enhanced my child's:						
LP	(i) concentration on learning	**73%**	6%	67%	23%	3%	0%
LP	(ii) learning motivation	**72%**	8%	64%	19%	8%	2%
LP	(iii) confidence toward learning	**62%**	3%	59%	38%	0%	0%
	eLearning have had a positive impact on my child's:						
LO	(i) knowledge and ability in using information technology	**75%**	11%	63%	22%	3%	0%
LO	(ii) language ability	**59%**	2%	57%	32%	10%	0%
LO	(iii) ability to cooperate	**53%**	3%	50%	36%	8%	3%
LO	(iv) communication skills	**52%**	2%	50%	39%	6%	3%
LO	(v) problem solving skills	**52%**	8%	44%	38%	8%	2%

5. CONCULSION

In sum, this study provided empirical evidence on how eLearning benefited students receiving special education under the framework of LEPO. As summarized in table 2 to 4 above, eLearning brought wide-ranging improvements to various aspects of teaching and learning in the two special schools in this study. It enabled a more interactive learning environment, as teachers have higher flexibility to design differentiated learning tasks that suit students of varying levels. eLearning also allowed for a learning process that is less constrained by time and location. Mobile apps and LMS served as effective tools for parents and teachers to monitor students' progress. In terms of learning outcome, the use of eLearning was reported to enhance a range of both discipline-specific and generic learning outcomes, such as improved teamwork and increased familiarity with technology.

The benefits of eLearning we have identified on the LE, LP, and LO is consistent with the fundamental principles for eLearning proposed by Nichols (2003). Addressing the where question, Nichols (2003) suggests that eLearning tools that can be adopted to actualize different education models and philosophies. Our classroom observations show how it can be applied to supplement face-to-face classroom in a special education setting, as well as to materialize constructivists pedagogies such as student-centered learning and differentiated learning. Second, to address the how question, Nichols (2003) hypothesizes that eLearning can not only enrich the presentation of learning materials, but also facilitate the learning process. Our findings illustrate how eLearning can ease the information delivery and facilitate the discovery process of students. Finally, for the what question, Nichols (2003) hypothesizes that the use of eLearning itself does not change the overall aim of education, because the desired learning outcome should be defined by a predetermined curriculum and learning objective rather than the tools used. Our findings are consistent with such hypothesis, as many of the positive effects on generic learning outcome overlap with the predefined learning goals listed in the official curriculum (e.g., Education Bureau, 2015; Education Bureau, 2019b).

Many of the benefit of eLearning we identified in special schools, such a more interactive learning environment and increased learning motivation, were also widely observed in mainstream schools as well (e.g., Groff, 2013; Huffaker & Calvert, 2003). Observations from our study suggest that student with SEN can also benefit from many of the advantages of eLearning. Some of the benefits are especially salient for students with SEN. For instance, mobile apps enabled students with autism to express their thought more easily, and voice-based input method allowed students with developmental dyslexia to communicate effectively using electronic devices. The improvement in communicative competence brought by the use of technology not only enhance teaching and learning, but also have spillover effect on other aspects of students' life.

6. LIMITATIONS

This study has two major limitations. First, the benefits we have identified rely primarily on self-reported data via interviews and surveys, so the reported benefits could only reflect the perception of the respondents but not necessarily the facts on the ground. In future studies, more objective measures like test scores could be used to gauge any measurable impact on students' learning outcome. Second, while 13 classroom observations session have been done to gather firsthand data on the learning environment and learning process, the result observed in this limited sample size in the two special schools serving students with mild intellectual disability may not be representative of the application of eLearning in special school context. Given the wide heterogeneity of students with SEN, other special schools may see a different set of benefits and challenges when adopting eLearning in their classrooms.

Practitioners interested in adopting eLearning should be cautious that even though eLearning could bring notable and widespread benefits to students with SEN, it would be questionable to assume that such benefit could be achieved simply by adopting the technological tools alone. Almost all school management we interviewed explained that much effort have been put to prepare for the implementation of eLearning in a school. Preparation has to be made in terms of the technological infrastructure, staff training, lesson design, consultation with parents, and readiness of students. One school has set up an IT taskforce to plan for the implementation of eLearning and respond to challenges arose in the is process. Therefore, in order for schools to reap the full benefit of eLearning, it involves much more than simply using the latest gadgets and software; it requires careful planning, thorough consultation with stakeholders, and skilful implementation of frontline teachers. One school principal gave words of caution as she likened eLearning tools as new kitchen technologies. She suggested that the use of eLearning cannot by itself improve teaching and learning, just like having the latest technologies in the kitchen would not turn a bad cook to a good one. Yet a good cook can make use of the new kitchen devices to become a better cook. In the age of rapidly changing eLearning technology, it is hoped that this article could stimulate educators to consider how such technology could best be used to enhance teaching and learning in special education settings.

7. REFERENCES

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