

A Set of Challenges for setting distance-learning environments based on university students' experience at the covid-19 pandemic time in Iraq

Alaa Alkhafaji (✉ alaa.alkhafaja@gmail.com)

Department of computer science, College of science, University of Mustansiriyah,
<https://orcid.org/0000-0001-8625-886X>

Haider Mshalli

Ministry of higher education and scientific research, Studies, planning and follow-up, Directorate, Dept. of Studies and planning

Carlo Giovannela

ASLERD (<https://en.wikipedia.org/wiki/ASLERD>) <https://orcid.org/0000-0002-0588-5739>

Marcello Passarelli

ASLERD (<https://en.wikipedia.org/wiki/ASLERD>)

Research Article

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Abstract

This paper presents an empirical study to investigate students' perspectives and attitude towards distance-learning at the university level in Iraq. Universities were forced to convert from face-to-face (f2f) learning to fully virtual due to the coronavirus covid-19 pandemic. The transition was within two weeks, which probably causes some challenges students might encounter due to this rapid transition. This study aims to highlight any challenges students might face. This would help prevent such challenges in the future time, which could ensure a smooth and seamless learning process over the internet. A mixed methods approach was used with data being gathered using a questionnaire technique with 79 questions; multichoice, scales and open-ended questions; this paper focuses on the quantitative data only. 2746 students responded to this questionnaire from different age groups and different study levels. A set of four challenges' themes is introduced in this paper, which was driven based on the results of this study. Themes include infrastructure related, pedagogy related, context related, and self-support related.

Introduction

To the best of our knowledge, this is the first study to be conducted in Iraq at the university level to investigate students' perspectives and attitude towards the distance-learning experience. In most countries, educational institutions were forced to close in the first term of 2020 due to Covid-19 (UNESCO, 2020). Universities in Iraq also closed their doors and transformed their educational activities from f2f to fully virtual. The transition was relatively quick as it had to be within two weeks from the lock down, which was at the end of February 2020, to ensure students do not miss their classes. Such a quick transition could bring with it many challenges especially if it was a new experience as in the case of Iraq, which it is considered a novel experience at the university level. With such a new experience, some issues could be raised such as a lack of the required infrastructure and the essential competence for humans (students) to carry out the experience. We conducted an empirical study to investigate students' perspectives regarding the experience of distance-learning with the aim of identifying any challenges and implications students might face throughout the last academic year and during the pandemic time while performing educational activities via the internet. This would help improve the experience by addressing the challenges to provide a smooth and seamless learning experience over the internet. As distance learning has become a necessity due to the pandemic (Chen, Kaczmarek, & Ohyama, 2020), it is important to be designed in a good way in order to deliver better learning services. This paper introduces a set of challenges to act as a framework for designing such learning environments. Such a framework would assist learning practitioners by taking these challenges into account when designing their learning activities. A questionnaire technique was used as the only tool to collect data, which was adopted from a previous study (Giovannella, Passarelli, & Persico, 2020). The questionnaire consists of 79 questions to gather quantitative and qualitative data using multichoice, scale and open-ended questions. Although a mixed method approach was used to collect data, the quantitative data only was the focus of this paper. A simple statistical analysis using the SPSS software was adopted to analyse data; the analysis was carried out to obtain the mean of data resulted from scaled questions, and frequencies of the nominal

data resulted from multi-choices. A few studies were conducted to investigate different aspects regarding distance learning at the covid-19 time (Adnan & Anwar, 2020; Amir et al., 2020; Basilaia & Kvavadze, 2020; Chen et al., 2020; Giovannella, 2020; Liguori & Winkler; Pace, Pettit, & Barker, 2020; Toquero, 2020). These studies were conducted in different contexts than the one that is being reported in this paper; the current study was conducted in the context of Iraq, where this experience is relatively novel. The aim of this study was to identify challenges of such experience in the context of Iraq by measuring students' attitudes and perspectives towards distance learning. The rest of this paper is structured as follows: section 2 gives an overview of the study design; section 3 presents the results; section 4 discusses the findings; section 5 outlines the challenges and sets out a direction for future work.

The Study Design

This study was designed to be conducted in the context of Iraq; students at the university level were targeted. The aim for conducting this study is to investigate two main aspects from students' perspectives: (a) challenges might encountered during the transition from the traditional education (f2f) to distance learning; (b) how the educational systems reacted to this rapid transition. A mixed methods approach was used with data being gathered using a questionnaire technique; quantitative data only are discussed in this paper. The questionnaire was developed originally by ASLERD (the association of smart learning ecosystem and regional development) (Giovannella et al., 2020). Students from different universities around Iraq responded to the questionnaire. The questionnaire was made available approximately four months after the lockdown and just before the final exam of the first term.

2.1 Methods

A questionnaire technique was used in this research to obtain a wide range of data from different geographical locations. The questionnaire consists of three sections with a total of 79 questions, multiple choices, scale and open-ended questions; Likert-type response scales, which include 10-point scales, scales ranging from -5 to 5, and 0-100% scales. The questionnaire was translated into Arabic; two experts who speak both languages (English and Arabic), proved the quality of the translation. It was necessary to conduct a pilot test for the questionnaire to evaluate the validity of the questions in the context of Iraq. Ten volunteered students participated in the pilot test which helped to enhance the questions – mainly the translation – by pointing out the weakness of the questions; based on the pilot test, the language was enhanced. Participants were recruited via different channels: social media, emails and electronic classrooms. The Convenience sampling method was adopted (Barnett, 1991; Sedgwick, 2013). The questionnaire was distributed electronically only due to the lockdown and social distance measure. The participation was completely voluntary and anonymously. The quantitative data, which is the focus of this paper, was cleaned preparing for the analysis phase. Missing data were excluded from the dataset. A simple descriptive analysis was performed to analyse the data using the SPSS software; frequencies for the nominal data of multiple-choice questions were obtained as well as the mean and t-test were obtained for the numeric data.

2.2 Participants

The questionnaire targeted university students, which were recruited through different channels such as social media and official emails. 2746 students responded to the questionnaire; they were 52% female, 45% male and 1.8 preferred not to answer. Respondents were 96.9% from state universities; they were 82.2% at the first-degree level. participants' age group were as follow: less than 22 (40%), 22-26 (45%), 27-30 (5%), 31-40 (5%) and older than 41 (5%).

Results

This paper focuses on quantitative data; we carried out descriptive and univariate analyses. For Likert-type response scales, we carried out one-sample t-tests against the midpoint of the scale (5.5 for 10-point scales, 0 for scales ranging from -5 to 5, 0 for the 0-100% scales). The results of the mean and t-tests have been reported in Tables 1 and 2. We performed the analysis to find out how students experience educational activities over the internet and to capture their perspectives of the experience at Covid-19 pandemic time. The names of the variables were adopted from a previous study with some amendments to suit the current variables (Giovannella et al., 2020). The questionnaire contains four sections: (a) technological context, (b) readiness to transition to distance learning; (c) educational activities and operating conditions; (d) future expectations and intentions; the result will be discussed based on these sections.

Table 1. Students' perception about the capability of the learning ecosystems to react, the operational conditions and the features of the educational activities carried out.

Variable	Average	t-test
University Readiness to swap to on-line education (UR)	M = 7.23 [7.13, 7.33]	$t(2579) = 34.20, p < .001,$ $Cohen's d = .75$
Technological Adequacy of On-line Environments (TAOE)	M = 6.45 [6.35, 6.55]	$t(2548) = 18.99, p < .001,$ $Cohen's d = .38$
Previous Experience in On-line Learning (PEOL)	M = 5.69 [5.59, 5.80]	$t(2527) = 3.53, p < .001,$ $Cohen's d = .07$
Teachers' Technological Readiness (TTR)	M = 6.22 [6.11, 6.32]	$t(2574) = 13.72, p < .001,$ $Cohen's d = .27$
Teachers' Pedagogical Readiness (TPR)	M = 6.34 [6.24, 6.44]	$t(2553) = 16.13, p < .001,$ $Cohen's d = .32$
Workload Increase (WI) %, tested against the baseline of 0	M = .49 [.48, .50]	$t(2554) = 79.46, p < .001,$ $Cohen's d = 1.57$
Students' Time Management Capacity (TTMC) (scale -5, +5)	M = 1.13 [1.00, 1.25]	$t(2552) = 17.72, p < .001,$ $Cohen's d = .35$
Educational Activity: Lecture-Discussion (EALD) (scale -5, +5)	M = .37 [.24, .49]	$t(2447) = 5.65, p < .001,$ $Cohen's d = .11$
Educational Activity: Transmissive-Interactive (EATI) (scale -5, +5)	M = .51 [.37, .63]	$t(2425) = 7.60, p < .001,$ $Cohen's d = .35$
Educational Activity: Asynchronous-Synchronous (EAAS) (scale -5, +5)	M = .38 [.26, .52]	$t(2385) = 5.99, p < .001,$ $Cohen's d = .12$
Educational Activity: Individual-Collaborative (EAIC) (scale -5, +5)	M = .62 [.48, .75]	$t(2395) = 8.96, p < .001,$ $Cohen's d = .18$
Reproducibility of Classroom Dynamics (RCD)	M = 5.88 [5.79, 5.98]	$t(2486) = 7.97, p < .001,$ $Cohen's d = .16$
Easyness to Use On-Line Learning (EUOL)	M = 6.61 [6.50, 6.72]	$t(2164) = 19.43, p < .001,$ $Cohen's d = .42$
Usefulness to On-Line Learning (UOL)	M = 6.17 [6.05, 6.28]	$t(2167) = 11.02, p < .001,$ $Cohen's d = .24$
Degree of University e-Maturity (UeM)	M = 6.01 [5.90, 6.11]	$t(2135) = 9.43, p < .001,$ $Cohen's d = .20$

Table 2. Students' perception about technologies and their expectations for the future

Variable	Average	t-test
Sustainability of On-line Education (SOE)	M = 5.63 [5.51, 5.75]	$t(2307) = 2.15, p = .032,$ $Cohen's d = .04$
Change in the Idea of Educational Experience (CIEE)	M = 6.02 [5.91, 6.14]	$t(2205) = 8.82, p < .001,$ $Cohen's d = .19$
Improvement in the Attitude towards Technologies (IAT)	M = 6.50 [6.38, 6.61]	$t(2199) = 16.86, p < .001,$ $Cohen's d = .36$
Improvements in Technological Skills (ITS)	M = 6.67 [6.56, 6.78]	$t(2181) = 20.99, p < .001,$ $Cohen's d = .45$
Intention to Work in Smart Working (IWSW)	M = 5.92 [5.81, 6.04]	$t(2166) = 7.09, p < .001,$ $Cohen's d = .15$
Extent to which University should Rely on On-line Learning (UROL)	M = 6.11 [5.99, 6.23]	$t(2173) = 10.25, p < .001,$ $Cohen's d = .22$

3.1. Technological context

The results suggest the mean of Previous Experience in On-line Learning (PEOL) (M=5.69) as shown in Table 1, this could be explained as the online learning is relatively a new experience in Iraq. Regarding the use of devices, the results indicate that smartphones are the most device students use in performing educational activities via distance-learning (94%), followed by laptops (20%) and both tablets and desktops with 5%. The possible explanation for this is that students found themselves needing their own device to be able to perform learning activities, so, as they already own smartphones, they made use of it instead of buying a new device (e.g. laptop), which they might not be able to afford (Authors, 2020). Regarding the connectivity, 65% used wi-fi wireless connection to connect to the internet to perform activities over the internet; 27% used 3G, 7% used optic fibre, while the rest chose other such as mobile data. 51% of respondents used to connect to the internet to perform activities from a private room at home, 45% also from home but at a sharing room, whereas 2% used the usual workspace and less than 1% used a shared workspace.

The results show that technology were used for different aspects such as: collaboration and team working (31%); delivering transmissive lessons (30%), synchronous and asynchronous communication with teachers (30%); content share (28%); assigning task or assignment to be performed asynchronously (27%); delivering interactive lessons (23%); content production and carrying out exercises synchronously 18% and 17% respectively (see Fig. 1) . These data indicate that delivering transmissive lessons was the main method for delivering educational materials over the internet; delivering interactive lessons were less used in this context. This could be due to poor network corrections as it will be presented later in this section.

In terms of assessments, students were assessed using various of methods, which include: online test (67%), individual homework to be presented online (46%), other types of homework to be presented online (46%), individual assignments to be done at home (39%), online interview (19%). It is clear that the main

method for assessing students were online tests, probably this is also due to the poor connections as holding an online interview to test or present homework over the internet would take a longer time as well as higher internet capacity (see Fig. 2).

The current data suggest that 32% of students needed one to two weeks to get familiar to distance learning; 31% needed less than a week; 22% between three to four weeks; whereas 15% said they still cannot get used to it (see Fig. 3)

The results suggest that the most reported difficulties students faced during the use of technology in education were poor connection (64%), followed by difficult in concentrating (29%), difficult to communicate with professors (27%), unsuitable home environment (25%), poor relationship with the camera through the online channels (23%), lack or limited resources (22%) (see Fig. 4).

- **Readiness to transition to distance learning**

As shown in Table 1, the mean of Universities Readiness (UR) to change to distance learning was 7.23, which indicates universities reacted as quickly as they could, whereas, Technological Adequacy of On-line Environments (TAOE) were 6.45. This gave an indication that universities were ready to change, but there was a lack of the required applications and platforms for online learning, which this could be since this experience is considered a relatively novel in Iraq. On the other hand, Teachers' Technological Readiness (TTR) and Teachers' Pedagogical Readiness (TPR) were 6.22, 6.34 respectively. This would give an indication that teachers at universities were not as ready, which could be for different reasons such as they were not very familiar with this experience for the same reason that was put earlier, which mean they needed to obtain the required skills quickly to be able to perform learning activities over the internet and keeping up the pace of the rapid transition from f2f to fully virtual. However, the lack of the required applications and platforms could be another possible reason for that. Nevertheless, teachers managed to provide learning services that could be considered as good despite the challenges they faced (Authors, 2020). Regarding the degree of University e-Maturity (UeM) the mean was 6.1, which is considered good taking into account the lack of the infrastructure and software that are required for the sustainability of such experience.

- **Educational activities and operating conditions**

As shown in Table 1, the workload (WI) of students was increased by 49% at the pandemic time. Additionally, the ability to manage their time (TTMC) was 1.13. This could be explained as the mean of the variable PEOL, students' previous experience in On-line Learning, was 5.69., which means students needed extra time and efforts to get familiar with the new learning environments as well as gain the required skills to perform educational activities over the internet.

In order to identify the mode of teaching activities students were attending, respondents were asked to rate activities: Lecture vs Discussion (EALD) (M=.37), Transmissive vs Interactive (EATI) (M=.51), Asynchronous vs Synchronous (EAAS) (M=.38), Individual vs Collaborative (EAIC) (M=.62). It seemed that

the educational activities were more discussion-based, interactive-based, asynchronous, and more directed to individuals than to groups (see Table 1). Although results might be considered as positive in terms of holding interactive and discussion based educational activities, they are not as positive as required to provide a seamless and engaging learning experience as the mean is just above the border line. The possible explanation is due to the poor network as it was reported earlier it is the main difficulty students faced regarding the distance learning. Poor network would hinder the process of holding a live online lecture or interactive activities, as these would require a stable internet connection otherwise it could cause more harm than good in terms of engagement and interaction. However, despite the technological context and the limited experience the teachers tried to use technologies to implement collaborative, interactive, synchronous and discussion-based activities. In our survey we also investigated the Reproducibility of Classroom Dynamics (RCD), which the results indicate that mean was slightly low but still above average (M= 5.88), which could be a good indication for the possibilities of the future of distance-learning in Iraq.

3.4. Future expectations and intentions

Another aspect we investigated is the future of distance learning in Iraq from the perspective of students. Results suggest that respondents changed their idea regarding the online educational experience (CIEE) after experiencing it for a few months while attending online classrooms (M= 6.02). Additionally, the results show an improvement in the feeling towards technologies (IFT) (M=6.50). Interestingly, there was an improvement in technological skills (ITS) of students (M= 6.67), which would be a good sign to show that students have a great ability to overcome tough times such as at pandemics. However, despite the change in respondents' attitudes, their Intention to Work in Smart Working (IWSW) was slightly low (M = 5.92). This could be due to the lack of support and, the required infrastructure and software as this experience is considered a novel in Iraq - as it was mentioned earlier. Extent to which University should Rely on On-line Learning (UROL) (M=6.11). Respondents reported they slightly miss Classroom Physicality (MCP) as the mean was 6.59. The results of Sustainability of On-line Education (SOE) was just above average (M=5.63). This also could be due to the lack of the infrastructure and software that are required for the sustainability of such experience as sustainability needs some elements that could be considered essential to make the experience as smooth as possible, which are standard technologies and network in the context of learning over the internet.

Additionally, the results suggest that skills of students have increased in different areas such as: online content production (38%), digital photo editing (24%), online personal production and digital content downloading, organisation and sharing (22%), digital video editing (21%), and, basic hardware use and management, and team working environment (18 %). The rest of the skills were slightly less popular (see Fig 5).

Regarding the future of the education system. 49% of participants chose face-to-face learning, whilst Blended and distance learning took 26%. Despite that the respondents were in favour of traditional

learning, blended and online learning together gain 52%, which could consider as good acceptance. Therefore, these results should interpret with caution as further investigation is needed (see Fig 6).

Respondents were asked to state what purposes technologies would consider useful for providing a high-quality learning experience. Results show that the main purposes that mostly would benefit from using technology are: delivering interactive lessons (37%), collaborative and team working (36%), delivering transmissive (34%), content sharing (29%), synchronous and asynchronous communication with teachers (28%) and content production (24%). Whereas the rest, as shown in Fig 7, have lower rates.

Respondents also stated purposes educational technologies may improve, which are: learning effectiveness (35%), learning autonomy and self-regulation, and quality of the learning experience (34%), developing interactions (33%), learning efficiency (31%), developing a digital identity (25%), designing and managing a learning process (21%), developing a sense of community/ belonging (20%) (see Fig 8).

Discussion

The questionnaire technique used in this study allowed us to gather a wide range of data. This in turn helps to have a clear understanding of students' attitude and perspectives towards the experience of distance learning. Giving that, the finding of this study has significant implications in setting online learning environments in the context of Iraq at university level. The results highlight several aspects that would be good to be considered when designing a learning environment over the internet.

Despite students were not very familiar with distance learning, they managed to find their way through it to continue their learning progress as well as to gain new skills. That would not be possible without the assistance from their universities and teachers as universities reacted as quickly as they could at that time to help students carry on their learning progress. Although universities and teachers were up to this rapid transition of learning mode from f2f into fully virtual, the lack of the required infrastructures was the big weakness of this experience. These added more workload on students as needed an extra time and effort to keep up with the pace of this transition. Attending educational activities from home and over the internet required a stable internet connection and a quiet place, which was a challenge in the context of Iraq. Additionally, extra burden regarding financial support was put on students, which they needed to have their own devices as well as internet connection. However, distance learning was easy to use and useful from the perspectives of students, which could have a positive indication for the future of distance learning in this context. Additionally, the idea of distance-learning has become more familiar amongst students, which could be the foundation for building a good learning environment over the internet when it is needed. Despite this positive insight regarding distance learning, the findings suggest the traditional education and physical classrooms – f2f – it is still more preferable than the virtual one if applicable. However, a note of caution is due here since the results indicate online and blended learning together have a considerable rate of acceptance.

In short, it could be said that universities and students managed to adapt with the rapid change after a short period of time; in other words, after perceiving the shock, in spite of the several challenges they all

faced. That contributed significantly in keeping the progress of the educational process on track, which this experience could be considered successful to some extent in this term. However, a big question arises here, how successful this experience was in terms of the quality of learning? Further research is needed here to measure this important aspect. The next section highlights the challenges.

Challenges And Future Work

Distance learning has become a necessity since the emergence of the novel coronavirus covid-19 pandemic. Universities in most countries around the globe adopted learning over the internet as a measure to prevent the spread of the virus (Giovannella et al., 2020). This study investigated how students at the Iraqi universities perceived distance learning and how universities addressed the health crises at the covid-19 pandemic time. Based on the current data that were discussed in the previous section, it is clear that this experience encountered several challenges which is important to point out in order to be addressed in the future. These challenges will be discussed based on four themes, which are:

5.1 Infrastructure related

Lack of infrastructures were the main challenge students faced when attending online learning activities. Poor network was a big problem in Iraq, as the network was unstable as well as the supply of electricity. This would prevent holding a synchronous meeting or lecture to deliver learning material to students. Instead, students had to receive videos of lectures to overcome the shortage of network, which would cause students to lose direct communication with teachers. This might make attending these videos less interesting.

the absence of standard applications, software and technologies to deliver learning activities would make the experience less sufficient as changing applications frequently with the aim of finding the right one to use would shatter students' attention. Consequently, this could lead to loss of engagement, which consequently, would cause failing of the whole learning process.

5.2 Pedagogy related

Another important challenge was digital pedagogy skills of teachers as the rapid transition from f2f into fully virtual learning, left no enough time for teachers to enhance their skills in digital pedagogy. Additionally, with such context as distance learning is considered a new experience, this challenge would be magnified; teachers would need extra time and effort to provide a smooth and comfortable learning environment. Carrying teaching activities encountered challenges as well. These were mainly asynchronous and transmissive sessions, this could be due to a challenge mentioned in the previous theme, which is poor network. However, despite these weaknesses, teachers managed to provide a learning service that could be considered sufficient in such a context (Authors, 2020).

5.3 Context related

The context students use when attending teaching activities could play a role in the educational process. Learning usually needs an environment that helps students to focus on the teaching activities such as a quiet place, which is not necessarily available while at home. Most students attended learning activities from home whether in a private or shared room, which in most cases is not considered the perfect environment for learning. Therefore, that added extra workload on students to keep on track, which consequently needed more time for students to adapt. Given that, students faced an extra challenge, which is self-time management. Additionally, based on the current data the classroom dynamic was not very sustainable since the interaction and communication between students and teachers became slightly less than in the f2f situations. Classroom dynamics is very important to enhance engagement and produce familiarity with the context. It helps to set up a positive environment for students to learn and communicate with teachers and with each other comfortably.

5.4 Self-support related - Competence and fund

As the experience of distance learning is relatively new in Iraq, students were not very familiar with it and did not have the adequate skills to deal with technology for learning. Hence, they needed to support themselves in various aspects such as enhancing their competence in using educational technologies. That also needs an extra time and effort from students to attain the required skills. However, after this experience, a good sign was shown as students gained new skills while performing learning activities during the distance learning process.

Another important challenge, the fact that students might not have enough funds to support themselves during such a difficult time as they might need to buy new devices such as laptops to perform learning activities. Not only this, but they also need funds for having a good internet connection to ensure a continuance learning performance, which otherwise might be discontinued. This could be an issue that prevents students from having a proper learning environment.

As challenges based on scaled and multichoice questions has been presented, further work is still needed to analyse qualitative data (open-ended questions) to extract students' perspectives, which could lead to extend the current list of challenges. Additionally, a comparative study between students and teachers' perspectives will be conducted. Moreover, further research is needed to measure the effectiveness of learning in such a context.

Declarations

Funding: No fund was made for this work

Conflicts of interest/Competing interests: NA

Availability of data and material: Data will be available upon request

Code availability: NA

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Figures

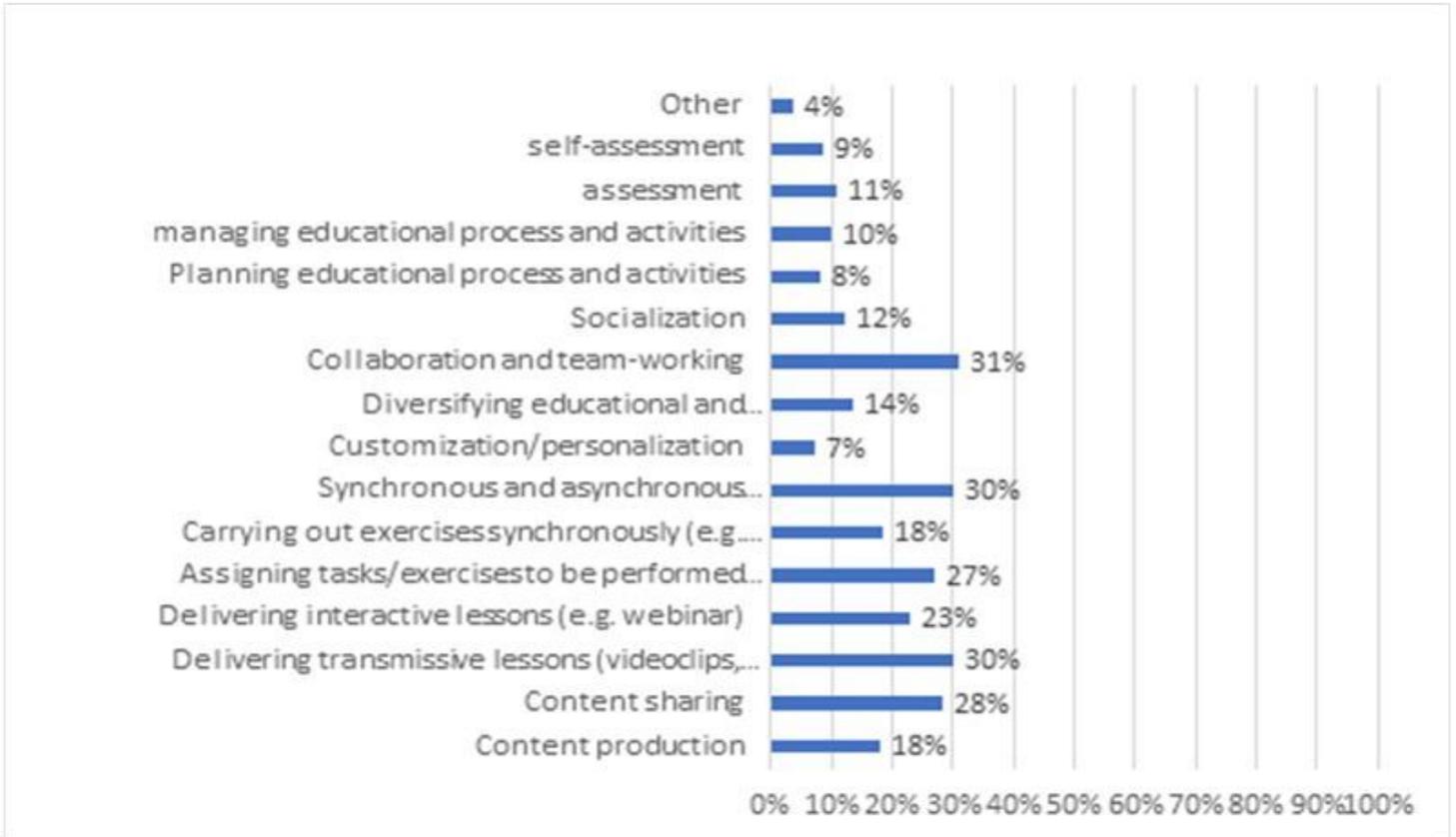


Figure 1

The aspects that technology was used for

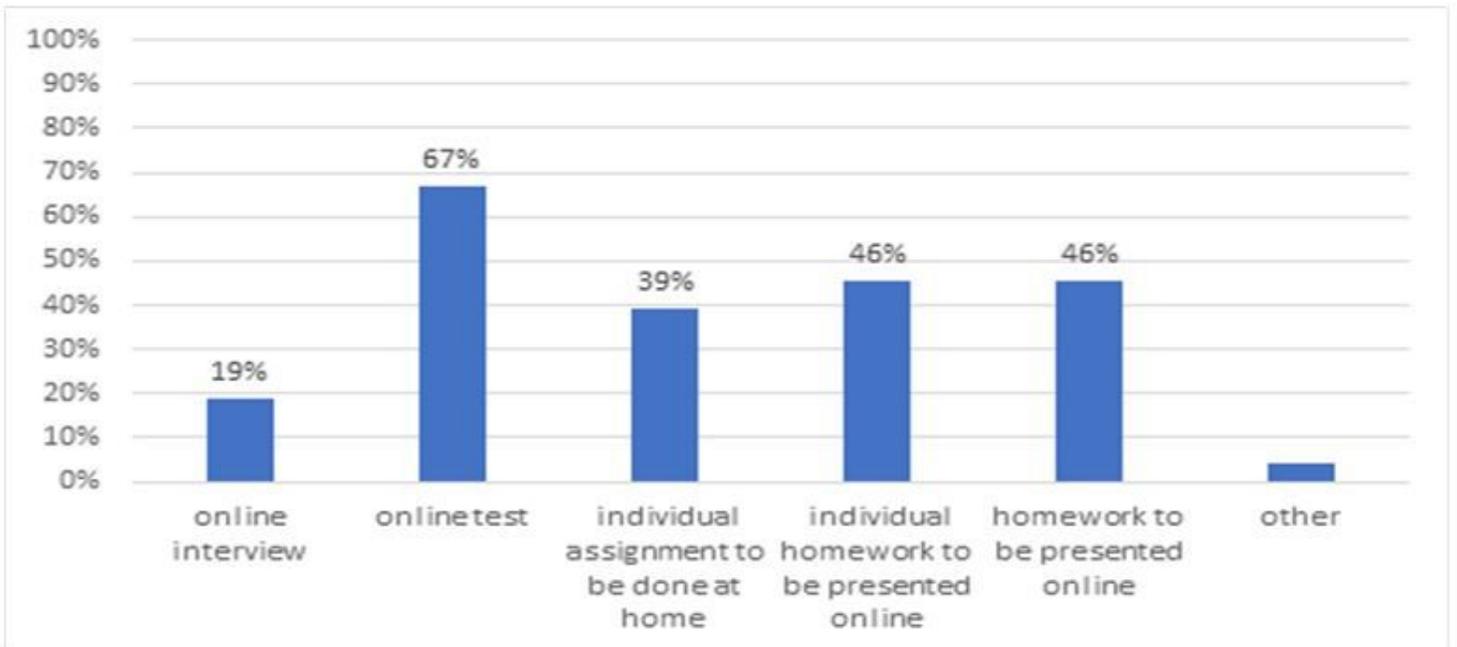


Figure 2

Illustration of assessments' modes

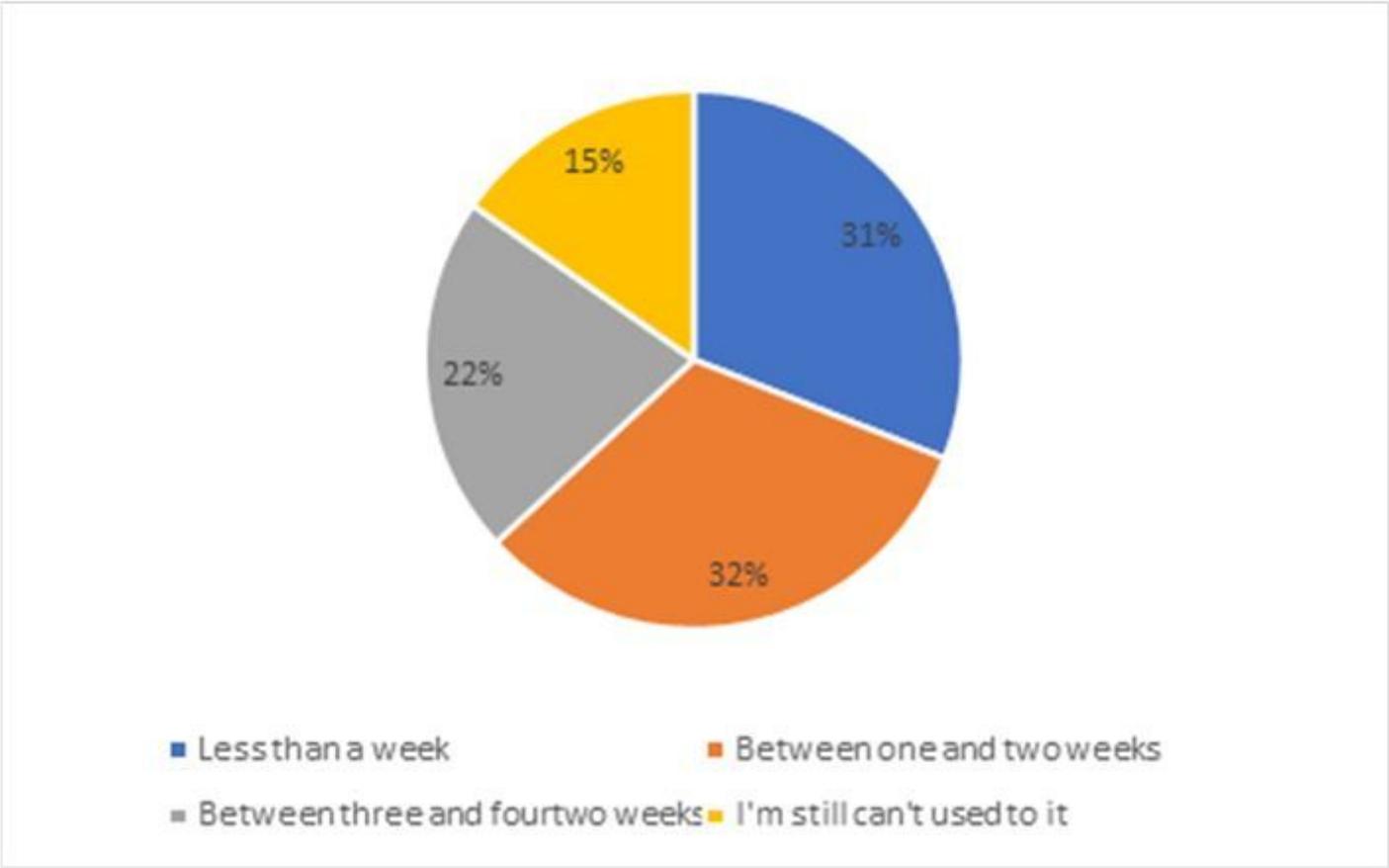


Figure 3

How long students spend until they got used to distance learning

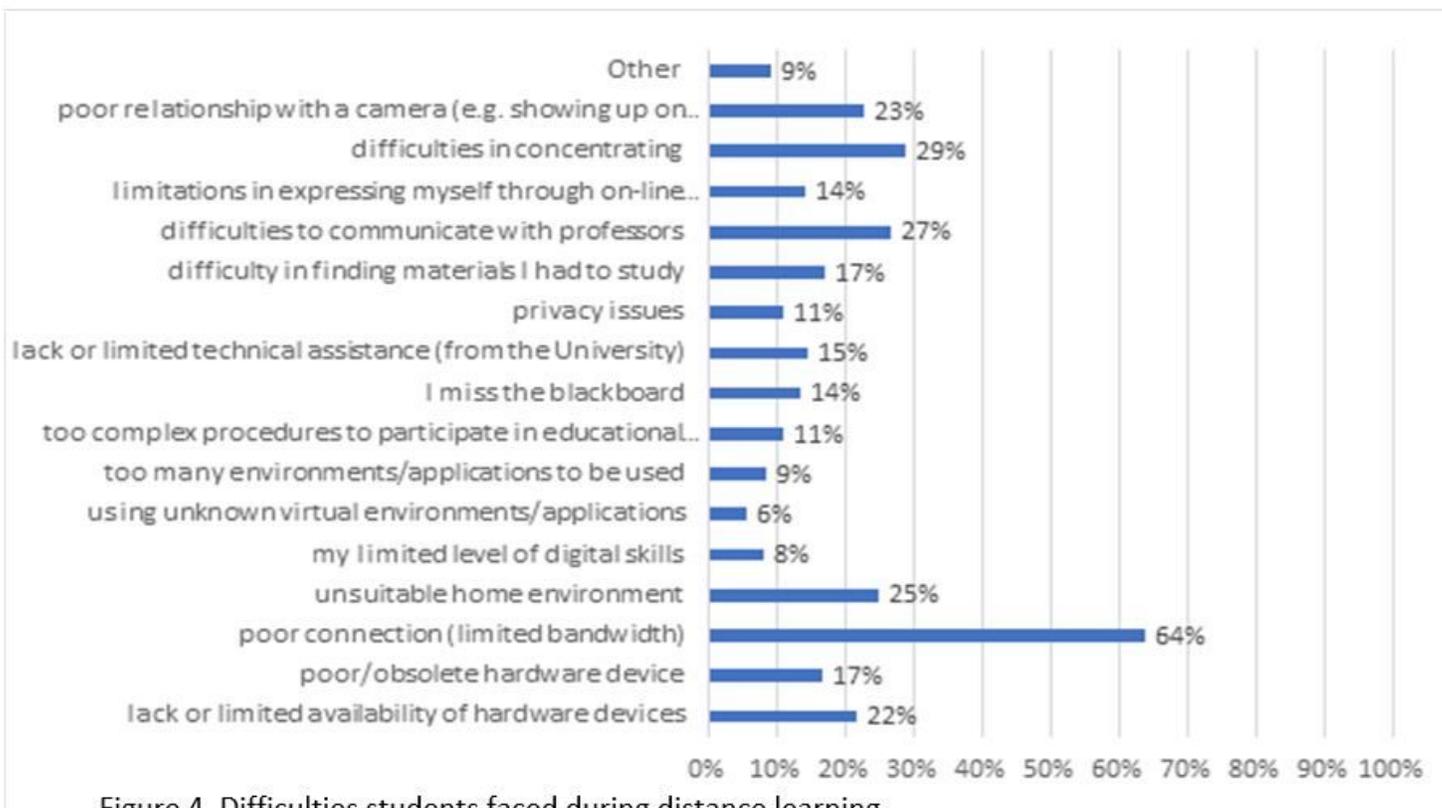


Figure 4. Difficulties students faced during distance learning

Figure 4

Difficulties students faced during distance learning

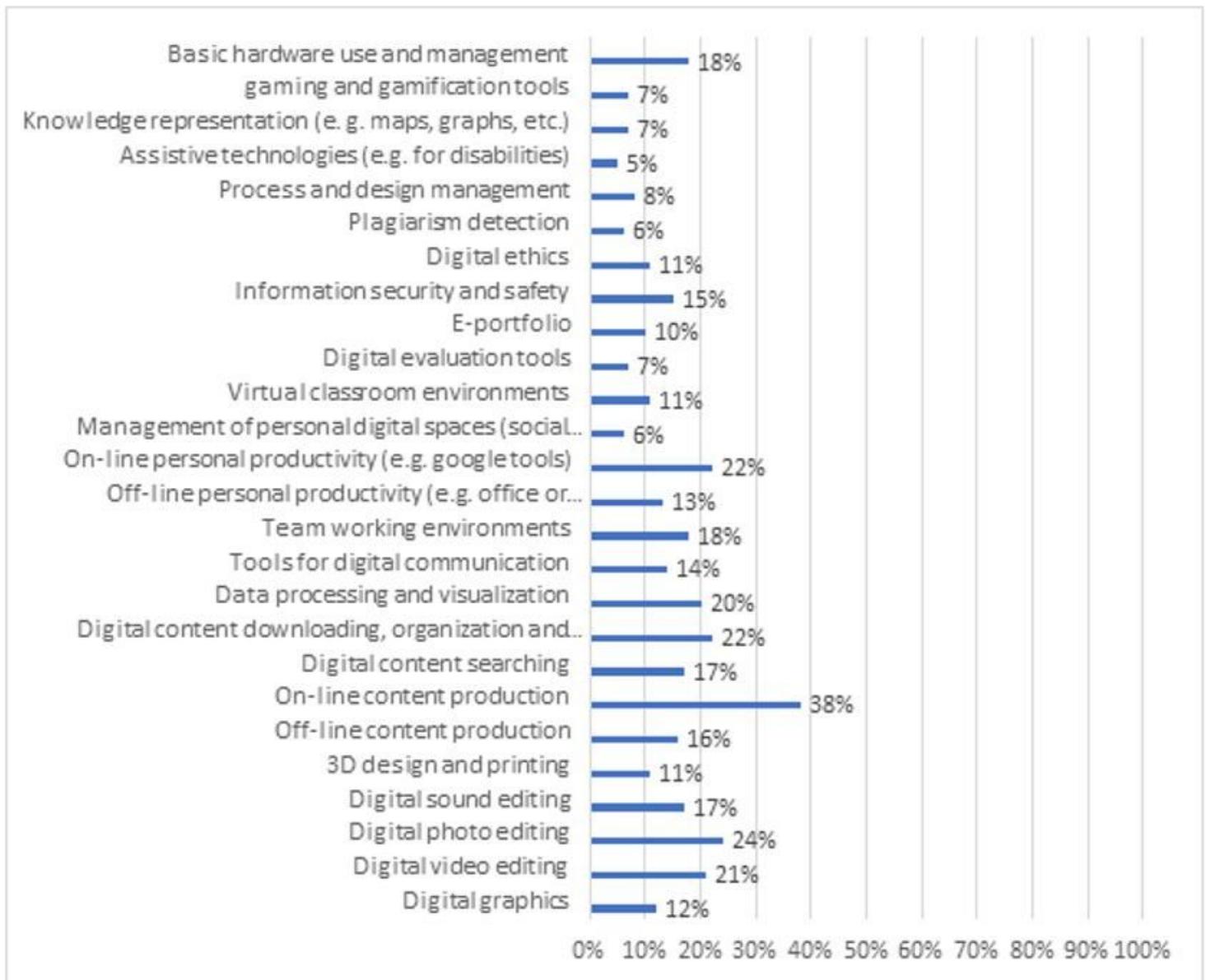


Figure 5

Skills of students that were increased

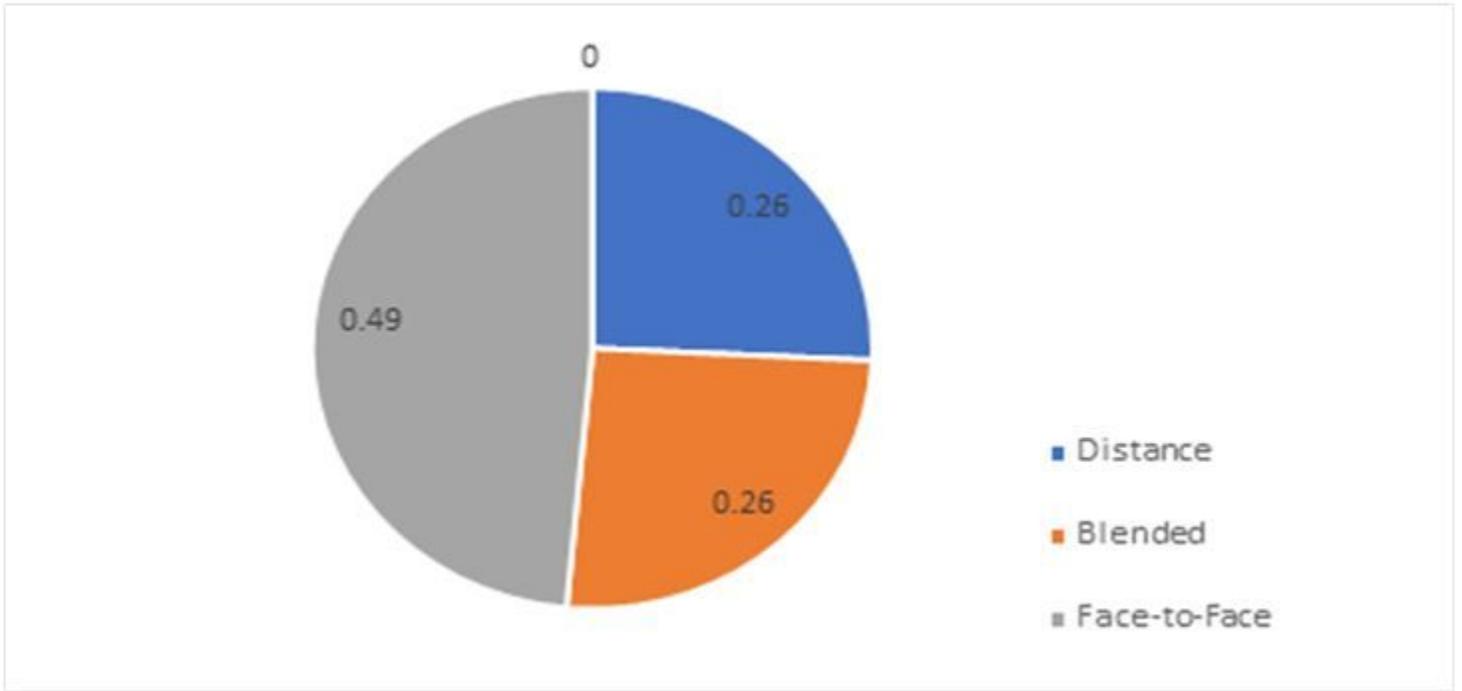


Figure 6

Illustration of students' preferences for future learning mode

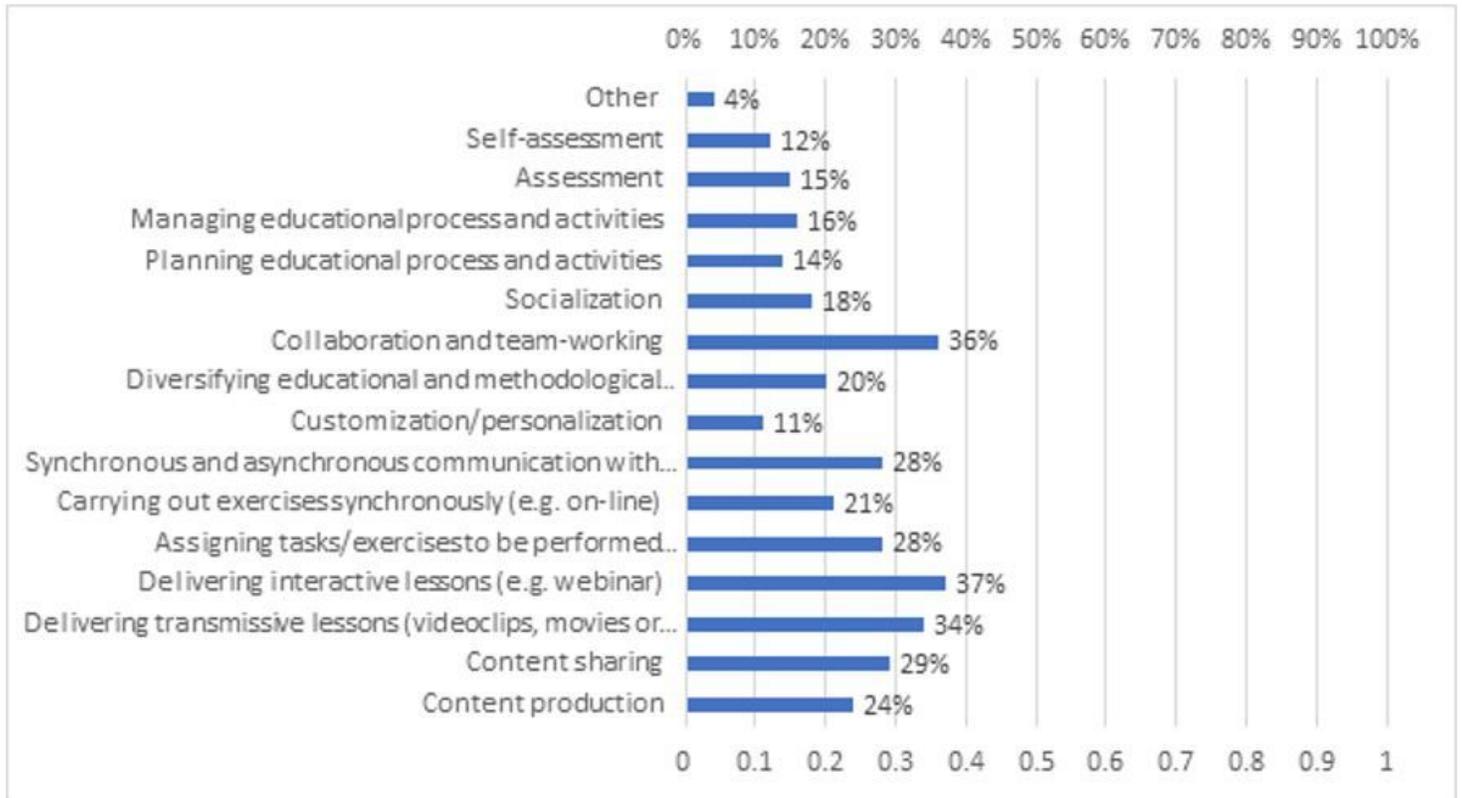


Figure 7

After this experience, for what purposes technologies would consider useful for

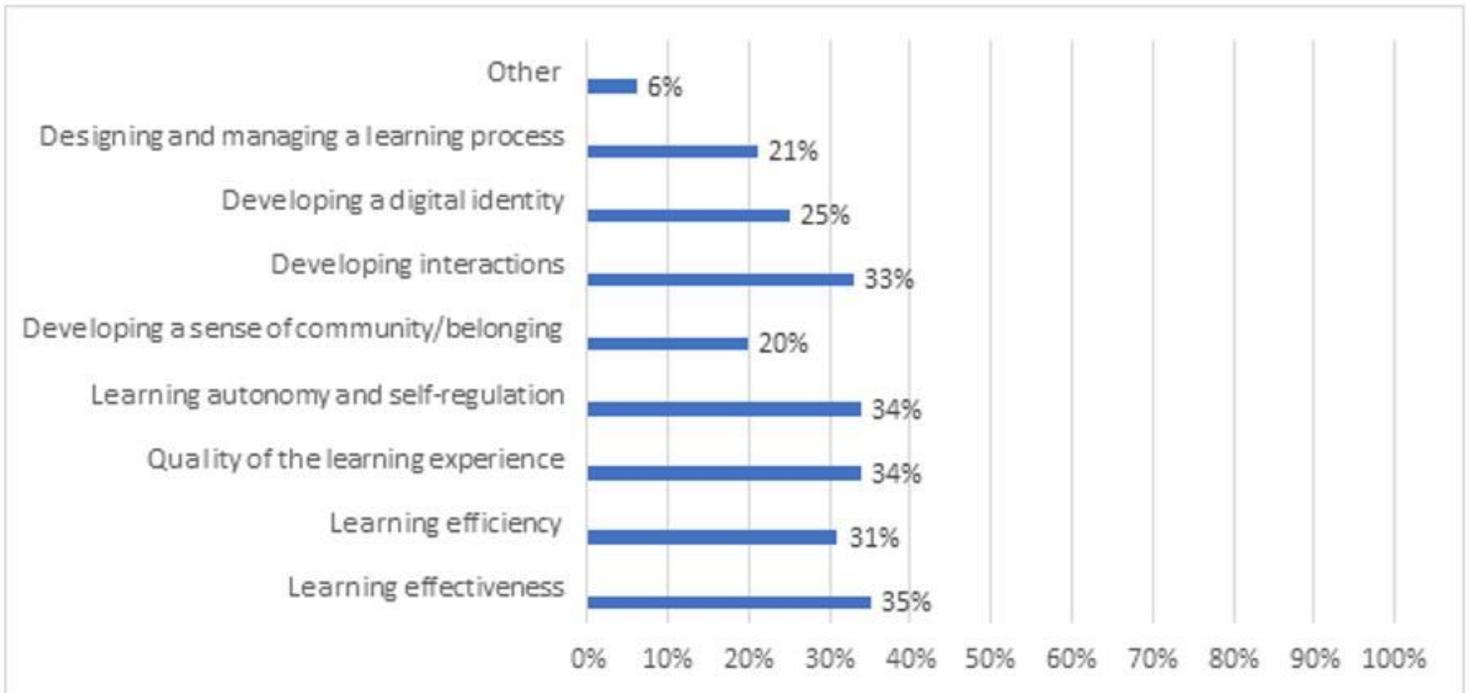


Figure 8

After this experience, what aspects educational technologies may improve