

# **Study of International Baccalaureate Diploma Programme and Career-Related Programme School Readiness for and Perceptions of On-screen Examinations**

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**February 2018**

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# Executive Summary

In June 2017, the International Baccalaureate (IB) Organisation contracted with Inflexion (formerly the Educational Policy Improvement Center) to identify the perceptions, potential challenges, and implementation needs of IB World schools as they plan for the transition to on-screen examinations in the Diploma (DP) and Career-Related (CP) Programmes. Inflexion employed a sequential multiphase mixed methods design with three distinct phases:

- **Phase 1** consisted of a brief review of the literature on transitioning to on-screen examinations, informal discussions with IB staff on their experiences with implementing on-screen examinations for the MYP, and analyses of extant data to develop a typology of archetypal DP/CP school groups.
- **Phase 2** involved individual and group interviews and observations at selected representative case study schools based on the archetypes.
- **Phase 3** tested the generalizability of the case study findings by surveying DP/CP school heads and programme coordinators.

## Findings

Key findings include the following:

- Respondents predicted that school leaders and students would be somewhat more receptive to the transition than teachers and parents/guardians.
- High levels of personal receptivity among coordinators and heads of school was predicted by their perceptions that their school teams had positive attitudes toward on-screen examinations and were confident about the examination logistics. Low receptivity was associated with lack of familiarity or negative perceptions of on-screen examinations and concern about costs associated with on-screen examinations.
- Nearly 80% of respondents reported they would need between six months and three years to prepare for the transition. Approximately 15% of respondents stated a need of more than 3 years to prepare.
  - Those who needed more time to prepare were particularly concerned about costs and had significantly more perceived barriers to implementation.
  - Those who needed less time to prepare reported significantly higher numbers of school context factors that were already in place to support implementation.
- Approximately 10% of respondents categorized their school as somewhat or extremely likely to stop offering the DP/CP if on-screen examinations became the only option for final external assessment.
  - Half of those who reported a likelihood to cease IB programming were from mainly public, state-funded schools in the United States, Ecuador, the United Kingdom, and Canada.

<u>More receptive schools</u>	<u>Less receptive schools</u>
Candidate	Authorized
Spanish language of correspondence (LoC)	English LoC
CP only	DP only CP and DP
Private	Public/state-funded

- Personnel in schools in which French is the language of correspondence were personally receptive to the transition yet also likely to say they would cease their participation in the DP/CP. Compared to schools in which Spanish or English is the language of correspondence, these schools reported a moderately high number of barriers combined with the lowest number of facilitating school context factors.
- School personnel were concerned about loss of student work, lack of user-friendliness of the examination interface, and prohibitive costs.
- Schools want opportunities for students and faculty to become familiar with the on-screen environment, especially through the ability for teachers to create formative classroom assessments in the on-screen environment
- Perceived benefits of transitioning to on-screen examinations include the following:
  - *Benefits to students:* A modern, 21st-century approach to assessment; more authentic or enhanced assessments; mitigation of effects of poor handwriting skills; quicker and higher quality feedback
  - *Benefits to teaching and learning:* Integration of technology, improved student preparation and learning
  - *Benefits to teachers and schools:* Administrative convenience, lower exam-related costs

Open-ended survey items and site visit observations and interviews provided an opportunity for respondents to elaborate on perceived facilitators, challenges/barriers, supports, benefits, and their receptivity. Many revealed a willingness to transition to on-screen examinations, even while expressing some discomfort or highlighting potential drawbacks. School leaders generally expressed a desire for more information about the exams themselves, inquiring about hardware/software compatibility, on-screen tools (e.g., for editing, graphing, drawing, writing equations), and the overall look and feel of the examination environment. Respondents also asked about the availability of technical support, exam space policy changes, and procedures for technical difficulties leading to data loss. These questions highlight the need for clear, accurate communication from IB; extensive testing of the new platform to work out any bugs; and sufficient lead time to allow teachers and students to become comfortable with on-screen examinations.

## Recommendations

To assuage concerns and address perceived barriers and supports, the IB should consider the following recommendations regarding transitioning to on-screen examinations.

1. **Roll out examinations in stages.** Gradually release on-screen examinations on a subject-by-subject or group-by-group basis.
2. **Roll out implementation communications in stages.** Create communication and guidance stages to allow schools to absorb each phase of information and to address evolving questions.

- 3. Anticipate and alleviate schools' anxieties through early communication and contingency planning.** Communicate to schools the new system's user-friendliness and accessibility, and make available contingency plans to anticipate and mitigate potential technical issues.
- 4. Offer early access to the examination environment.** Teachers want the opportunity to test drive the new system, and to develop their own assessments in the examination environment to familiarise students.
- 5. Provide sample on-screen examination paper in all subjects.** Hands-on opportunities with the examination environment should be supplemented with samples of examination papers completed in the on-screen format.
- 6. Offer free video-based training.** IB would serve most schools' stated needs by developing a free webinar that includes video demonstrations on administering on-screen examinations.
- 7. Identify specific schools' needs to mitigate schools leaving IB.** Conduct further pattern analysis among the 10% of schools that indicated a possibility of abandoning the DP/CP, and consider providing additional supports to mitigate potential losses.
- 8. Tap expertise of schools that have solved common problems.** IB could leverage the work of schools that are already implementing well some form of digital assessments (e.g., MYP eAssessment) by establishing a digital resource to which such schools or practitioners can contribute the promising practices they have developed or adopted.
- 9. Tailor communications to various stakeholder groups.** Consider how to message the transition to on-screen examinations with parents, schools, universities, and other stakeholders based on their differing interests and perceptions.
- 10. Learn more about extreme responders.** Further data should be gathered on the 10% of schools that say they require more than 3 years to successfully transition to consider their specific needs.
- 11. Understand policy across levels of schools and systems.** IB should make a concerted effort to understand regional and national policy contexts to anticipate possible solutions to local constraints on schools.

## Navigating This Report

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This report reflects work conducted between 1 June 2017 and 4 January 2018 regarding school perceptions of DP on-screen examinations and is composed of six primary sections: Introduction, Methods, Overall Survey Results, Survey Results for Different Groups, Discussion, and Recommendations. To support engagement, and readability, the body of the report is purposefully concise and provides key contextual information and findings. Full details of the conduct of the study and its extensive findings are included in 13 appendices. Readers who are most interested in the study findings should begin reading on page 11.

The Introduction starts on page 1 and provides the purpose of this study, background on IB and its prior implementation of on-screen examinations, streamlined findings from Phase 1 activities that were featured in a previously submitted interim report, and a brief description of the purpose of this final report. The streamlined findings feature evidence from a brief literature review that guided the study, discussions with IB staff about their perceptions of on-screen examinations, and a typology of archetypal DP/CP schools.

The Methods section starts on page 6 and provides a description of the research design and research questions and abbreviated descriptions of the methods employed for the Phase 2 site visits and Phase 3 survey. In Appendices G–I, we present full descriptions of the Phase 2 methods, including processes for selecting schools, developing interview and observation protocols, visiting schools, and analysing data from those visits. In Appendix J, we present full descriptions of the Phase 3 methods, with the surveys presented in Appendix K.

The Overall Survey Results section begins on page 11. This section is organized into seven subsections: data on receptivity to on-screen examinations, perceptions of school context factors that could facilitate a transition to on-screen examinations, additional facilitators that could ease the transition, perceptions of barriers to implementing on-screen examinations, perceptions of the supports schools expect to need from IB for the transition, anticipated benefits of transitioning to on-screen examinations, and preferences for how to stage the introduction of on-screen examinations. Appendices L and M contain expanded information about the findings.

Results disaggregated by groups of interest begin on page 33. Significant differences in receptivity, advance notice needed, and intention to cease offering the DP/CP are discussed by subgroup (e.g., strand, region, language of correspondence, etc.).

Discussion of those results starts on page 39.

Recommendations start on page 47.

# Introduction

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In June 2017, the International Baccalaureate (IB) Organisation contracted with Inflexion (formerly the Educational Policy Improvement Center) to identify the perceptions, potential challenges, and implementation needs of IB World schools as they plan for the transition to on-screen examinations in the Diploma Programme (DP) and Career-Related Programme (CP). The collaboratively designed study aimed to (a) illuminate factors that facilitate, impede, or support implementation of on-screen examinations; (b) cultivate a rich understanding of barriers and needs that DP/CP school staff perceive regarding implementation; and (c) optimize the IB's implementation approach.

## The International Baccalaureate (IB) Organisation

Founded in 1968, International Baccalaureate (IB) Organisation is a nonprofit education foundation that offers international education programmes to assist students in developing skills for success in a global world (IB, 2017a). IB's mission statement sets the organisation's intention to "develop inquiring, knowledgeable and caring young people who help to create a better and more peaceful world through intercultural understanding and respect" by working "with schools, governments and international organisations to develop challenging programmes of international education and rigorous assessment" (IB, 2017b, par. 5). Currently, the IB has nearly 5,000 schools in more than 150 countries, with approximately 3,300 schools offering the DP and more than 160 offering the CP (IB, 2017c).

## IB's Implementation of On-screen Examinations

Since 2016, the IB has offered eAssessments as an option to formally assess students at the conclusion of the Middle Years Programme (MYP). There are two types of eAssessments: on-screen examinations and e-portfolios. MYP on-screen examinations are electronic exams designed to allow students to demonstrate achievement in relation to subject group criterion. For subjects that are less appropriate for on-screen examination (e.g., performing arts, sciences, mathematics), the IB offers an e-portfolio (IB Community Blog, 2015). Administration of eAssessments is voluntary; however, the IB encourages MYP schools to participate in the examinations.

The IB is planning to implement on-screen assessment for the DP and CP. With more than 150,000 students completing DP or CP examinations annually, limitations of paper-based examinations have become evident. Additionally, the transition to on-screen examinations would offer the IB an opportunity to create and deliver authentic assessments in a familiar medium for today's learners. However, given the wide spectrum of IB World Schools, the IB is aware of the contextual constraints that may affect some schools' abilities to successfully implement on-screen examinations.

## The Current Study

To study the facilitators, barriers, and supports that IB World Schools anticipate as they transition to on-screen examinations, Inflexion employed a sequential multiphase mixed methods design with three distinct phases, summarized in Figure 1. In this report, Phase 1

findings are reviewed and Phase 2 and 3 results are presented. Additionally, data are integrated and recommendations are provided to assist the IB with planning for and implementing on-screen examinations with IB World Schools.

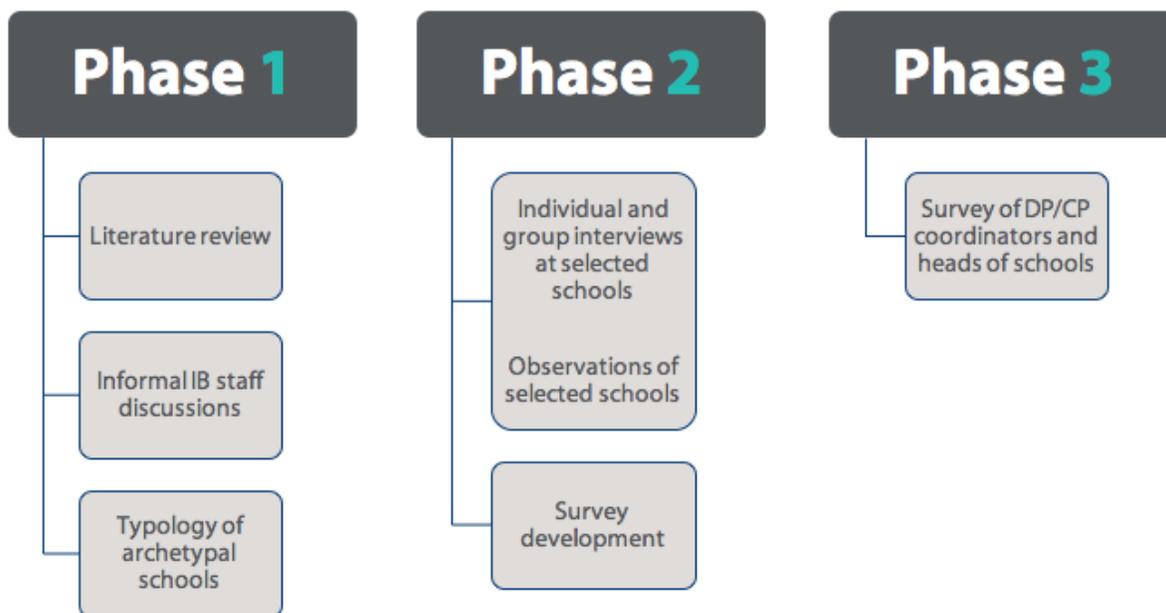


Figure 1. Inflexion's three-phase approach to studying school perceptions of the transition to on-screen examinations.

## Review of Phase 1: Establishing a Typology of Archetypal Schools

In Phase 1, Inflexion conducted a brief review of the literature on transitioning to on-screen examinations, engaged in informal discussions with IB staff on their experiences with implementing on-screen examinations for the MYP, and analyzed extant data to develop a typology of archetypal DP/CP school groups (see Appendix A for a detailed description of Phase 1 methods). Phase 1 results were presents in the interim report and are summarized below.

### Literature Review

Drawing upon previous research, Inflexion researchers conducted a brief literature review of articles, reports, and blog posts to examine the facilitators, barriers, and supports related to on-screen examinations. A full description of the literature review's methodology and findings can be found in Appendices A and B, respectively. *Facilitators*, or school context factors, refer to any actions that IB schools can take, processes they can implement, or resources they can marshal to ease their own transitions to on-screen examinations. *Barriers* refer to actions, processes, or resources (typically the lack thereof) that can impede such a transition. *Supports* refer to actions, processes, or resources that IB can undertake organizationally or provide on behalf of transitioning schools.

Key facilitators include effective school or district leadership, communication, opportunities for collaboration and professional development, experience with innovation, and resources to support innovation.

Common barriers to implementation of on-screen examinations included issues with access to technology, technological design, security of technology, and limited resources.

In summary, the Phase 1 literature review underscored that the following should be considered by the IB:

- **User-friendliness:** Students and educators are more willing to engage with technology that is easy to use. Additionally, examinations should be accessible to diverse student populations, including those with special needs.
- **Professional development:** IB can support educators' transition to on-screen examinations by advocating for and/or offering professional development opportunities focused on the administration and use of such examinations.
- **Discussion forums:** Educators should also have access to physical or virtual spaces to discuss implementation challenges and share strategies for success.
- **Policy:** IB should consider its appropriate role in understanding and potentially attempting to influence school, local, and national policy to support the adoption of new technology and local technical support necessary for on-screen assessment. Although IB can implement several of these supports internally, it should encourage schools to develop their own systems and structures to facilitate the transition to on-screen examinations.
- **Technical support:** IB must be able to respond to security or log-in issues that cannot be solved locally.
- **Contingency plans:** Technological failures are nearly inevitable and can result in a loss of data. Developing contingency plans can mitigate the effects of issues ranging from unreliable internet connection to power outages and server failure.

### IB Staff Perceptions of On-screen Examinations

To assist in framing the study of facilitators, barriers, and needed supports related to implementing on-screen examinations, Inflexion conducted informal discussions with selected IB staff. Appendix A provide a full description of the informal discussion's methodology, Appendix C presents the Informal IB Staff Discussion Prompts, and Appendix D displays the full informal IB staff discussion results. Informal discussions revealed key facilitators and barriers that MYP schools experienced during the implementation of on-screen examinations. Highlights include the following:

- **Planning:** Elements of planning incorporate internal and external communication, development of realistic transition timelines, research and development on on-screen examinations, and school-level planning.

- **School-level resources:** There are many costs associated with on-screen examinations (e.g., computers and other technology, furniture, space, training for educators). Thus, better-resourced schools will be better able to accommodate on-screen examinations.
- **Logistical considerations:** Logistical thinking requires analyses of space and equipment, the particularities of assessing certain subject areas (e.g., mathematics), and timing of assessments.
- **Resources available to educators:** School personnel will need professional development around the new on-screen examinations and access to instructional materials and sample documents. Additionally, educators will need to “test-drive” the system so they can become familiar with the environment and create practice assessments they can integrate into their classes.
- **Culture:** Two important aspects of culture that affect a school’s ability to implement on-screen examinations are attitudes towards technology and integration of technology into teaching and learning.
- **MYP on-screen examinations:** Although experience with MYP on-screen examinations should promote acceptance of on-screen examinations for DP and CP, there are notable differences between the MYP and the DP and CP that will need to be considered.

In both the literature review and IB staff discussions, Inflexion found copious evidence that successful implementation of on-screen examinations would require the IB to consider schools’ diverse needs when making appropriate accommodations and preparations. The IB’s sheer size and spread requires flexibility and preparedness to address myriad issues that will range from limited devices and Internet connection bandwidth to educators’ perceptions of and comfort with technology. Thus, Inflexion developed criteria for school archetypes to understand school-specific facilitators, barriers, and needed supports with greater depth.

### Typology of Archetypal DP/CP schools

Using a two-step cluster analysis, Inflexion developed eight distinct groupings of schools. Inflexion highlights notable characteristics of each cluster below; however, a full description of the cluster analysis methodology, typology of archetypal school results, and individual cluster profiles are presented in Appendix A, E, and F, respectively.

- **Cluster 1: Star Schools** – On average, Cluster 1 schools offer the most subjects, have the most IB students and exams, and have highest exam performance.
- **Cluster 2: Remarkably Average** – Cluster 2 schools are average IB implementers. They are not positively or negatively “best” or “worst” on any aspect.
- **Cluster 3: “Trouble” Schools, Otherwise Average** – Cluster 3 schools are fairly average, but have all been flagged as having had a “trouble” incident.
- **Cluster 4: MYP On-screen Assessment Implementers** – Cluster 4 schools have already implemented on-screen examinations in their MYP. The majority of these schools are in Africa, Europe, or the Middle East, and are privately funded. Although still

small, the largest percentage of schools with French as their language of correspondence fall in this cluster.

- **Cluster 5: Challenges with Electricity and Internet** – Cluster 5 schools reside in countries with the greatest issues relating to electricity and internet. The majority of schools are in the Asia-Pacific region or Africa and are privately funded.
- **Cluster 6: Small Programmes** – Cluster 6 schools, on average, offer the smallest number of subjects, and have the smallest number of IB students and exams. These schools have the highest electricity and internet ratings. Almost all schools are in North America, Europe, and industrialized/more affluent nations in the Asia-Pacific region.
- **Cluster 7: New IB Schools, Primarily Spanish** – Cluster 7 schools have the shortest tenure as IB schools and the highest percentage of schools with Spanish as their language of correspondence. These schools also have some challenges with internet access.
- **Cluster 8: New IB Schools, “Trouble” Schools** – Cluster 8 schools also have a short tenure as IB schools and all schools have been flagged as having had at least one “trouble” incident. This cluster also has a large percentage of schools with Spanish as their language of correspondence.

# Methods

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This section outlines the study's research questions and Phase 2 and 3 methods.

## Research Questions

Three primary research questions guided Inflexion's study of school perceptions regarding a transition to DP/CP on-screen examinations. The first research question focused on the perceptions and attitudes of IB World Schools towards the implementation of on-screen examinations. The second research question focused on the facilitators and barriers that schools anticipate experiencing during a transition to on-screen examinations. The third research questions focused on developing key actions that the IB can take to best support schools throughout this transition. The specific research questions addressed by the study were as follows:

1. What are the perspectives and attitudes of IB World Schools concerning the planned implementation of on-screen DP/CP examinations?
  - a. What do schools perceive to be the impact—on teachers, students, and the wider school community—of DP/CP on-screen examinations?
  - b. Among which school groups is receptiveness to on-screen DP/CP examinations highest and lowest?
  - c. What proportion of schools would stop offering the DP/CP if the only option is on-screen assessment?
2. What do schools believe are the pedagogical, organizational, and structural changes that would be required to transition to, and support, on-screen DP/CP examinations?
  - a. What do schools identify as knowledge, skills, and capacity barriers to adopting on-screen examinations?
  - b. What do schools identify as knowledge, skills, and capacity facilitators for transitioning and adopting on-screen DP/CP examinations?

*Based on answers to Questions 1 and 2:*

3. What are the key actions the IB can take that will best support school, teacher, and student transition to on-screen DP/CP examinations?
  - a. What do different school groups identify as “lynch-pin” factors for adoption or rejection of on-screen DP/CP examinations?
  - b. What proportion of schools would be ready for on-screen assessment in 2021?

## Phase 2: Site Visits

To solicit IB World School concerns and organizational capacity related to the implementation of on-screen examinations, Inflexion researchers conducted case studies of archetypal DP/CP schools. Six representative schools were selected collaboratively by IB staff and Inflexion researchers to serve as case study sites. Inflexion's researchers visited those schools to conduct individual and group interviews and observations. The primary purposes of the case study site visits were (a) to develop a comprehensive survey that was administered to IB World Schools in Phase 3 and (b) to supplement Phase 3 survey data to provide rich, nuanced

understandings of the facilitators, barriers, and supports that need to be accounted for based on the school typology. Brief summaries of the school selection process, protocol development process, site visit process, and analysis and synthesis of site visit data are presented next. Appendix G presents a full description of Phase 2 methods.

### School Selection Process

To determine which schools would be selected as case study sites, Inflexion researchers identified the most “typical” school for each typology group (henceforth referred to as cluster) described on page 4. The “most typical schools” were those schools that were (1) closest to their respective cluster means for the largest number of continuous variables and (2) exhibited the same nominal response as their respective cluster on the categorical variable. Schools with a higher number of matched variables were considered to be more representative or typical of the cluster than schools with a lower number of matched variables. Overall, clusters had schools of 6 (i.e., Clusters 4, 5, and 7) or 7 (i.e., Clusters 1, 2, and 8) or 8 (i.e., Clusters 3 and 6) matched variables; no school matched on all nine variables (variables are listed in Appendix A). Inflexion created a prioritized list of high-scoring schools per cluster, enabling the IB to purposively select schools of interest to ensure diversity of both geography and strand across the clusters.

### Protocol Development Process

Semistructured interview and observation protocols were developed through a multistage process. First, an initial draft was created drawing on the Phase 1 literature review of scholarly and practitioner literature regarding perceptions of adopting on-screen examinations and potential implementation challenges, and Phase 1 informal IB staff discussion results. Existing frameworks designed to solicit and examine the depth of concerns, such as Stages of Concern (Hall & Hord, 2011), were also used to develop the initial set of questions. The initial items were cross referenced with the proposal that Inflexion originally submitted to the IB. Particular attention was given to ensuring the research questions were adequately represented on the protocols.

Internal reviews of a draft protocol informed the development of role-specific protocol variations. In total, five protocols were created—one observation protocol used at the location schools used for holding exams, and a discussion protocol for each of the following roles: IB coordinator or head of school, assessment coordinator, students, IB teachers in general, and specific teachers of IB subjects for which on-screen examinations might be of particular concern (See Appendix H). Inflexion researchers incorporated feedback from IB prior to finalizing the protocols.

### Site Visit Process

Each Inflexion researcher initiated communication with his or her designated school(s), using email text approved by the IB. Researchers worked with coordinators at the school to arranged interviews and a tour of the site(s) where examinations take place. All interviews were recorded and transcribed. Transcripts of interviews conducted in Colombia were professionally translated from Spanish to English to facilitate analysis by Inflexion researchers.

## Analysis and Synthesis of Site Visit Data

Inflexion researchers started with a list of initial qualitative start codes derived from the Phase 1 literature review and the informal IB staff discussions. Additional codes were developed as new themes emerged, and unused start codes were excluded. Data were analyzed by school and then across cases to determine the extent to which a theme was shared or unique among clusters. Researchers also applied magnitude codes to estimate the importance of each theme. Cross-case school context/facilitator, barrier, and support summaries can be found in Appendix I.

## Phase 3: Survey

To examine the generalizability of site visit study results, all heads of schools and programme coordinators from authorized and candidate schools were invited to participate in a survey on their perceptions of on-screen examinations. A brief summary of the survey development process, procedure, and data analysis plan is presented next. Appendix J presents a full description of Phase 3 methods.

### Survey Development Process

Researchers developed a 21-question survey to administer to coordinators and heads of school. Surveys were developed through a multiphase process similar to that used for site visit protocol development. First, an initial draft of the authorized school survey was developed, drawing on the Phase 1 literature review of scholarly and practitioner literature, Phase 1 informal IB staff discussion results, Phase 2 site visit results, and the research questions in Inflexion's original proposal to the IB. Inflexion researchers then solicited and incorporated feedback from the IB prior to finalizing the survey. In collaboration with IB staff, Inflexion researchers created an abbreviated survey for candidate schools, excluding three items that were relevant to authorized schools, but not relevant to candidate schools. The finalized authorized and candidate surveys were translated into Spanish and French. Appendix K displays the authorized and candidate surveys in each of the three languages (i.e., English, Spanish, and French).

### Procedure

In November and December 2017, 7,012 heads of schools and coordinators from 3,568 schools were invited to complete the survey. Contact information for heads of school and coordinators at current authorized and candidate schools was provided to Inflexion researchers by the IB. Respondents completed the survey online at their convenience at a location of their choice. Respondents were told that the purpose of the survey was to help the IB identify the benefits, concerns, and challenges that schools anticipate related to on-screen examinations so that the IB can plan how to best support schools through the transition. Most respondents completed the survey in fewer than 30 minutes.

#### *Survey Limitations*

It is important to note survey limitations prior to examining the findings. First, this survey was long and some respondents only completed part of the survey; respondents who completed at least one question were included in response rate calculations and subsequent analyses.

Another limitation was that the survey was open for a limited time. The survey was open for approximately 3 weeks and researchers received several requests to extend the deadline. Although the researchers were able to extend the survey deadline by a week, it was not possible to accommodate the requests to extend the survey beyond that. Similarly, the timing of the survey was not ideal. Survey administration spanned a winter holiday when some schools were closed and coincided with some schools' end-of-year reporting. An unforeseen limitation was that heads of school and coordinators often completed the survey together. As such, it was not possible to explicitly compare heads of school and coordinator perceptions and also necessitated the calculation of school-level response rates as more meaningful than individual-level response rates.

### *School-Level Response Rates*

Given the survey limitations, Inflexion researchers focused on school-level response rates. A total of 2,748 heads of schools and coordinators, representing 2,245 schools, completed the survey. Response rates were similar across status (authorized and candidate), language (English, Spanish, and French), region (IBA, IBAEM, and IBAP), strand (private international, private national, public–rest of the world, and public–US), and cluster.

### Internal Structure

Inflexion researchers conducted a series of exploratory factor analyses using principal axis factoring on the school context, barriers, and supports items (separately). Models that were deemed to be the most parsimonious, theoretically supported, and provided the most interpretable solution were selected as the best fitting factor solutions.

For the school context items, a 3-factor solution was selected. The three factors were labelled as follows:

1. positive attitudes towards on-screen examinations
2. teacher and student knowledge, skills, and familiarity regarding on-screen examinations
3. confidence about examination logistics

For the barriers items, a 6-factor solution was selected. The six factors included the following:

1. lack of time/user-friendliness of the testing interface
2. exam dishonesty
3. power/internet/accessibility issues
4. concerns about examination logistics
5. lack of familiarity/negative perceptions of on-screen examinations
6. student challenges with on-screen examinations

One item did not align with the other items; however, it was considered to be an important barrier. As such, the single item was considered to be its own factor and was labelled prohibitive costs.

For the supports items, a 1-factor solution was selected. The factor was labelled supports to capture the broad range of statements.

Results for these survey items are organized by factor.

## Data Analysis Plan

Survey data were analyzed descriptively first to note frequencies and distributions of responses. Means and standard deviations were calculated overall and for specific groups of interest. A series of *t*-tests and analyses of variance were conducted to address questions regarding group differences. Given that statistical tests were overpowered, effect sizes were calculated to assess practical significance of research findings. Open-ended items were coded thematically using the constructs identified during the case studies and literature review and then adding *in vivo* codes as needed.

# Overall Survey Results

Heads of schools and IB coordinators completed a survey on their perceptions of on-screen examinations for the DP and CP. This section presents overall survey results, followed by selected disaggregated results comparing groups of interest (e.g., status, region, language, strand, program, position, cluster). Callout boxes are used to highlight open-ended survey responses that support or contrast quantitative survey results. See Appendix L for all disaggregated data.

## Receptivity

School receptivity to transitioning to on-screen examinations is of particular interest in this study. As such, several of the survey questions asked about aspects of receptivity, including personal ratings of receptivity, the extent to which the school community would support or oppose DP/CP examinations transitioning to an on-screen system, the amount of advance notice that schools would need to transition to on-screen examinations, and the likelihood that schools would stop offering the DP/CP if on-screen examinations were the only option.

Overall, respondents were moderately receptive to transitioning to on-screen examinations (see Figure 2). On a scale of 0 (not at all receptive) to 100 (very receptive), the average receptivity rating was 67.38 ( $SD = 27.58$ ). Although respondents overall were somewhat positive, receptivity ratings varied considerably. Thus, factors contributing to receptivity were explored further in subsequent sections.

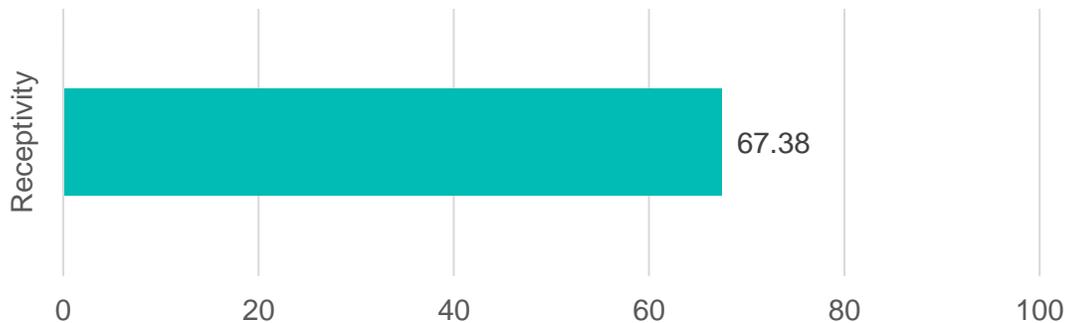


Figure 2. Respondents' ratings of receptivity to on-screen examinations.

Given the importance of receptivity to this study, Inflexion researchers examined whether ratings of school context, barriers, and supports (described below) predicted respondent receptivity. Inflexion researchers calculated scores for the school context and barriers subscales, as well as the scale score for supports. Four of the subscales were significant predictors, explaining 51.6% of the variability in receptivity: positive attitudes towards on-screen examinations, confidence about examination logistics, lack of familiarity/negative perceptions of on-screen examinations, and prohibitive costs. Specifically, positive attitudes towards on-screen examinations and confidence about examination logistics were related to more positive ratings of receptivity; higher scores on

“Our school will definitely see this as a positive step towards [the] future and we will embrace the change.”

the subscales called lack of familiarity/negative perceptions of on-screen examinations and prohibitive costs were related to less positive ratings of receptivity.

Additionally, Inflexion researchers assessed whether the number of extreme responses (number

“Students use computers for nearly all tasks at school and in particular to write at school, and therefore they find handwriting difficult and time-consuming.”

of school context items for which respondents selected the *strongly agree* response option and the number of barrier items for which respondents selected the *extremely concerned* response option) could be used to predict respondent receptivity. Overall, the number of extreme responses for school context and barrier items

were significant predictors, explaining 39.8% of the variability in receptivity. Specifically, a greater number of extreme positive responses to school context items were related to more positive ratings of receptivity and a greater number of extreme negative responses to barriers items was related to far lower ratings of personal receptivity.

“We will be hard-pressed to convince parents and students that on-screen exams are in their best interest when they all know that universities mostly test on paper.”

Respondents were asked to rate the extent to which their school community would support or oppose DP/CP examinations transitioning to an on-screen system on a scale of 1 (*strongly oppose*) to 5 (*strongly support*). Although ratings were similar (i.e., average scores within half a scale point) across school community groups, respondents believed that students would be most supportive and parents or other guardians would be least supportive of a transition to on-screen examinations (see Figure 3).

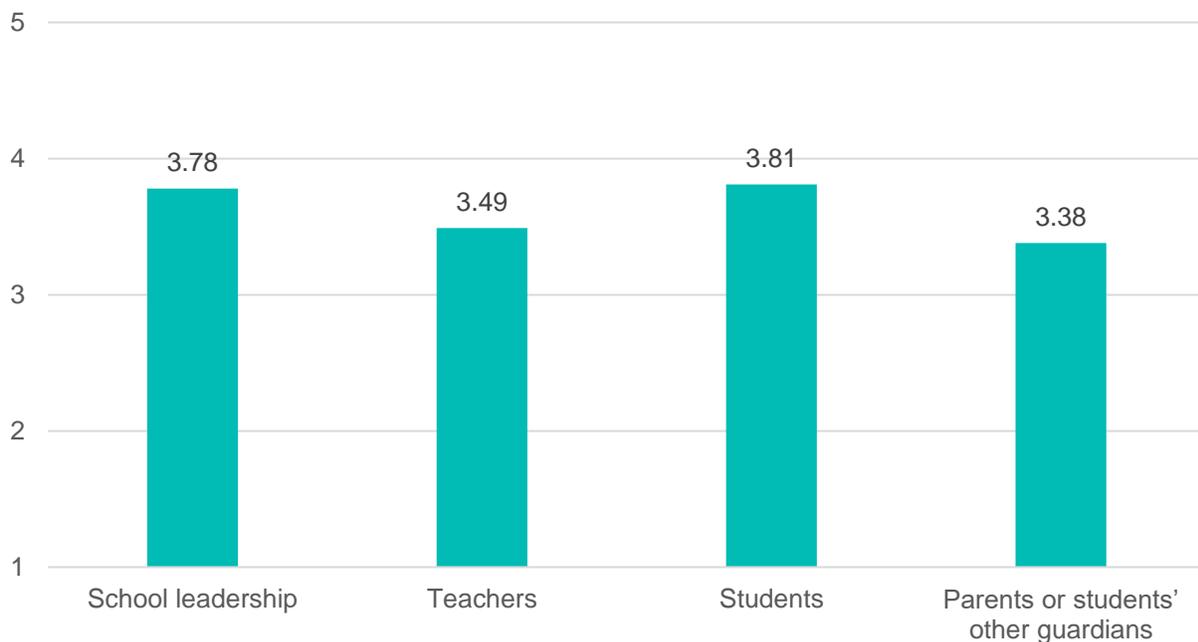


Figure 3. Respondent perceptions of school community support for on-screen examinations.

Respondents also were asked about how much advance notification their school would need to be ready to implement on-screen examinations. As shown in Figure 4, the majority of respondents (78.6%) reported that they would need between six months and three years. Only

6.7% of respondents indicated that they would be ready in less than 6 months and 14.7% of respondents indicated they would need more than 3 years to prepare for on-screen examinations. Thus, it appears that most schools could be ready to implement on-screen examinations by 2021.

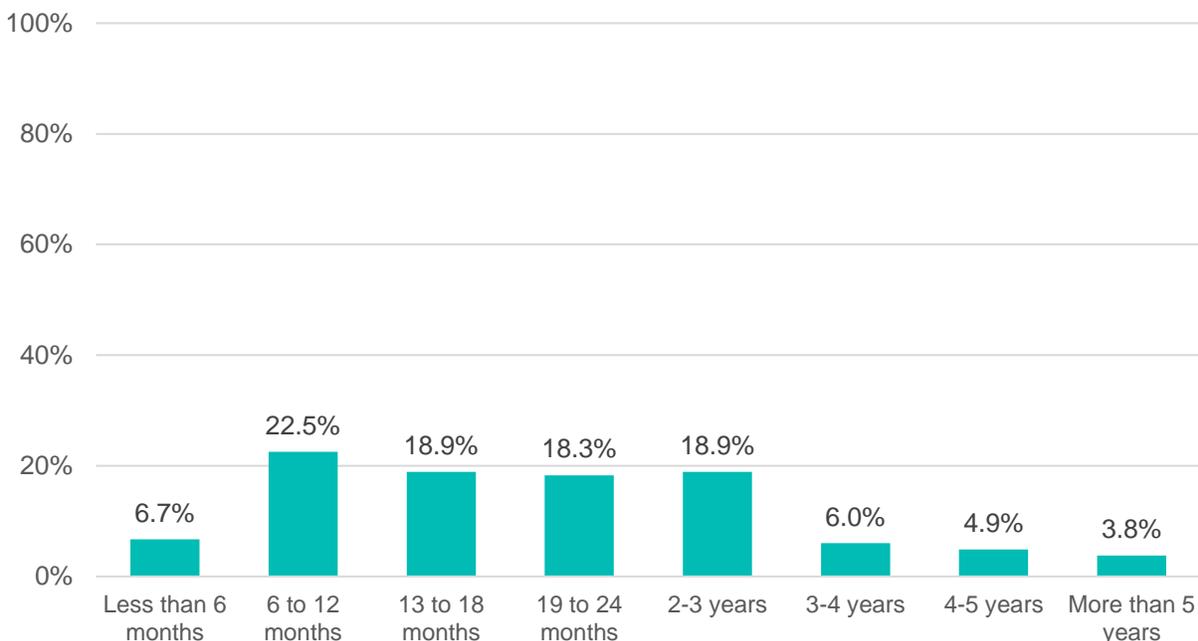


Figure 4. Amount of advance notice needed to transition to on-screen examinations.

Perceived advance notice needed by schools is particularly important for IB planning around on-screen examinations. As such, Inflexion researchers examined whether subscale scores or number of extreme ratings of the school context, barriers, and supports items predicted the length of advance notice that schools needed, focusing on the three-year mark (e.g., examining the

“My school can do this, but we will need significant lead time and guidance from the IB to make the transition as smooth as possible.”

“We wouldn’t feel comfortable doing this in less than 2 years as we would want students entering our DP program to know they have an online assessment waiting for them at the end.”

predictors of whether schools needed 3 or fewer years compared to more than 3 years notice). Overall, five of the subscales were significant predictors of whether a school would be ready for on-screen examinations in 3 or fewer years: higher scores on positive attitudes towards on-screen examinations and confidence about examination logistics (both rated from 1 to 6); and lower scores on power/internet/accessibility issues, lack of familiarity/negative perceptions of on-screen examinations, and prohibitive costs (all rated from 1 to 5). Figure 5 displays the mean scale scores by advance notice needed.

“Our students have Chromebooks rather than laptops. . . . If laptops are required, I do not know how our school will afford to purchase enough for all students to sit for exams at the same time.”

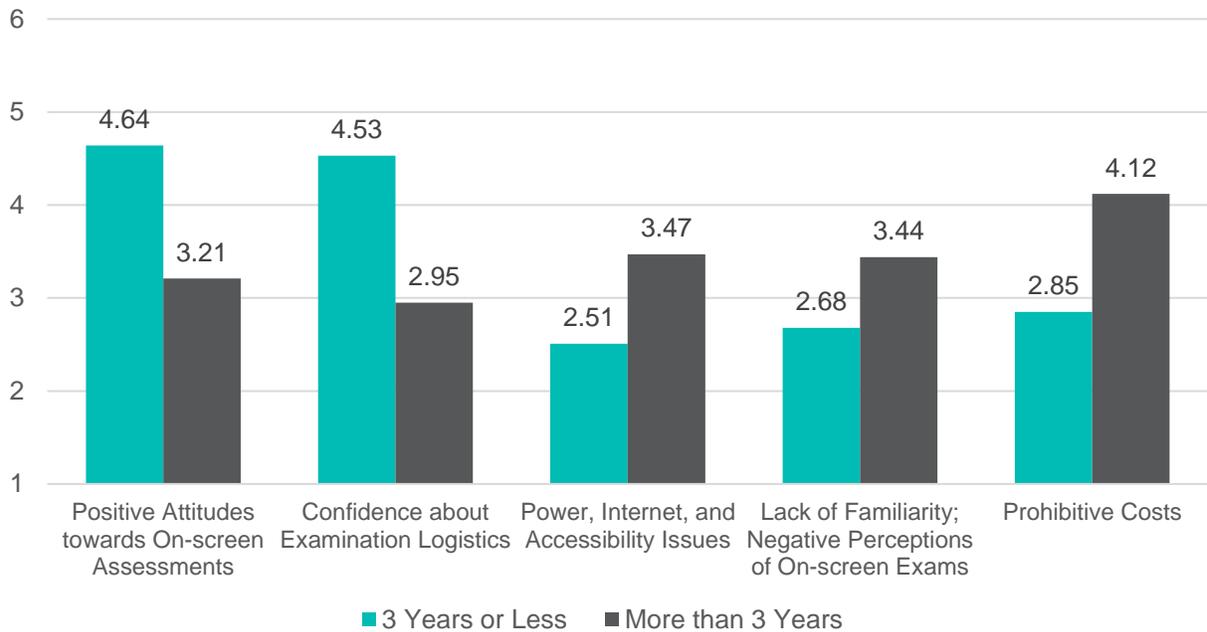


Figure 5. Mean scale scores on factors that predict amount of advance notice needed.

Additionally, the number of extreme responses for school context (ranging from 0 to 13) and barriers (ranging from 0 to 20) items were significant predictors of amount of advance notice needed. As shown in Figure 6, schools that had a greater number of extreme positive responses on the school context items were more likely to be ready to transition to on-screen examinations in 3 or fewer years and schools with a greater number of extreme responses on the barriers items were less likely to be ready to transition to on-screen examinations in 3 or fewer years.

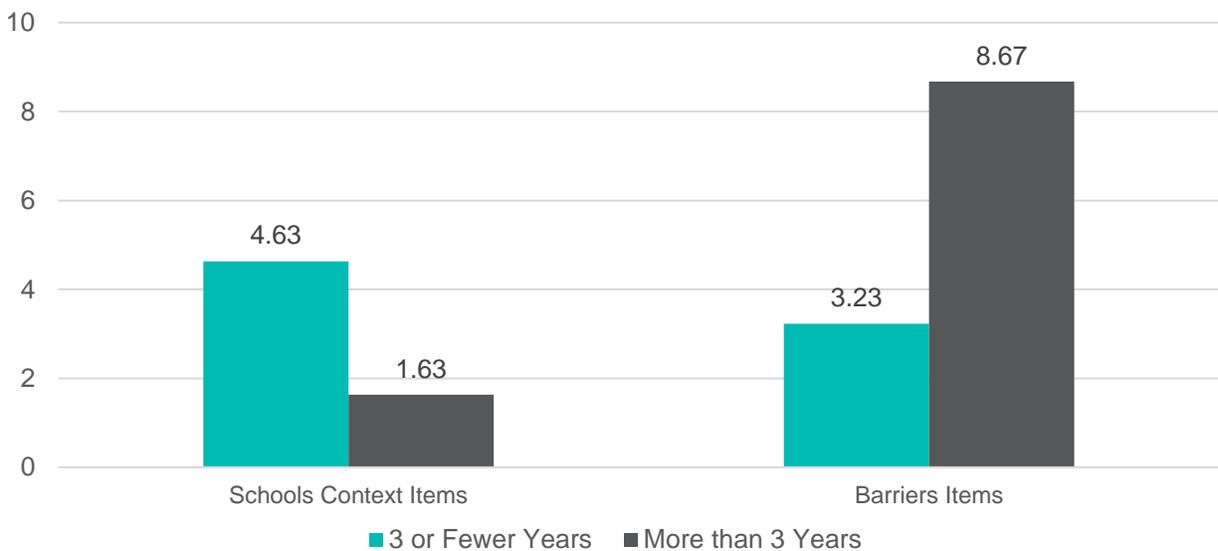


Figure 6. Mean number of extreme responses by advance notice needed.

As shown in Figure 7, only 9.6% of respondents indicated that it was *somewhat* or *extremely* likely that they would stop offering the DP/CP if the only option for final external assessment was on-screen examinations. Of the 245 respondents who selected *somewhat* or *extremely likely*, 54 countries were represented. However, about half of the respondents (52.7%) were from one of four countries: the United States (23.7%), Ecuador (17.1%), the United Kingdom (6.1%), and Canada (5.7%). The percentages of respondents from other countries selecting *somewhat* or *extremely likely* were less than 5% each.

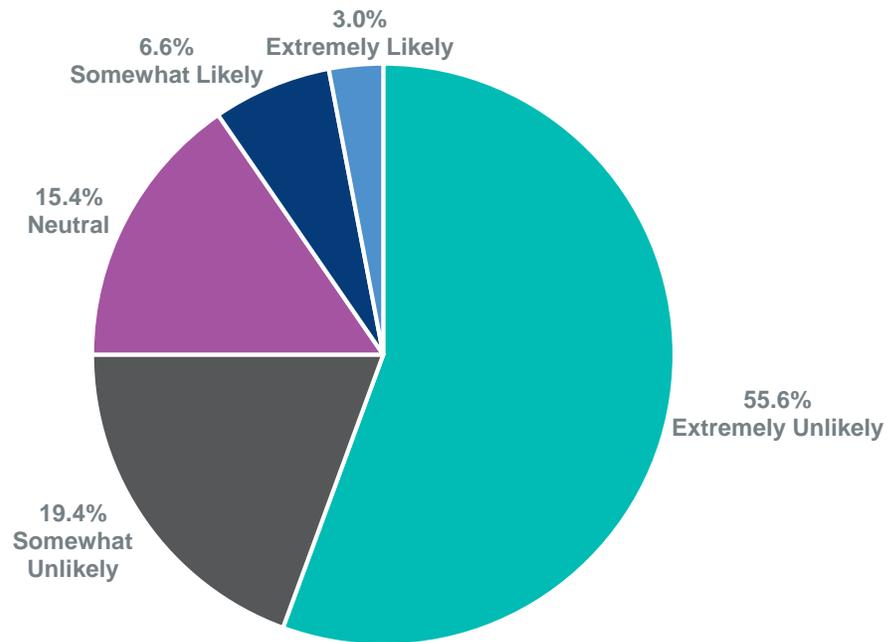


Figure 7. Likelihood that respondents would stop offering the DP/CP if the only option for final external assessment was on-screen examinations.

Moreover, the likelihood that respondents would stop offering the DP/CP if on-screen examinations were the only option for final external examinations is important for IB planning around on-screen examinations. As such, Inflexion researchers examined whether ratings of school context, barriers, and supports (subscales and extreme responses) predicted whether a school was likely to stop offering the DP/CP. As shown in Figure 8, four subscales were significant predictors of whether a school was likely to stop offering DP/CP: low scores on positive attitudes towards on-screen examinations (rated from 1 to 6) and confidence about examination logistics subscales (rated from 1 to 6); and high scores on power/internet/accessibility issues (rated from 1 to 5) and student challenges (rated from 1 to 5).

“If on-screen exams become mandatory, it is very possible that we would leave the Diploma Program.”

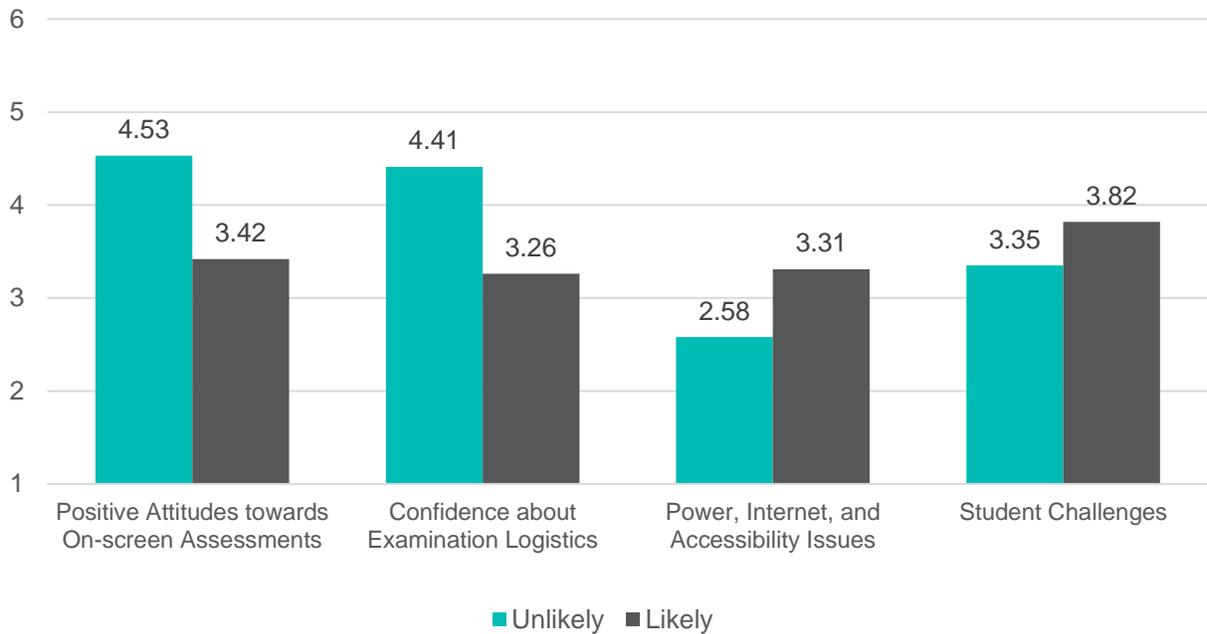


Figure 8. Mean scale scores by likelihood of stopping DP/CP.

Additionally, the number of extreme responses for school context (ranging from 0 to 13) and barriers (ranging from 0 to 20) items were significant predictors of likelihood to stop offering DP/CP. Perhaps unsurprisingly, schools that had a greater number of extreme positive responses on the school context items were less likely to report they would stop offering DP/CP and schools that had a greater number of extreme responses on the barriers items were more likely to stop offering DP/CP.

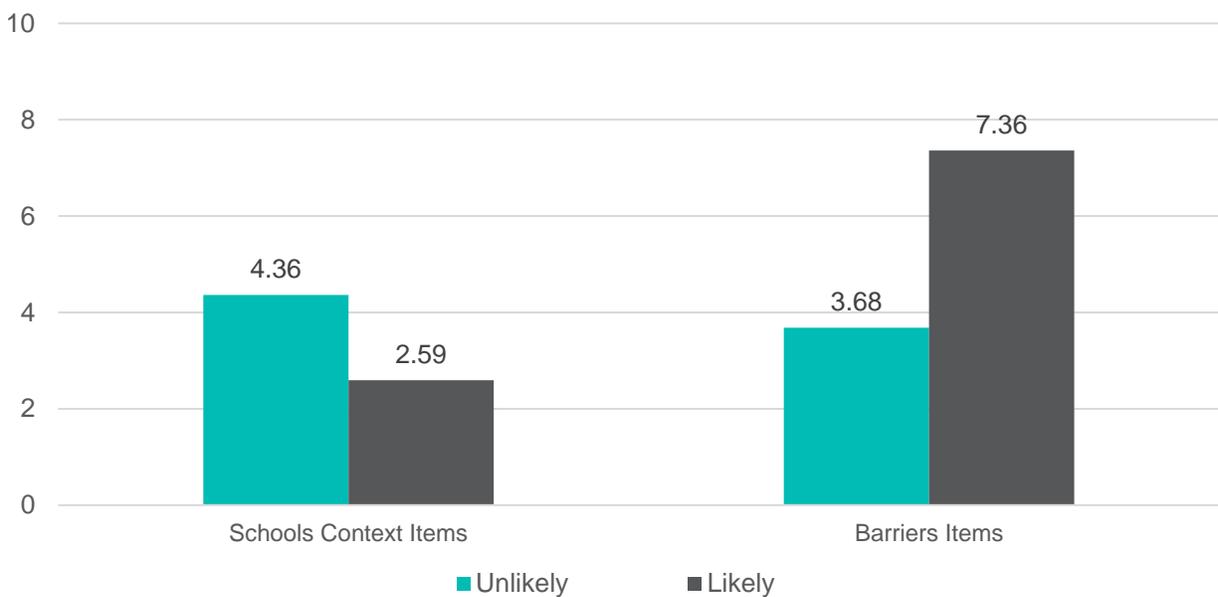


Figure 9. Mean number of extreme responses by likelihood of stopping DP/CP.

## School Context Factors

Respondents were asked to rate their level of agreement with statements related to school context questions around the integration of technology in teaching, learning, and assessment; logistics and internal support for on-screen examinations; and attitudes towards and comfort with technology that could facilitate

“It depends very much on the teacher. Some teachers naturally go towards more contemporary forms of tools, and some do not.”

the transition to on-screen

examinations. All statements were rated on a 6-point scale ranging from *strongly disagree* (1) to *strongly agree* (6); a separate *no opinion* option was available for respondents who did not have an opinion about the statement. As shown in Table 1, ratings were fairly positive with most items receiving a mean

“All our secondary age students already have individual laptops and use them in all subjects daily. Their ICT literacy is generally very good.”

Table 1. Respondents’ Perceptions of Facilitators to On-screen Examinations

Rate your level of agreement for the following statements:	N	M	SD
<b>Positive Attitudes Towards On-screen Examinations</b>			
Moving to on-screen exams is an important step forward from pen-and-paper examinations.	2,541	4.68	1.57
IB students will benefit from the authentic and engaging tasks/questions that can be provided using on-screen exams.	2,462	4.64	1.37
Taking DP/CP exams on-screen will help to prepare IB students for technologies they will use in the workplace.	2,559	4.57	1.51
Teaching and learning will benefit from the authentic and engaging tasks/questions that can be provided using on-screen exams.	2,498	4.53	1.42
Taking DP/CP exams on-screen will be less burdensome for IB students than hand written exams.	2,510	4.25	1.57
On-screen exams will feel more natural to IB students than traditional, handwritten exams.	2,532	4.00	1.58
<b>Teacher and Student Knowledge, Skills, and Familiarity Regarding On-screen Examinations</b>			
IB teachers at this school regularly integrate technology into teaching and learning.	2,679	5.33	0.89
IB students at this school have the technological knowledge and skills necessary to do on-screen exams.	2,630	5.10	1.14
IB teachers at this school have the knowledge and skills necessary to prepare students for on-screen exams.	2,642	4.57	1.33
IB teachers at this school regularly use formative and summative on-screen assessments.	2,651	3.26	1.65
<b>Confidence about Examination Logistics</b>			
Our school has information technology personnel who can assist with logistical aspects of administering on-screen exams.	2,604	4.68	1.58
We will be able to manage students using their own laptops or school-supplied laptops for on-screen exams.	2,558	4.47	1.70
It will be difficult to find a suitable space to administer on-screen exams to our DP/CP students.	2,626	3.25	1.85

Note. No opinion responses were excluded from mean and standard deviation calculations.

rating of 4 or greater. Respondents most strongly agreed that they have teachers at their school that already regularly integrate technology into teaching and learning and that students at their school have the technological knowledge and skills necessary to do on-screen examinations. Agreement to these statements are particularly important as they have been shown to facilitate successful transition to on-screen examinations in the literature. Although still positively rated, respondents were least likely to agree that teachers at their school regularly use formative and summative on-screen examinations. Additionally, respondents slightly agreed that it may be difficult to find a suitable space to administer on-screen examinations, although there was much variance among responses to this item.

Average ratings on the three school context factors were also examined. As shown in Figure 10, ratings were fairly positive with most items receiving a mean rating greater than 4 on the 6-point scale. Overall, respondents reported the highest ratings on teacher knowledge, skills, and familiarity regarding on-screen examinations. Although still highly rated, respondents reported the lowest ratings on their confidence about examination logistics.

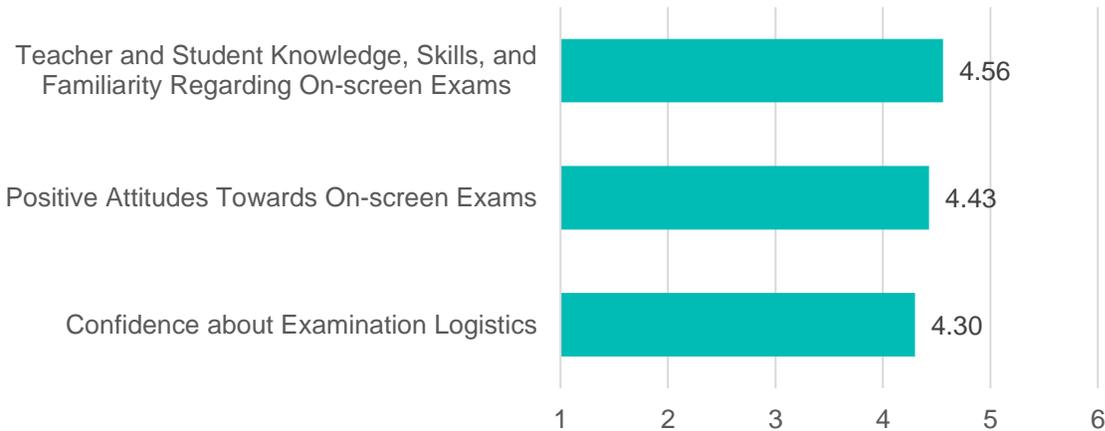


Figure 10. Average ratings on the school context factors.

### Additional Facilitators to On-screen Examinations

Having rated items regarding school context and possible benefits of on-screen examinations, respondents were asked in an open-ended set of items to explicitly list the three actions, processes, or resources that were or could be implemented in their school to facilitate the adoption of on-screen examinations. The 2,366 respondents provided a total of 6,796 comments, which were thematically coded and summarized in Table 2. Responses ranged from indications of schools’ readiness for on-screen examinations to schools intending to investigate alternatives to the DP. Table 2 displays the number of comments that pertain to a particular theme, and the percentage of overall comments that each theme accounts for to demonstrate the prevalence of each theme in the data from the open-ended items.

Developing students’ on-screen skills was the theme that drew the most responses (26.4%). Schools described facilitators of implementation that include dedicating time for students and teachers to practice in the on-screen environment, possibly completing IB-provided mock exams, and teachers incorporating more on-screen assessment opportunities into their regular

Table 2. Open-ended Responses Listing Actions, Processes, and Resources Respondents' Schools Can or Will Use to Support the Transition to On-screen Examinations

Theme	#	%	Representative Comments
Developing students' on-screen skills	1,552	26.4	<ul style="list-style-type: none"> <li>• Dedicate time for practicing online examinations for teachers and students</li> <li>• Asking teachers to incorporate more on-screen assessments</li> <li>• Continue to work with students to teach technical literacy and plagiarism education</li> <li>• Do online mock-exams (if provided by IBO)</li> </ul>
Resources	1,486	25.3	<ul style="list-style-type: none"> <li>• Every student is issued a Chromebook to use at the beginning of each school year</li> <li>• Enable one of the school's computer rooms with the necessary software</li> <li>• We will need to add a couple of fiber cables to ensure the internet is powerful enough</li> <li>• Ensure that there are enough power outlets in case batteries run out</li> </ul>
Staff and faculty training	772	13.1	<ul style="list-style-type: none"> <li>• Training of technical support personnel for this process</li> <li>• Train teachers who will invigilate how to solve common issues</li> <li>• Ensure that staff is trained to conduct online examinations</li> </ul>
Adapting for exam space needs	575	9.8	<ul style="list-style-type: none"> <li>• Adapt the computer rooms for on-screen evaluation</li> <li>• Moving to on-screen assessments would impact our venue choice, which has no WiFi and probably lacks sufficient power sockets</li> </ul>
Policies and procedures	450	7.6	<ul style="list-style-type: none"> <li>• Update assessment and academic honesty policies</li> <li>• Develop a policy for using BYOD</li> </ul>
Technical support	422	7.2	<ul style="list-style-type: none"> <li>• We would need a dedicated full-time tech support to assist</li> <li>• Training our IT department to support these exams</li> </ul>
School community communication	214	3.6	<ul style="list-style-type: none"> <li>• Ensure community awareness for the reasons and garner buy-in</li> <li>• Parent/student meetings on onscreen exams</li> </ul>
Professional development	174	3.0	<ul style="list-style-type: none"> <li>• Provide additional PD to our faculty on technology integration</li> <li>• Spending much of our school's PD calendar on developing pedagogy to support onscreen assessment</li> </ul>
Logistics	105	1.8	<ul style="list-style-type: none"> <li>• Build the online assessment into our schedule</li> <li>• Might have to limit the number of IB students due to the large amount of state &amp; national testing that happens at the same time as IB exams</li> </ul>
No solutions offered (concerned about program continuation)	82	1.4	<ul style="list-style-type: none"> <li>• We will investigate alternatives to the IB Diploma Programme</li> <li>• We cannot support the transition—not enough technology or support</li> </ul>
Other	33	0.6	<ul style="list-style-type: none"> <li>• Negotiating with local government to allow us to keep personal information on-line (currently forbidden)</li> <li>• Asking the IB Program to switch to more online texts if the students are going to take online exams</li> </ul>
Already prepared	18	0.3	<ul style="list-style-type: none"> <li>• We all use Chromebooks already. This isn't a big deal.</li> <li>• We already have policies for this</li> </ul>
<i>Total</i>	<i>5,883</i>	<i>100</i>	

practice. The next row encompassed various resources that nearly a quarter of responding schools indicated as helpful possibilities to facilitate implementation: issuing Chromebooks to each student, requiring students to purchase their own devices in order to participate in the DP or CP, or outfitting computer labs to comply with IB on-screen examination needs (25.3%). The table also features topics that did not figure as prominently into the open-ended responses such as school community communication, professional development, and logistics. These topics and other less prevalent topics are included so readers can see facilitators that received less emphasis from respondents.

## Barriers to On-screen Examinations

Next, respondents were asked to rate their level of concern with a variety of challenges related to transitioning to on-screen examinations. All statements were rated on a 5-point scale ranging from *not at all concerned* (1) to *extremely concerned* (5); a *no opinion* option was available as a separate option for respondents who did not have an opinion about the statement. As shown in Table 3, respondents were concerned about a number of challenges related to logistics, including logistical problems of loading files onto students' own devices just before exams, technological failures resulting in a loss of student work, length of time/logistical problems to set up the on-screen examinations on every computer, insufficient or untimely support from the IB, and length of time/logistics of uploading student exam files to the IB. Respondents were least concerned about perceptions that on-screen exams are less rigorous.

“The experiences from MYP eAssessments and the unfriendly interface and the loss of student work (which happened to us) has to be resolved if we move forward with these critical examinations.”

Average ratings on the seven barrier factors were also examined. As shown in Figure 11, respondents expressed moderate concerns related to on-screen examinations, with most items receiving a mean rating of 3 or greater. Overall, respondents reported being most concerned about the challenges that they anticipate for students with on-screen examinations and the lack of time/user-friendliness of the testing interface. Although still rated as a moderate concern, respondents were least concerned about power/internet/accessibility issues and examination dishonesty.

“It is extremely important that all users (teachers and students) have access to an environment that at least simulates the exam environment.”

Table 3. Respondents' Perceptions of Barriers to On-screen Examinations

Barriers	N	M	SD
<b>Lack of Time/User-friendliness of the Testing Interface</b>			
Length of time/logistical problems to set up the on-screen exams on every computer	2,616	3.56	1.28
Length of time/logistics of uploading student exam files to the IB	2,610	3.50	1.30
Lack of user-friendliness of the exam interface	2,572	3.10	1.26
<b>Examination Dishonesty</b>			
Increased examination dishonesty prior to exams (e.g., hacking)	2,614	2.63	1.31
Increased examination dishonesty during exams (e.g., plagiarism, cheating)	2,613	2.62	1.32
<b>Power/Internet/Accessibility Issues</b>			
Internet stability/unreliable internet	2,626	3.28	1.39
Lack of accessibility features such as color contrasts, text-to-speech software, spellcheck and highlighting options, or closed-captioning	2,589	2.57	1.30
Inadequate power supply to support the number of computers that will be used during the testing session (e.g., extension cord, power sockets)	2,629	2.39	1.42
Electricity stability/unexpected power outages	2,628	2.36	1.35
<b>Concerns about Examination Logistics</b>			
Logistical problems of loading files onto students' own devices just before exams.	2,618	3.59	1.32
Insufficient in-house IT support (e.g., for responding to frozen screens, malfunctioning hardware)	2,622	3.29	1.42
Out-of-date technology and/or maintenance of technology	2,625	3.00	1.43
Inadequate number of computers	2,615	2.76	1.51
<b>Lack of Familiarity/Negative Perceptions of On-screen Examinations</b>			
Teachers' lack of familiarity/confidence with how on-screen exams work	2,619	3.21	1.22
Students' lack of familiarity/confidence with how on-screen exams work	2,618	2.92	1.24
The perception that on-screen exams are less rigorous	2,536	2.22	1.30
<b>Student Challenges with On-screen Examinations</b>			
Technological failures resulting in a loss of student work	2,604	3.58	1.32
Insufficient or untimely support from IB (e.g., responding to log-in issues, resolving software errors)	2,587	3.54	1.28
Inability of students to record on-screen their work that is usually sketched or handwritten	2,610	3.06	1.34
<b>Prohibitive Costs</b>			
Overall costs associated with on-screen exams	2,542	3.04	1.42

Note. No opinion responses were excluded from mean and standard deviation calculations.

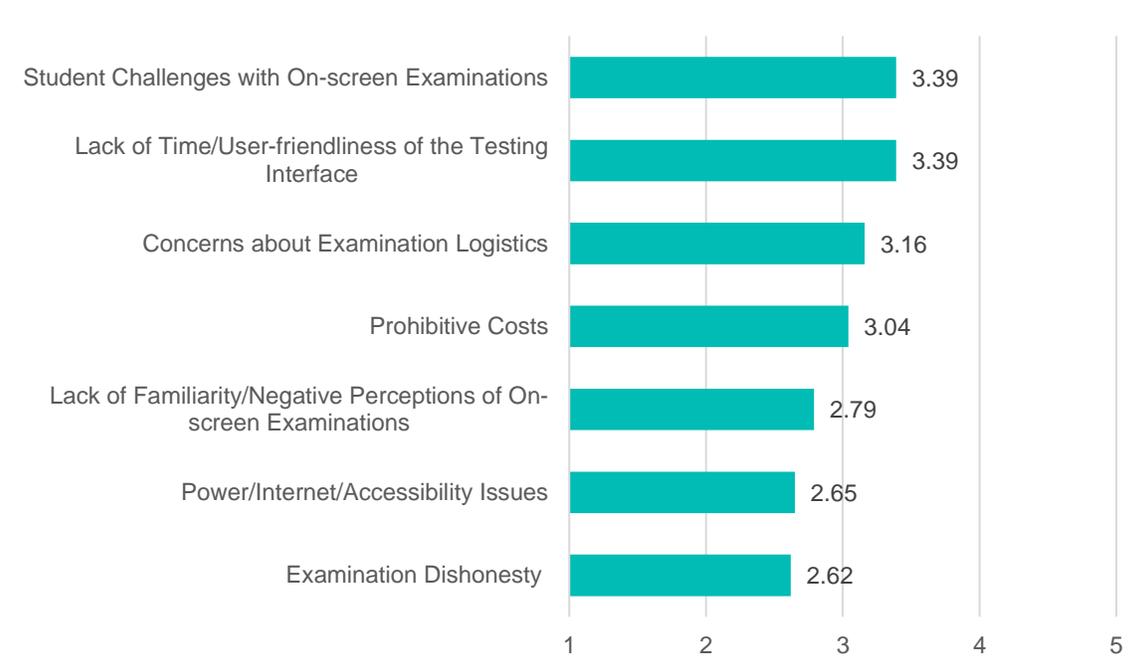


Figure 11. Average ratings on the barriers factors.

In responding to an open-ended survey item asking about additional anticipated challenges that might stem from the transition to on-screen examinations, 1,239 respondents provided data that were coded thematically and presented in Table 4. The most common theme included 239 respondents (12.9%) who listed no additional anticipated challenges. Those respondents indicated their schools had already accounted for any anticipated challenges or they stated, “without clear details of the actual process, it is difficult to answer this question.” Therefore, responses coded under the theme of “No additional anticipated challenges” are not included in Table 4. Furthermore, because student preparation was addressed under facilitators, 206 responses (11.2%) to the anticipated challenges item also were excluded from Table 4. Similarly, responses to this item that reiterated concerns addressed under facilitators (e.g., about student preparedness) were excluded from Table 4. Of the responses not previously covered, the most common theme featured in Table 4 discusses exam scheduling as an anticipated challenge (8.5%), particularly challenges associated with administering multiple IB exams (or IB exams alongside Advanced Placement or other exams) in the same time window given possible limitations of space and technology devices. Other frequently occurring themes included exam space requirements (7.9%), threats to validity (7.4%), availability of resources (6.8%), stability of resources (6.4%), and data loss (6.1%).

Table 4. Open-ended Responses Listing Additional Anticipated Challenges of Transitioning to On-screen Examinations

Theme	#	%	Representative Comments
Exam scheduling	156	8.5	<ul style="list-style-type: none"> <li>The fact that MYP e-assessments take place during the Diploma exam period makes it difficult to deliver onscreen exams to both programs</li> <li>The amount of time between exams in a day is insufficient to set up devices</li> </ul>
Exam space requirements	146	7.9	<ul style="list-style-type: none"> <li>Silent physical space with hardware and electricity support necessary to carry out the exam according the requirements of IB</li> <li>The computer lab does not meet the distance between the students that IB requests</li> </ul>
Threats to validity	137	7.4	<ul style="list-style-type: none"> <li>Need to ensure assessment is good and above all relevant as it drives learning</li> <li>I am concerned that students will not be able to demonstrate their best work due to gaps in their technical/computer skills, not necessarily in their understanding of the material that is assessed</li> </ul>
Availability of resources	126	6.8	<ul style="list-style-type: none"> <li>IBDP will only serve those schools with large numbers of computers or one-to-one programmes</li> <li>It would be prohibitively expensive for the school to purchase over 200 machines for this purpose</li> </ul>
Stability of resources	115	6.2	<ul style="list-style-type: none"> <li>Power outages and internet issues are serious concerns</li> <li>We run into problems with inadequate power supplies since most laptops will need charging during longer exams</li> </ul>
Data loss	113	6.1	<ul style="list-style-type: none"> <li>Technology issues . . . causing a student to lose credit or exam answers</li> <li>The experiences from MYP eAssessments and the unfriendly interface and the loss of student work (which happened to us) has to be resolved if we move forward with these critical examinations</li> </ul>
Faculty preparation	97	5.3	<ul style="list-style-type: none"> <li>There is not a proper training for teachers to install applications, or upload files to the virtual platform of the IB, or the means by which they have to send the exams</li> <li>Lack of PD to teach teachers how to prepare their own high quality online assessments to help prepare their students</li> </ul>
Effect on perception of IB	91	4.9	<ul style="list-style-type: none"> <li>If we take up the computer lab space for the IB exams . . . this would cause significant disruption in our school, and could cause greater tension between staff and our IB Programme</li> <li>On-screen exams may even lead to parental lobbying for an alternative exam system</li> </ul>
Subject-specific challenges	87	4.7	<ul style="list-style-type: none"> <li>I am worried about the way exams will be performed that involve algorithms, formulas, and drawings</li> <li>[This transition] could ultimately undermine the ability of students to actually write the Chinese characters themselves</li> </ul>
Compatibility of extant resources	83	4.5	<ul style="list-style-type: none"> <li>All of our students have school-issued Chromebooks which must use only online, web-based examinations</li> <li>It needs to be seen whether on-screen examinations would require a specific hardware or software</li> </ul>

Theme	#	%	Representative Comments
Financial concerns	68	3.7	<ul style="list-style-type: none"> <li>• If costs go up, I don't know that I can justify them to maintain a program in our district</li> <li>• Lack of economic resources for changes and teacher training</li> </ul>
Exam security	67	3.6	<ul style="list-style-type: none"> <li>• The security of the information that is handled online</li> <li>• Students claiming technical problems in order to invalidate the assessment and prompt retakes</li> </ul>
IB communication issues	44	2.4	<ul style="list-style-type: none"> <li>• Lack of timely and effective communication from IB; I still cannot get IB to respond to a month-old email</li> <li>• Lack of a clear policy and procedure from the IB</li> </ul>
Other	35	1.9	<ul style="list-style-type: none"> <li>• Problems of theft of computers</li> <li>• Many universities are not yet transitioning to online exams and therefore there are concerns that we may not be equipping them with the necessary skills to complete written examinations</li> <li>• Health issues relating to eye fatigue from the rays of the computer and student stress due to technological issues</li> </ul>
Nation-specific challenges	20	1.1	<ul style="list-style-type: none"> <li>• The great firewall problems in China</li> <li>• In Ethiopia, the internet is periodically blocked or entirely switched off by the government for security reasons</li> <li>• The cultural perception in India that online exams are less rigorous and authentic</li> </ul>
Special needs accommodations	16	0.9	<ul style="list-style-type: none"> <li>• The duration of the tests, as it would affect students with special education needs</li> <li>• The DP e-assessments must have an audio function so those who are entitled to a reader are not required to be housed in a different space</li> </ul>
<i>Total</i>	<i>1,846</i>	<i>100</i>	

Note. Data from respondents who indicated no additional anticipated challenges or responses that were redundant from previous tables have not been included as unique rows in this table (e.g., Student preparation: featured in Table 2). Therefore, totals of numbers of comments and percentage of comments reflect the overall data, which is available separately from this report, not simply the data presented in the current table.

## Supports from IB

Respondents were asked to rate the importance of a variety of supports that could potentially be provided by the IB to successfully transition to on-screen examinations. All statements were rated on a 6-point scale ranging from *very unimportant* (1) to *very important* (6); a separate *no opinion* option was available for respondents who did not have an opinion about the statement. Overall, all listed supports were highly rated by respondents, with ability to create formative classroom assessments in the on-screen environment and pre-examination opportunities for teachers and students to gain familiarity with the on-screen environment being rated highest. Although still highly rated, guidance from the IB on communicating information about on-screen exams to students' parents or guardians received the lowest rating.

"If our teachers can have access throughout the year to the same IB on-screen assessment interface that will be used during the testing sessions, it would go a long way towards helping students and teachers feel more comfortable and confident with utilizing this interface during the testing sessions."

Table 5. Respondents' Perceptions of Supports Needed to Successfully Transition to On-screen Examinations

Supports	N	M	SD
<b>Guidance</b>			
Guidance from the IB on communicating information about on-screen exams to students' parents or guardians.	2,501	5.56	1.06
Guidance from the IB on implementing on-screen exams.	2,516	5.56	1.07
Guidance from the IB on preparing students over the course of the DP/CP.	2,538	5.52	1.10
Guidance from the IB on planning for on-screen exams (e.g. checklists, frequently asked questions).	2,525	5.20	1.23
<b>Training and Demonstrations</b>			
Demonstrations on how to set up computers for the on-screen exams (e.g., downloading exams, checking devices).	2,540	5.62	1.06
IB training for school personnel on the on-screen assessment interface.	2,517	5.59	1.03
<b>Access to the Assessment Environment</b>			
Ability to create formative classroom assessments in the on-screen environment.	2,494	5.70	0.99
Pre-examination opportunities for students to gain familiarity with the on-screen environment.	2,531	5.67	1.02
Pre-examination opportunities for teachers to gain familiarity with the on-screen environment.	2,500	5.66	1.01

Note. No opinion responses were excluded from mean and standard deviation calculations.

Additionally, respondents were asked to rate the extent to which each of the professional development formats would be useful for training school personnel on the different aspects of on-screen examination. Ratings were on a continuum of 0 to 100 (*not useful* to *extremely useful*). Although ratings were similar across formats, respondents reported that training videos and webinars would be the most useful; documentation to read and face-to-face workshops would be the least useful.

"It would be important that this type of training does not have extra costs for the institution, hence the importance, for example, of webinars or videos."

Table 6. Respondent Perceptions of Usefulness of Professional Development Formats

Statement	N	M	SD
Documentation to read	2,522	65.26	29.20
Face-to-face workshops (fee required)	2,467	65.56	30.31
Webinars (free to attend or download)	2,513	72.79	26.77
Training videos (free to download)	2,536	79.75	23.77
Discussion forums to communicate with other schools (MYP, DP, and CP schools)	2,521	68.76	28.05

Respondents were asked in an open-ended item to name any additional supports they might need to help their schools transition to on-screen examinations. Their responses were coded and are summarized in Table 7; however, more than a third (36.2%) of respondents stated IB

Table 7. Open-ended Responses Listing Additional Supports Respondents Would Need From the IB to Implement On-screen Examinations Successfully

Theme	#	%	Representative Comments
Real-time technical support	164	11.5	<ul style="list-style-type: none"> <li>Efficient response and fix of tech issues</li> <li>A hotline answered by a human being that a coordinator could call if there were a question about implementation. IB Answers can sometimes take several days.</li> <li>Online technical support from IB available during the implementation and during the time exams are carried out</li> </ul>
Faculty/staff training	157	11.0	<ul style="list-style-type: none"> <li>Training in developing on-screen exams</li> <li>A workshop for DP coordinators in anticipation of the move to on-screen examinations</li> <li>I believe that there should be free tutorial videos</li> </ul>
IB exam examples	137	9.6	<ul style="list-style-type: none"> <li>Sample exams to practice ahead of time</li> <li>A bank of potential questions for schools to use for testing and mock examination purposes</li> </ul>
Clear processes and procedures	114	8.0	<ul style="list-style-type: none"> <li>A clearly written, easy to read handbook of instructions</li> <li>A FAQ sheet of what to do in case of tech emergencies during the exams</li> </ul>
Financial assistance	92	6.5	<ul style="list-style-type: none"> <li>Financial assistance if the investment in technology is significant</li> <li>Reduction in fees to allow for extra anticipated IB costs</li> </ul>
Compatibility of resources	56	3.9	<ul style="list-style-type: none"> <li>Chromebook compatibility would be key</li> <li>Making sure the technology is user-friendly across a wide range of browsers and devices</li> </ul>
Thoughtful, gradual implementation	45	3.2	<ul style="list-style-type: none"> <li>I believe introducing onscreen exams subject by subject would be the best approach. Test it out with a small subject group and work out the kinks before rolling it out to all exams.</li> <li>It is a challenge that needs time, effort, and intensive training to be successfully implemented</li> </ul>
Strategic communication	43	3.0	<ul style="list-style-type: none"> <li>A coherent transition plan with clear timelines and a guarantee of expected support from IB</li> <li>A leaflet to explain to parents the reasons why on-screen assessments were being used</li> </ul>
Other	31	2.2	<ul style="list-style-type: none"> <li>A guarantee that the system will work</li> <li>The option to still use paper exams</li> <li>Customization for different/diverse learners</li> </ul>
Exam enhancements	26	1.8	<ul style="list-style-type: none"> <li>A locking system so no other windows or browser can be opened</li> <li>Great care in the interface and clarity of on-screen directions, appearance, etc.</li> </ul>
Build-your-own exam software	25	1.8	<ul style="list-style-type: none"> <li>An exam generator for teachers to use during the course</li> <li>Absolutely vital the IB provides the software or framework so that mock exams can be conducted onscreen</li> </ul>
Subject-specific support	18	1.3	<ul style="list-style-type: none"> <li>A fast and efficient way to write equations and draw graphs . . . using tools specifically designed for the purpose of maths, economics, chemistry, physics, etc.</li> <li>How does the IB want to keep students learning to write Chinese without simply writing pinyin on a keyboard?</li> </ul>
<b>Total</b>	<b>1,423</b>	<b>100</b>	

Note. Data that were coded as “No additional supports” have not been included as a unique row in this table. Therefore, totals of numbers of comments and percentage of comments reflect the overall data, which are available separately from this report, not simply the data presented in the current table.

could not provide any additional help (beyond the stated items) to aid implementation of on-screen examinations. Importantly, responses from this largest group of coded statements ranged from “All aforementioned supports are adequate” to “Against the backdrop of our very poor equipment at present, online exams seem unreal/utopian.” Therefore, Table 7 data itemizes only the themes that corresponded to supports that IB could actually provide to focus readers of this report on potentially malleable factors that IB may consider. The most commonly named supports were real-time technical support, a need for faculty and staff training, and a desire for exams and clear procedures.

## Benefits of On-screen Examinations

As part of the school context questions described above, respondents were asked to rate their level of agreement with statements related to the perceived benefits of on-screen examinations. All statements were rated on a 6-point scale ranging from *strongly disagree* (1) to *strongly agree* (6); a separate *no opinion* option was available for respondents who did not have an opinion about the statement. As shown in Figure 12, ratings were fairly positive with most items receiving a mean rating of 4 or greater. Respondents most strongly agreed that IB students will benefit from the authentic and engaging tasks/questions that can be provided via on-screen examinations and moving to on-screen exams is an important step forward from pen-and-paper examinations. Although still positively rated, respondents were least likely to agree that on-screen exams will feel more natural to IB students than traditional, handwritten exams.

“Engaging tasks supported by video and audio resources, which can go beyond testing students’ [knowledge and understanding], will give them a great, positive experience of doing an e-assessment.”

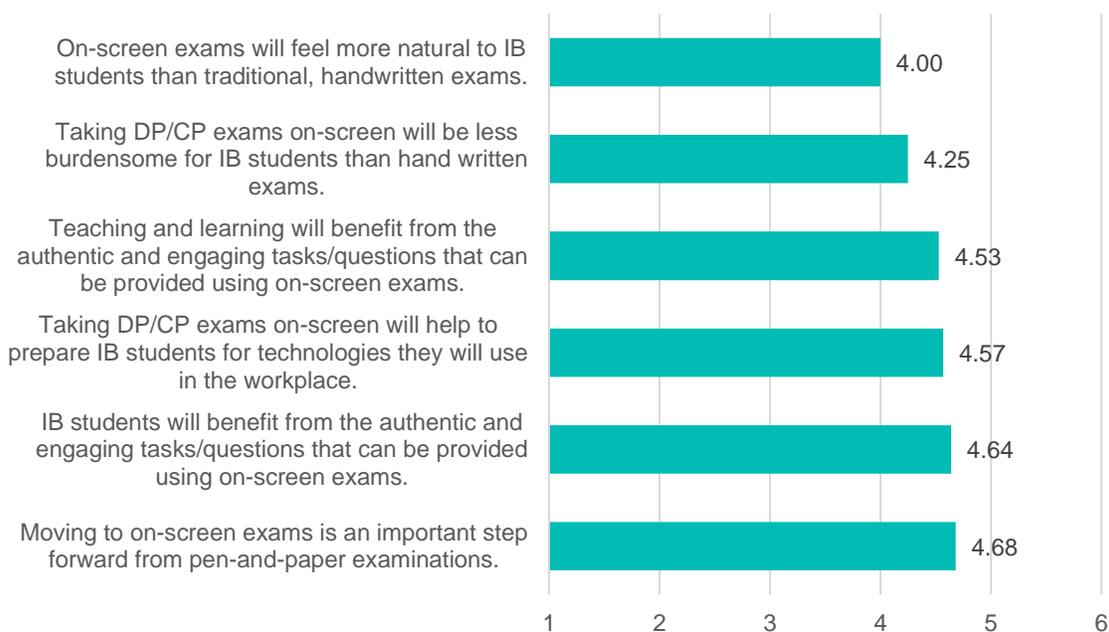


Figure 12. Average ratings of school context items related to benefits of on-screen examinations.

In a series of open-ended items, respondents were asked to describe perceived benefits of on-screen examinations for students (see Table 8), teaching and learning (see Table 9), and teachers and schools (see Table 10). Many of the 1,239 respondents seemed to find the benefits very interconnected, often making self-referential responses to their comments from a previous or subsequent item. Consequently, these three items generated responses that often spoke simultaneously to two or all of the following groups of potential beneficiaries: students, teaching and learning, and teachers and schools. Therefore, this report first presents an overall picture of responses about benefits across those three categories. Following that overall depiction, data included in Tables 8–10 reflect responses that uniquely fit into those three categories.

“On-screen work is the norm for students. On-screen work allows students to work in a familiar way and likely allows them to be more productive and efficient.”

“Depending on the design, they may be a setback in the development of argumentation and criticism skills.”

Overall, respondents were most likely to report that students would benefit from a modern, or 21st-century approach to assessment, allowing them to experience more authentic or enhanced assessments. A particular benefit that many respondents highlighted noted the expected limitation of poor

handwriting as a factor in exam scoring. Respondents also expected quicker and/or higher quality feedback resulting from transitioning examinations to an on-screen format. The most commonly reported benefits to teaching and learning included integration of technology and improved student preparation and learning. Another common response indicated that schools perceived *no benefits* to teaching and learning for switching to on-screen examinations. Benefits to teachers and schools included administrative convenience and lower exam-related costs.

“We give several online tests now, and the on-screen format hasn’t changed the teachers’ modes of teaching content in those courses.”

Specifically in Table 8, which includes data about student-specific potential benefits, the plurality of respondents cited student comfort due to on-screen examinations more naturally aligning with or mirroring how they work in classrooms prior to examinations (35.9%). Other high-frequency student-specific benefits included feedback quality or speed (15.3%), 21st-century preparation (14.8%), and more authentic assessment (13.6%). Among respondents, 217 listed no additional anticipated benefits to students with some stating that benefits would depend on the changes or that they saw no significant benefit for students (7.6%). According to one respondent, “It seems to me that the benefits are more in the administration logistics and tasks.” Correspondingly, Table 8 does not specify responses that identifying benefits determined to more directly pertain to teachers and schools, such as administrative convenience (2.0%), lower costs (1.5%), eco-friendliness (1.0%), and exam security (0.5%).

Table 8. Open-ended Responses Listing Anticipated Benefits to Students Resulting from the Transition to On-screen Examinations

Theme	#	%	Representative Comments
Student comfort	1,027	35.9	<ul style="list-style-type: none"> <li>Students are comfortable with technology and on-screen formats are familiar to them</li> <li>IB students are generally not used to the large amount of time spent handwriting, which means they sometimes have problems with hand cramps, fatigue, and bad handwriting</li> <li>More consistent with how they tend to do their work in class</li> <li>This is an extension of what [students] are naturally inclined to do</li> </ul>
Feedback quality or speed	439	15.3	<ul style="list-style-type: none"> <li>Faster turnaround in marking and therefore release of results</li> <li>Faster and more reliable results</li> <li>It'll be easier for the examiners to read, this results in fairer grading</li> </ul>
21st century preparation	425	14.8	<ul style="list-style-type: none"> <li>21st century learning environment</li> <li>More reflective of future work and study life</li> <li>Skills that are needed in the working world</li> </ul>
More authentic assessment	389	13.6	<ul style="list-style-type: none"> <li>Evaluate higher level skills</li> <li>Range of assessment tasks available</li> <li>Able to edit in real time and would support full use of spell and grammar checkers. This reflects the real business world.</li> </ul>
Exam time management	168	5.9	<ul style="list-style-type: none"> <li>Working on screens may allow them to make the most of the time available</li> <li>Students type faster than they write</li> </ul>
Requires fewer special needs accommodations	43	1.5	<ul style="list-style-type: none"> <li>This is especially beneficial with students who have issues with fine-motor skills and/or other disabilities that prohibit the ability to communicate effectively on paper exams</li> <li>The decrease in stigma for students with special needs</li> </ul>
Improved exam security	15	0.5	<ul style="list-style-type: none"> <li>No possibility of tampering, inadvertent or otherwise</li> <li>There is less risk of plagiarism, copying, or cheating on the part of the students</li> </ul>
Other	11	0.4	<ul style="list-style-type: none"> <li>Perhaps for them the transition is easier because of the novel aspect</li> <li>They would be participating in important changes in IB</li> </ul>
<i>Total</i>	<i>2,863</i>	<i>100</i>	

Note. Data that were coded as non-beneficial or more directly beneficial to teaching and learning or teachers and schools have not been included as unique rows in this table. Therefore, totals of numbers of comments and percentages of comments reflect the overall data, which are available separately from this report, not simply the data presented in the current table.

Regarding benefits to teaching and learning (see Table 9), the idea that implementation of on-screen examinations would lead to more normalized and better integration of technology into regular practices was the most common theme (26.5%). Table 9 does not explicitly feature the next largest group, nearly 20% of respondents ( $n = 462$ ), which perceived no additional anticipated benefits to teaching and learning. Responses included, "I cannot answer without seeing what is proposed" and "The exams will not impact the instructional practices." However, the table does include the third-most common theme: improved teaching, within which schools indicated that implementing on-screen examinations could add dynamism and innovation to

classrooms, enhancing the focus on critical thinking and problem solving. As described previously, some themes focused more on benefits that did not really specify teaching and learning, so those responses are counted in the Table 9 totals, but not featured as rows. For example, student comfort with technology (4.1%) and accommodating students with special needs (0.7%) were not specified in the table, nor were responses identifying teacher and school benefits, such as administrative convenience (4.4%) and eco-friendliness (1.3%).

*Table 9. Open-ended Responses Listing Anticipated Benefits to Teaching and Learning Resulting from the Transition to On-screen Examinations*

Theme	#	%	Representative Comments
Integration of technology	621	26.5	<ul style="list-style-type: none"> <li>• More technology will be involved in teaching and learning</li> <li>• Teachers would have to develop online assessments to mirror IB's strategy</li> <li>• Normalize the use of ICT</li> <li>• The teacher would be obliged to keep up with the technology</li> </ul>
Improved teaching	403	17.2	<ul style="list-style-type: none"> <li>• More dynamic and innovative classes</li> <li>• Teachers can focus more on teaching as examinations are more streamlined using computers</li> <li>• It forces teachers and students to learn problem solving and critical thinking skills involved with the use of technology</li> </ul>
Modern approach	192	8.2	<ul style="list-style-type: none"> <li>• It will support the 21st century teaching/learning skills</li> <li>• Grasping and practicing the latest educational trends</li> </ul>
Consistent with classroom practices	170	7.2	<ul style="list-style-type: none"> <li>• It is more in line with what students do on a regular basis for most assignments</li> <li>• We will not have to spend 6 months practising handwriting before the final exams!</li> </ul>
Feedback quality or speed	104	4.4	<ul style="list-style-type: none"> <li>• More easily accessible data</li> <li>• Perhaps more timely and clear instructional feedback</li> </ul>
Other	9	0.4	<ul style="list-style-type: none"> <li>• A change of approach</li> <li>• It's more secure</li> </ul>
<i>Total</i>	<i>2,346</i>	<i>100</i>	

*Note. Data that were coded as non-beneficial or more directly beneficial to students or teachers and schools have not been included as unique rows in this table. Therefore, totals of numbers of comments and percentages of comments reflect the overall data, which are available separately from this report, not simply the data presented in the current table.*

Regarding benefits to teachers and schools, administrative convenience was the most common theme (28.3%). Respondents expected conveniences to include fewer hassles from handling paper, storing examination materials, and sending/shipping completed papers to examiners. Respondents also expected lower costs by removing the need to ship materials, among other cost savings they expected to be able to transfer to students or their families (14.1%). The next most common theme included 314 respondents who identified no additional anticipated benefits to teachers and schools (10.9%). Such responses included, "Hard to judge at this stage without having seen any such examinations" and "None, it's more work." As with the previous two open-ended items about benefits, several responses to items about benefits for teachers and schools actually accounted for student benefits or benefits for teaching and learning, which were already presented in Table 8 or 9. Such themes that were featured in the data for the current item but not listed as rows in Table 10 include integration of technology (6.7%), feedback quality or speed (6.4%), modern approach to teaching and learning (6.1%), improved teaching (5.2%),

and consistency with classroom practices (2.4%), authentic assessment (1.7%), and student access (0.4%).

Table 10. Open-ended Responses Listing Anticipated Benefits to Teachers and Schools Resulting from the Transition to On-screen Examinations

Theme	#	%	Representative Comments
Administrative convenience	819	28.3	<ul style="list-style-type: none"> <li>No more handling of paper</li> <li>The logistic process will be facilitated, especially in relation to the sending of the exams</li> <li>Less administrative hassle</li> <li>No storage of test materials and exam prep</li> </ul>
Lower cost	407	14.1	<ul style="list-style-type: none"> <li>Cost savings on shipping &amp; receiving materials</li> <li>Savings are transferred to parents</li> <li>Lower costs (if the IBO can lower its costs and pass it on)</li> </ul>
Professional development	175	6.0	<ul style="list-style-type: none"> <li>Teachers would be able to enhance their skillsets in framing more engaging questions</li> <li>Continued professional development in line with real world changes</li> </ul>
Eco-friendly	148	5.1	<ul style="list-style-type: none"> <li>No paper wastage</li> <li>Less packaging to handle, therefore leading to less environmental [impact]</li> </ul>
Technology infrastructure development	99	3.4	<ul style="list-style-type: none"> <li>Fully equipped computer labs</li> <li>If funding is available, more and better access to electronic devices on school premises</li> </ul>
Higher or more accurate scores	40	1.4	<ul style="list-style-type: none"> <li>Higher achievement levels as student interest may increase</li> <li>Maybe improved results due to less hand strain</li> </ul>
Other	40	1.4	<ul style="list-style-type: none"> <li>There will be more effective articulation between the MYP and DP</li> <li>Validating the school's policy of all students purchasing and using the school-approved computer</li> </ul>
Academic honesty and exam security	17	0.6	<ul style="list-style-type: none"> <li>Situations or suspicions of plagiarism could be avoided</li> <li>Security of papers no longer an issue</li> </ul>
<i>Total</i>	<i>2,894</i>	<i>100</i>	

Note. Data that were coded as non-beneficial or more directly beneficial to students or teaching and learning have not been included as unique rows in this table. Therefore, totals of numbers of comments and percentages of comments reflect the overall data, which are available separately from this report, not simply the data presented in the current table.

Additionally, respondents were asked to rate the extent to which they agree that the benefits outweigh the difficulties of transitioning to on-screen examinations. Ratings were on a continuum of 0 (*strongly disagree*) to 100 (*strongly agree*). As shown in Figure 13, on average, respondents slightly agreed that the benefits of on-screen examinations outweighed the difficulties ( $M = 63.06$ ,  $SD = 28.02$ ), but the variation in responses was large, indicating an expansive range of opinions (explored in the survey results for different groups section).

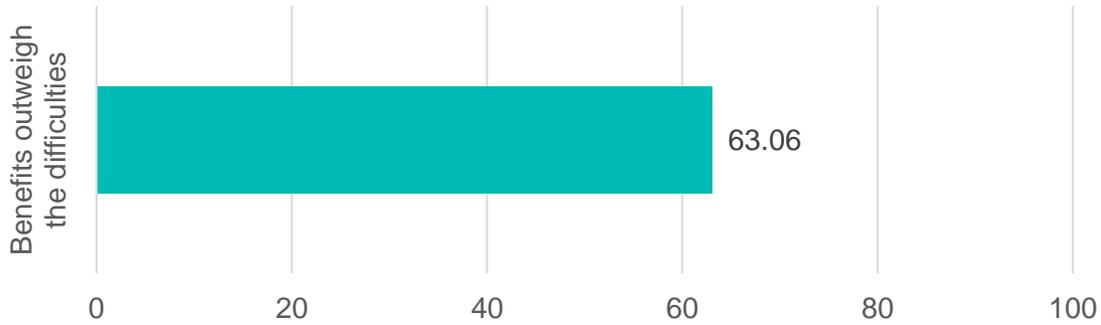


Figure 13. Respondents perceptions that benefits outweigh the difficulties associated with on-screen examinations.

### Best Way to Introduce On-screen Examinations by Stakeholder Group

Respondents were asked to rank in preference four ways of introducing on-screen examinations for different stakeholder groups: students; the school, logistically; the school in terms of cost; and overall. Respondents' rankings were consistent across the different stakeholder groups. These ways are rank ordered in Figure 14 below from most favored method at the top to least favored at the bottom of the figure.

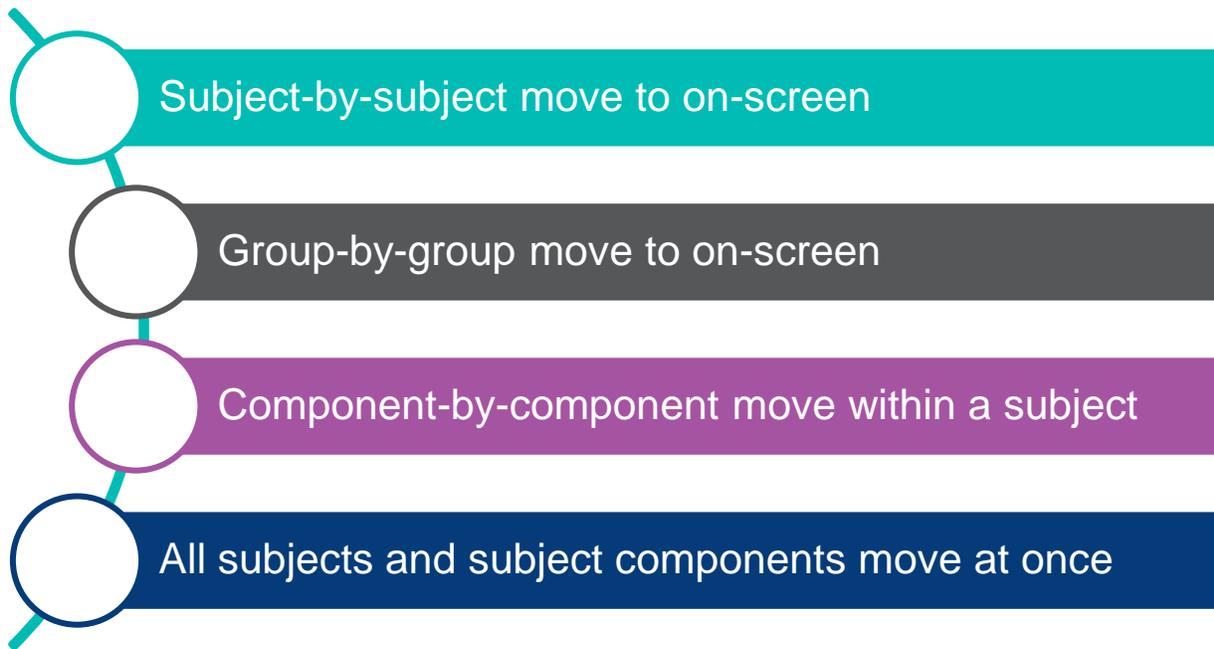


Figure 14. Respondent rankings of ways to introduce on-screen examinations.

## Survey Results for Different Groups

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Having provided results for all survey completers, this section presents selected disaggregated results comparing various groupings of respondents (i.e., by status, region, language, strand, program, position, cluster) on key areas of interest. These include receptivity, advance notice needed to implement on-screen examinations, and percentage of schools that would stop offering DP/CP if on-screen examinations were the only option. See Appendix L for all survey results for different groups.

### Receptivity

Of particular interest was whether receptivity differed by groups (e.g., status, region, language, strand, programme offerings, position of respondent, cluster). Given that statistical significance tests are overpowered with sample sizes this large, Inflexion researchers examined practical significance through standardized and unstandardized effect sizes. In plain terms, effect sizes help to establish the size of a difference between groups.<sup>1</sup>

Overall, receptivity appeared to differ meaningfully by status, language, program, and cluster. Specifically, respondents from candidate schools had higher levels of personal receptivity than did those from authorized schools (*mean difference* = 5.29,  $d = 0.20$ ). Additionally, schools in which Spanish is the language of correspondence reported higher levels of receptivity than did schools corresponding in English or French (*mean difference* = 12.45 and 15.79, respectively,  $\eta^2 = 0.04$ ). Schools offering only the CP reported the highest levels of receptivity compared to schools offering only the DP or both the CP and DP (*mean difference* = 13.15 and 13.49, respectively,  $\eta^2 < 0.01$ ).

“Being a candidate school, we are still in the process of setting the systems and policies. It would be interesting to know if we can do anything at this stage to make the transition easier for us.”

Further, as shown in Figure 15, receptivity differed by cluster. Cluster 1 consisting of high performing schools with larger DP cohorts (Star Schools) had the lowest receptivity of any cluster and Cluster 7 (New IB Programmes in the Americas, Primarily Spanish) had the highest receptivity of any cluster (*mean difference* = 20.77,  $\eta^2 = 0.04$ ). More than 40% of the schools in Cluster 1 are US public schools, while schools in Cluster 7 are predominately in the public rest of the world or private national school strands.

“The benefits are enormous. We would be willing to implement them and we would make the effort to guarantee the budget for it.”

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<sup>1</sup> For standardized effect sizes, Inflexion researchers set liberal cut scores of 0.20 for Cohen’s  $d$  (which coincides with Cohen’s benchmark for a small effect) and 0.05 for  $\eta^2$  (indicating that at least 5% of the variance in receptivity could be explained by the grouping variable). For unstandardized effect sizes, Inflexion researchers examined the raw differences between group means. Liberal cut scores of 10 points (on a 0–100 scale) and 1 point (on a 1–5 and 1–6 scale) were set.

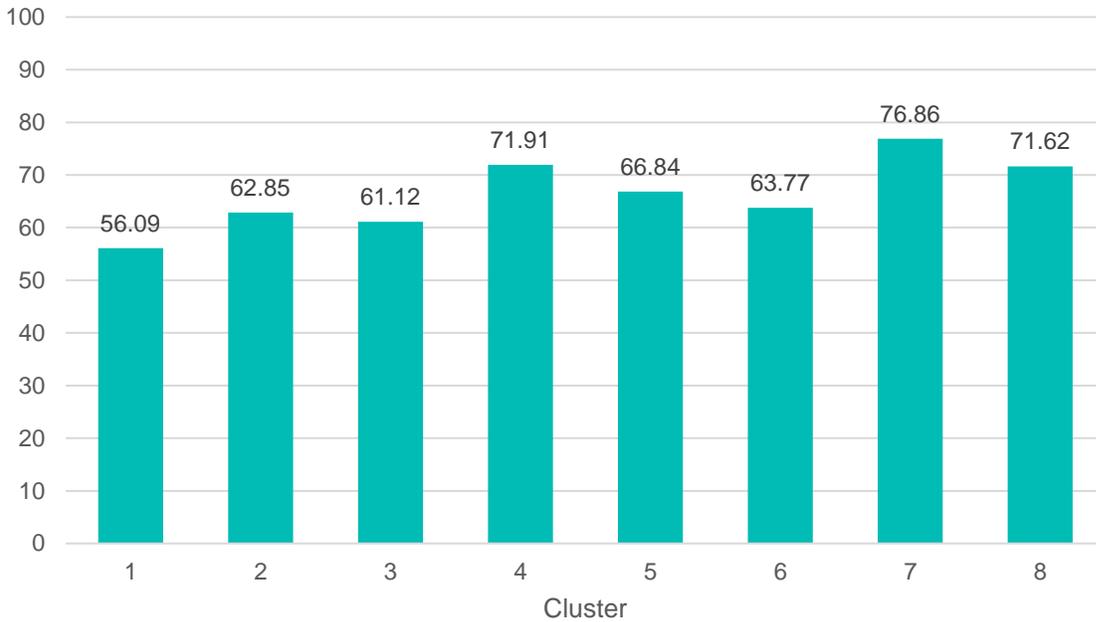


Figure 15. Mean receptivity rating by cluster.

As shown in Figure 16, receptivity by region and language was also examined to help inform interpretation of the cluster differences. Ultimately, the Spanish schools in IBA were most receptive to transitioning to on-screen examinations. This is likely driving the high levels of receptivity in Cluster 7.

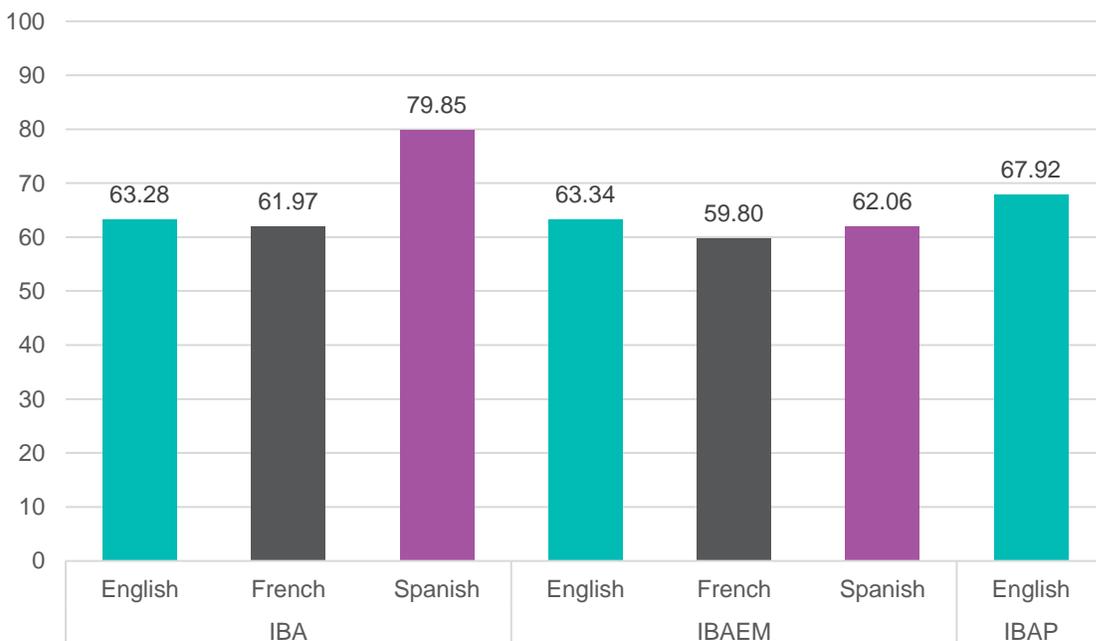


Figure 16. Mean receptivity rating by language for each region.

## Advance Notice Needed to Implement On-Screen Examinations

To facilitate planning, researchers examined the length of advance notice that respondents believed they would need to implement on-screen examinations by groups of interest (e.g., status, region, language, strand, programme offerings, position of respondent, cluster). Of particular interest was the percentage of schools that could be ready to implement on-screen examinations in 3 or fewer years (by 2021) and those that indicated that they needed more than 3 years to prepare for on-screen examinations.

Overall, the length of advance notice varied only somewhat by status, region, program, and cluster. Specifically, a larger percentage of candidate schools (95.5%) compared to authorized schools (84.0%) reported needing 3 or fewer years to prepare for on-screen examinations. Additionally, a higher percentage of schools in the IBAP region (91.4%), compared to the IBA (85.2%) and IBAEM (81.8%) regions, reported needing 3 or fewer years to prepare for on-screen examinations. All of the schools offering only CP (100.0%) reported needing 3 or fewer years to prepare for on-screen examinations, compared to schools offering only DP (85.5%) or both the CP and DP (79.1%).

Further, as shown in Figure 17, length of advance notice that respondents believed they would need to implement on-screen examinations differed by cluster. A larger percentage of Cluster 5 (Challenges with Electricity and Internet) and 7 (New IB Programmes, Primarily Spanish) schools reported needing 3 or fewer years to prepare for on-screen examinations, compared to the other clusters. The cluster with the smallest percentage of schools reporting needing 3 or fewer years to prepare for on-screen examinations was Cluster 1 (Star Schools). This cluster therefore featured those schools that were both least receptive to transitioning to on-screen examinations and perceived needing more than 3 years to prepare for the transition.

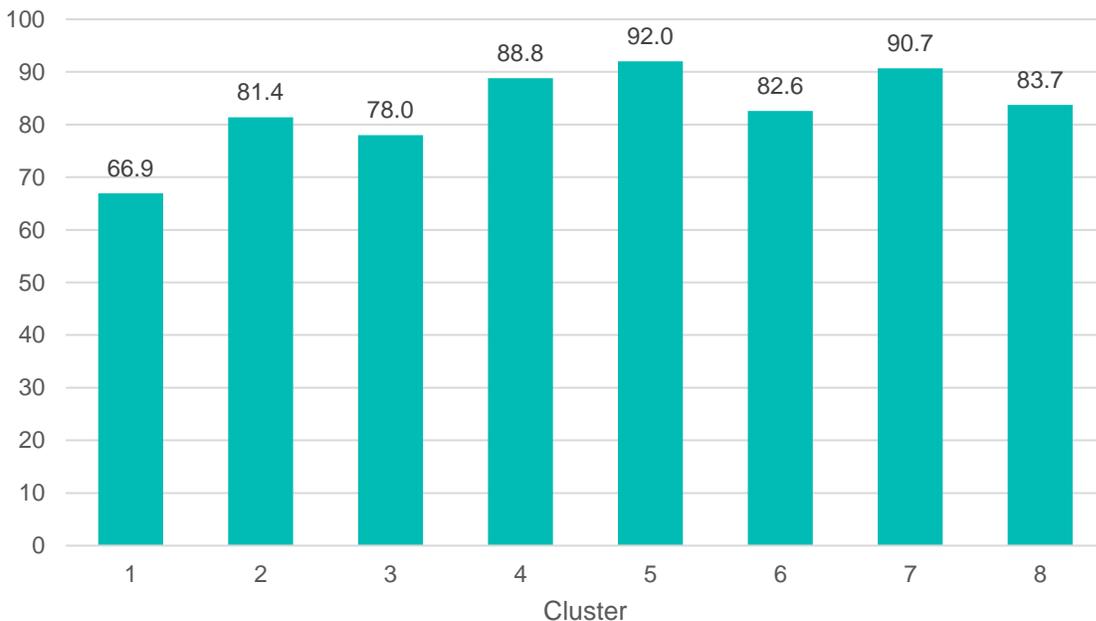


Figure 17. Percentage of respondents who reported their schools could be ready for on-screen examinations in 3 or fewer years (by 2021).

## Percentage of Schools That Would Stop Offering DP/CP if On-screen Examinations Become the Only Option

The percentage of schools that would stop offering DP/CP if on-screen examinations was the only option was also of particular interest by group (e.g., status, region, language, strand, programme offerings, position of respondent, cluster). Figure 18 presents the percentage of respondents in each group that indicated they were somewhat or extremely likely to stop offering DP/CP. Overall, responses across groups were fairly similar. Of particular note, it appears that schools that offer only the CP are less likely to stop offering the programme if on-screen was the only examination option. Private schools appear less likely than public schools to stop offering the programme if on-screen examinations were the only option.

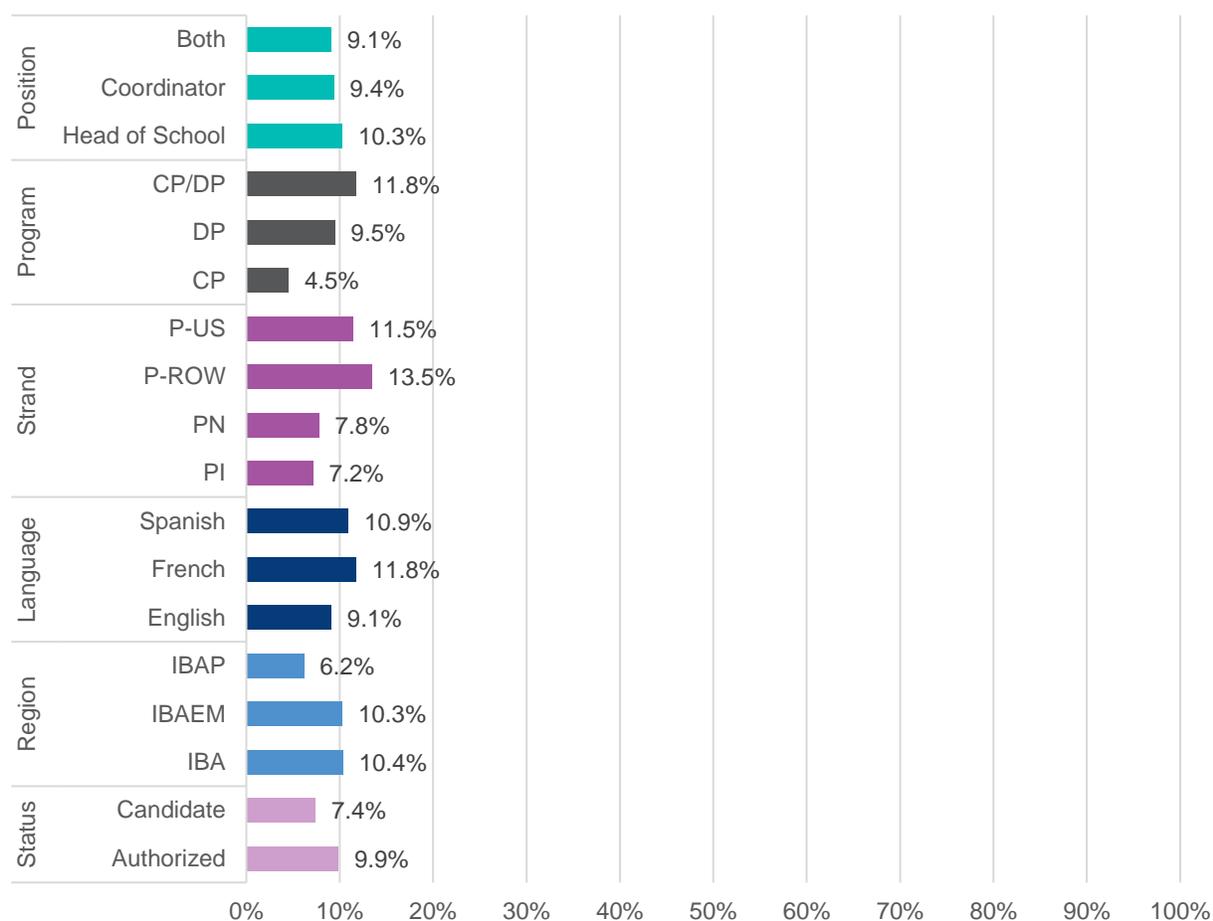


Figure 18. Percentage of respondents selecting somewhat or extremely likely to stop offering DP/CP by group.

Higher percentages of schools in which French or Spanish was the language of correspondence (compared to schools with English as the language of correspondence) and schools in the IBA and IBAEM regions (compared to schools in the IBAP region) report that they would be somewhat or extremely likely to stop offering DP/CP if on-screen examinations were the only

option. Public/state-funded schools were more likely than private schools to report they would cease the DP/CP programme if there was a move to on-screen examinations.

Similarly, the percentage of schools that would stop offering DP/CP if on-screen examinations was the only option was examined by cluster (see Figure 19). Cluster 8 (New IB Programmes, Trouble Schools) had the highest percentage of schools indicate that they were somewhat or extremely likely to stop offering DP/CP if on-screen examinations were the only option, and was noticeably higher than Cluster 2, 4, 5, 6, and 7. There are also a higher percentage of Cluster 1 (Star Schools) and 3 (Trouble Schools, Otherwise Average) reporting that they were *somewhat* or *extremely likely* to stop offering DP/CP if on-screen examinations were the only option. Of some importance, Cluster 1 featured those schools that were least receptive to transitioning to on-screen examinations, perceiving needing more than 3 years to prepare for the transition, and that were more likely to stop offering DP/CP if on-screen examinations were the only option for external assessments. Further, whether the schools had been flagged as “trouble” schools seems to relate to their likelihood to stop offering the DP/CP if on-screen examinations were the only option.

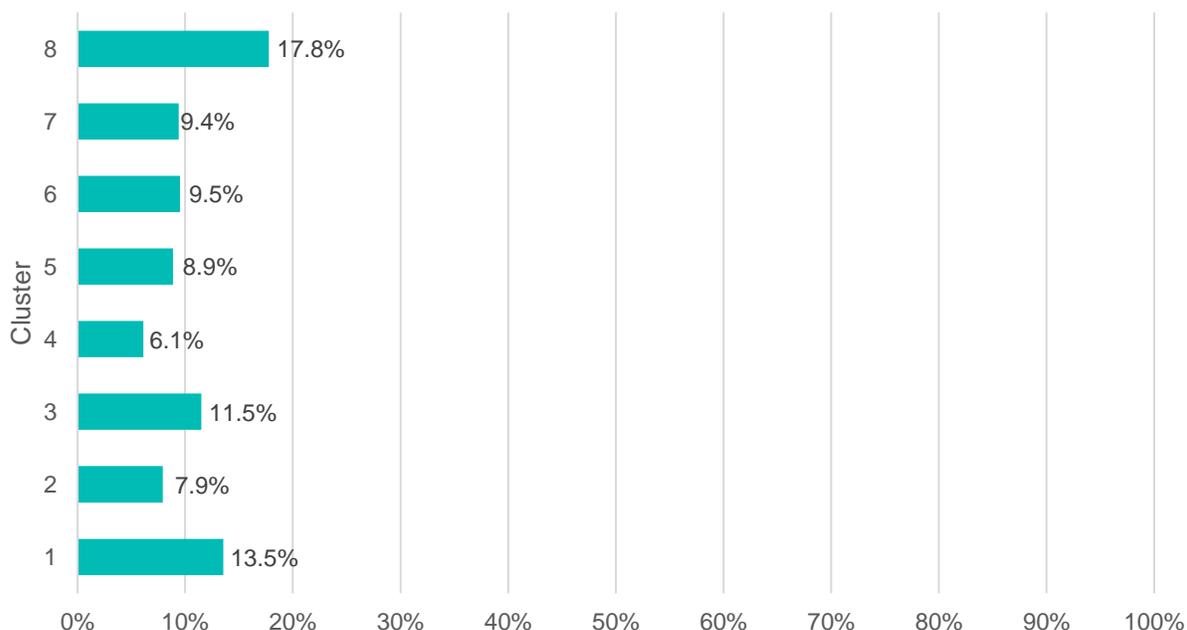


Figure 19. Percentage of respondents selecting somewhat or extremely likely to stop offering DP/CP by cluster.

Researchers also examined whether mean ratings for school context items, barriers, and supports differed for respondents who indicated that they were extremely likely to stop offering DP/CP and those who indicated that they were extremely unlikely to stop offering DP/CP. Again, a liberal cut score of 1 point (on a 1–5 or 1–6 scale) was set. Table 11 presents the school context items with a difference at or larger than the cut score. Respondents who indicated they were extremely likely to stop offering DP/CP rated school context items lower than did respondents who indicated they were extremely unlikely to stop offering DP/CP. The largest differences in mean ratings were for “moving to on-screen exams is an important step forward

from pen-and-paper examinations” and “we will be able to manage students using their own laptops or school-supplied laptops for on-screen exams.”

*Table 11. Mean School Context Factor Ratings for Respondents Indicating They are Extremely Unlikely or Extremely Likely to Stop Offering DP/CP*

Statement	Extremely Unlikely	Extremely Likely	Mean Difference
Moving to on-screen exams is an important step forward from pen-and-paper examinations.	5.13	3.42	1.70
We will be able to manage students using their own laptops or school-supplied laptops for on-screen exams.	5.04	3.35	1.69
Our school has information technology personnel who can assist with logistical aspects of administering on-screen exams.	5.10	3.68	1.42
On-screen examinations will feel more natural to IB students than traditional, handwritten exams.	4.41	3.00	1.41
IB students will benefit from the authentic and engaging tasks/questions that can be provided using on-screen examinations.	5.02	3.62	1.40
Taking DP/CP exams on-screen will be less burdensome for IB students than handwritten exams.	4.68	3.28	1.40
Teaching and learning will benefit from the authentic and engaging tasks/questions that can be provided using on-screen exams.	4.92	3.54	1.38
Taking DP/CP exams on-screen will help to prepare IB students for technologies they will use in the workplace.	4.91	3.70	1.21
It will be difficult to find a suitable space to administer on-screen examinations to our DP/CP students.	2.80	3.93	-1.13

Researchers also examined perceived barriers for this subgroup of those respondents indicating being extremely likely or extremely unlikely to stop offering the DP/CP. Table 12 presents the barriers with a difference at or larger than the cut score. Respondents who indicated they were extremely likely to stop offering DP/CP rated barriers higher than respondents who indicated that they were extremely unlikely to stop offering DP/CP. The largest differences in mean ratings were for “inadequate number of computers.” No differences larger than the cut score was found among the support items.

*Table 12. Mean Barrier Ratings for Respondents Indicating They are Extremely Unlikely or Extremely Likely to Stop Offering DP/CP*

Barrier	Extremely Unlikely	Extremely Likely	Mean Difference
Inadequate number of computers	2.29	3.66	-1.37
Out-of-date technology and/or maintenance of technology	2.57	3.71	-1.14
Overall costs associated with on-screen exams	2.59	3.59	-1.00

## Discussion

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The survey data reinforced the variety of opinions the research team had encountered during the Phase 2 site visits. Those site visits help bring the survey findings to life. In this section, we discuss highlights from the survey findings and elaborate on those findings with descriptions from the site visits and open-ended survey responses when applicable.

### Overall Receptivity to Adopting On-Screen Examinations

The degree to which an individual is receptive to and adopts change(s) or innovation(s) in practice depends on many factors that have been extensively studied (see Rogers, 2003, for the most comprehensive treatise on diffusion of innovations). Data from our survey cohere with the general framework for innovation adoption.

One of the findings of greatest interpretive interest is the percentage of respondents who indicate they are somewhat or very likely to stop offering (or never begin offering) the DP/CP if on-screen examinations are the only form of external assessment. Roughly 10% of respondents reported being likely to cease their involvement with the DP/CP. Correspondingly, about 15% of respondents indicated that they would need more than three years to prepare for such a transition. Rogers (2003) notes in his compilation of innovation adoption research that approximately 16% of people fall into the “laggards” category of people who adopt an innovation far after everyone else (or the “laggards” may not adopt the innovation at all). By contrast, “early adopters” comprise the 16% on the other end of the spectrum (and roughly 10% of this survey’s sample). These early adopters are most eager to be on the cutting edge. In our survey of DP/CP coordinators and heads of school, we found similar findings to the overall research: about the same percentage of respondents were equally likely to be highly eager or very averse to adopting on-screen examinations.

With the IB respondent sample falling into the commonly found spread from laggards to early adopters, we can examine factors that seem to affect receptivity with the twin goals of (a) promoting factors that seem to facilitate transition and (b) mitigating barriers where possible. New, private schools in Latin America generated particularly positive support for the transition to on-screen examinations. This finding does not necessarily seem due to prior exposure to on-screen examinations; public schools in the United States have high-stakes computerized assessments as standard components of many accountability systems, yet clusters with high proportions of U.S. public schools showed low levels of receptivity to IB’s planned transition. Interestingly, schools in regions with higher electricity and internet challenges (Cluster 5) reported a greater likelihood of being ready for on-screen assessment in 3 or fewer years compared to the other clusters. IB should further explore this finding by engaging Cluster 5 schools in conversation. Perhaps because these schools deal with internet and power issues more than schools in countries with better developed infrastructures, they have become experts in overcoming these uncertainties and could share their wisdom with fellow schools. Overall, the highly receptive schools were starting out with a high number of the following facilitating school context factors: positive attitudes toward on-screen examinations and confidence regarding the logistics of implementation. This latter finding may be due in part to the control over resource acquisition that these private school leaders believe they will have in order to create a seamless transition. Findings from Inflexion’s visit to a private school in South America supported this idea. That coordinator emphasized a resource disparity between private and public IB schools in the region (see the text box).

“Here in Colombia, the Education Ministry did a test in which the schools of the state had to present the test via online last year. This test was not successful for most schools because we’re talking about public schools that don’t have good internet connection[s], so they didn’t do it again this year. We were a part of that pilot, and our students were able to take the test without any problems.

– *Cluster 7 New Programme, Primarily Spanish site visit*

When examining characteristics of schools where respondents indicated a likelihood to stop offering the DP (or not continue as candidate schools), one geographic factor arises as particularly worthy of discussion. The 245 respondents who indicated that they would

“The IB should aim to keep step with the relevant national authorities. The IB often forgets that it cannot alter school cultures merely by decree and, if it wishes to expand, should remember that it may in the beginning only be a small part of a school’s offering. Trying to burden institutions with extra steps that they otherwise will not need WILL damage the expansion of the IB.” – *Survey respondent*

discontinue the DP came from schools in more than 54 countries. However, half of those respondents resided in just four countries: The United States, Ecuador, Canada, and the United Kingdom. Some of these differences may be accounted for by the sheer numbers of respondents from these countries, which are four of the most common purveyors of DP/CP in the

world and total nearly 46% of all DP/CPs worldwide. In other words, the numbers may be high, but the percentages of total respondents from these countries who report they are likely to end their association with the DP are aligned with percentages in other countries. However, this does not quite hold true. There were large numbers of respondents from India, Mexico, China, Germany, and Spain, and yet these countries were not among the group constituting a large proportion of respondents who would cease offering the DP. This concentration suggests there are national factors in the four countries worth investigating in more depth, perhaps discussing not only the barriers that DP participants in these four countries observe, but also determining why a move to on-screen examinations might not influence DP participation in the other countries where percentages of negative responses were lower. Perhaps the issue at hand is a function of costs, perceived or real.

“As it is, having IB at our school is a very high cost burden since we do not receive any financial support for these programs from the state. I would hope that at least the fee for the exams or the annual program fees would go down if there are not paper exams.” – *Survey respondent*

### What, How, and Why?

There are well noted stages of concern through which school staff progress when faced with adopting an innovation (Hall & Hord, 2011). First, staff want to know more about the innovation; this corresponds well to our findings regarding the number of school leaders who want more information before noting what supports they would need or what challenges they would encounter. This finding also aligns to what Rogers (2003) refers to as the need for awareness knowledge. All DP/CP schools will need to have basic descriptive information about what the IB means by “on-screen examination”, an issue we discuss further in the Implications for Communications section.

“The only problem, like I was saying before, is understanding how the IB would like to make up these tests on-screen.” – *Cluster 8 New Programme “Trouble” School site visit*

According to Rogers (2003), implementers who relinquish their concerns about what an innovation entails move toward wanting to know more about the management of the innovation. In Rogers' terminology, the implementers need "how-to" or logistical knowledge. We witnessed this portion of the process during our site visits after we provided very limited descriptions of the on-screen examinations. Staff wanted to know

"What I do hope is that as the IB moves into producing these potential online exams, that they're actually going to come to the schools and show, 'This is what we're thinking of. What are your thoughts on it?'" – *Cluster 4 MYP eAssessment Implementers site visit*

how the move to on-screen would be made, how much time students would have to learn the new system(s), what the hardware and software requirements would be, whether there would be a larger break between exam sessions to check computers, and so on. Survey respondents with high levels of "how to" concerns were more likely to say they would end their association with the DP/CP programme(s) and/or would need more than three years to prepare. These respondents were highly concerned about costs; had already experienced some challenges with programme implementation (i.e., they were coded as yes on the "trouble" variable); and had power, internet, or other foundational accessibility issues.

"Let's say the question is to draw a diagram of the heart. So, then, how would . . . the student has to be getting, clicking the tools and then you'd have . . . Like, 'How do I draw the diagram now? How do I draw the diagram of the heart?' You know? How good logistics is . . . needs to be taught to, really, to the minutest of details before it's actually put into practice." – *Cluster 8 New Programme "Trouble" School site visit*

"I think we have to find the perfect setup for students. Sometimes they need the English or U.S. keyboard layout. . . . In Europe, we have a different date and time format and also a number of different keyboard layouts as you have in UK. This could be interesting for Excel sheet formats, so little things you have to take care of. For example, you used a limit space or a dot and we use a comma often in numbers. To not make something which could add up in a wrong result, we have to think, take care of that. . . . You have to take care of that before." – *Cluster 2 Remarkably Average site visit*

Attending to the "how to" concerns of schools will be critical; finding ways to support schools with strong logistical concerns also will be critical to maintaining these schools' affiliation with the IB for DP/CP.

Those staff who feel very confident in their ability to manage the transition to and implementation of on-screen examinations can focus their attention on the highest level of Hall and Hord's concerns framework (2011): the consequences of the innovation on their students and on teaching and learning overall. This aligns also with Rogers' (2003) "principles knowledge" or people's need to understand the causal links between the innovation and the outcomes it is designed to achieve. This level is where a lot of the "why"

questions come in that the IB will need to address. Such thoughts and concerns also were evident in our site visits. Addressing the "why" questions well will help to create or deepen positive attitudes toward on-screen examinations and reduce school personnel's uncertainty about the expected consequences of the transition.

"I'd also like to know why, really. Like, what benefits does the IB think this will have for students? I can see the benefits it will have for them as an organization, but how do they think this is going to benefit the most important people in this conversation, which are these 17-, 18-year olds who are writing exams that will often determine where they want to go to university and what they do next." – *Cluster 2 Remarkably Average site visit*

“We see lots of advantages. First of all, you save a lot of time and energy. You basically save a lot of natural resources. And, second of all, given that the students are digital natives, thanks to tests that have been done here in the school, we’ve been able to prove that the online results are better. . . . Why is that? Because the level of focus they have when there’s only a screen in front of them is higher simply because they don’t focus on anything else around them. They’re . . . kids who spend more than 8 hours in front of a screen and, in fact, we have several students who have a hard time handwriting, which is a common difficulty for some, so they’re must faster on the computer.”  
– *Cluster 7 New Programme, Primarily Spanish site visit*

## Implications for Pre-Implementation Planning

Schools will need to be notified as far in advance as possible to determine what, if any, technological adjustments and/or upgrades they will need in order to comply with IB’s new on-screen assessment system. For example, many survey respondents and interviewees during site visits touted the flexibility and utility of Chromebooks, a product that has limited functionality unless it is Internet-enabled. This product might, therefore, not be fit for task, depending on IB’s final design for its on-screen examination system. Problematically, the Google product has dominated U.S. personal computing in the K–12 sector since 2013, especially due to Google’s efforts to penetrate the public-school market that once belonged to HP and Lenovo. Chromebooks account for at least 20% of the U.S. K-12 computing market, though they have not seen as much success elsewhere (Futuresource Consulting, 2017). The U.S.-specific challenge might be particularly challenging for a worldwide shift given that nearly 24% of DP/CP schools are in U.S. public schools and this group has already raised notably more objections to the overall concept of transitioning to on-screen examinations.

“All of our students have school-issued Chromebooks, which must use only online, web-based examinations.” – *Survey respondent*

Although most of the responding schools indicated they could be ready for on-screen examinations in three or fewer years, it is clear through the survey, open-ended responses, and the site visits that the schools expect to have the full two years of a Diploma Programme cohort to prepare students for the high-stakes, on-screen exams. Thus, teacher training and student support materials would need to be developed, piloted, *and* deployed more than two years prior to first on-screen DP exam. This has significant implications for coordination among IB departments, as the assessment staff must be far enough along in developing the DP/CP

“The teachers need time to understand also this kind of new exams. Also, to help students when they have to practice. They have to revise. So it’s always the same exam because if we change the methodology, we need also to teach them—to guide them—to obtain the maximum result. I think this is the point to help them best. Not only during the two years, but also during the final exam to finish. – *Cluster 8 New Programme “Trouble” School site visit*

examinations and sharing information about those exams that the academic and school support divisions can develop, test, and deploy multiple modes of high quality training plus student support and preparation materials.

## Implications for Communications

How on-screen examinations are messaged and IB's approach to ensure timely, accurate, and actionable information is critical to the success of schools' implementation. Communication with IB using various support channels yields a mixed bag of supportive or unhelpful experiences.

"I noticed that my co-worker and I, when we went for training . . . we got two different types of information. . . . So just things in terms of like a space to go to where we can clarify if we have questions or discrepancies, or if we just want to, like, find out if we can do something." – *Cluster 6 Small Programme site visit*

Communication procedures, purposeful and timely messaging, and well-maintained avenues for schools to solicit information are necessary to support educators, particularly those who "still

"[Communication during the MYP on-screen examination rollout] was granulated. The communication with the MYP is still quite granulated. We found out through Twitter, two weeks ago, some changes are being made to MYP. You know, I don't find that acceptable, at all. I mean, I think if there was a direct help desk, or platform, where DP teachers that were registered, obviously, could go to that would be absolutely perfect. And people know where to get the information." – *Cluster 4 MYP eAssessment Implementers site visit*

can't get IB to respond to a month-old email" (site visit participant). Drawing on the MYP transition to on-screen assessment, IB faculty echoed similar statements, stressing a need for simple and clear communication

that explains the reasoning behind moving to on-screen examinations and the ways through which IB will support stakeholders during the transition. Multiple modes of communication with IB, while perhaps expanding opportunities for IB teachers to obtain the information they seek, can clutter communication or lower the "official" feel of the message.

"I haven't really heard from the IB about that, actually: why they think it's a good idea. What's their reasoning?" – *Cluster 2 Remarkably Average site visit*

A targeted communication strategy considers the types of information stakeholders will need at different points of the transition. For example, initial communications could introduce the reason for the change and its justification. Providing a reason alone, does not convey the benefits an on-screen approach provides compared to current assessment practice. Inflexion researchers' initial communications with site visit and survey participant schools were the first indication of the impending change. Survey and site visit educators' initial reactions reflected what Hall and Hord (2011) refer to as the "Self" stage, in which the central concern revolves around how an innovation will affect oneself, driving one's need to learn more about the change. Tailored messaging will be essential to address the specific concerns stakeholders in different roles will have, accounting for differences across coordinators, assessment specialists, and teachers, especially those who teach subjects for which calculations or

"There may be an argument for why having a computer would be worthwhile, but as far as doing the actual work, I can't see that it brings much to the experience for the student, and it's frustrating. Even for me, I type up, in 15 years, hundreds of math tests, hundreds of thousands of equations, probably. It takes longer to type it up than to write it. A lot. I'm so familiar with the equation editor where students, even if they were to use it in class, sometimes they wouldn't become familiar enough to be able to even come close to the speed that they can write and draw diagrams. Math isn't just writing words." – *Cluster 1 Star Schools site visit*

student generated visuals such as graphs or diagrams are essential forms of evidence.

To build schools' understanding of the full implications of an on-screen approach to assessment, teaching, and learning practices, students and faculty will need materials to familiarize them with the on-screen interface and format(s) of assessment items. For faculty, early efforts toward familiarization will foster their

consideration of what changes might be needed to existing teaching and learning practices to ensure students can successfully demonstrate their knowledge and skills when assessed. Such materials should be subject specific, since the change might have greater ramifications for math, sciences, and other subjects for which student knowledge is demonstrated in ways other than writing. Even in subjects with a greater dependency on writing, students and teachers will benefit from knowing how the interface will

(a) allow students to examine and interact with text in fluid and flexible ways, (b) demonstrate their analytic process, and (c) adjust the organization of their essays.

“And since all these exams we’re talking about, end of the year exams the IB developed over two years, that would mean surely train them since day one—from day one onwards until the date of the exam—on onscreen tests. Just for them not to have unexpected surprises when they finally take their exam. So this would imply teaching the subject, et cetera, predominantly using computers and especially doing a lot of mock tests during year one and year two, in order for them to know exactly what to expect, what the layout of the exam will be like.” – Cluster 8 New, “Trouble” School site visit

Successful examination experiences will require sufficient training for IB faculty, assessment coordinators, and technology coordinators. Similar to differentiated familiarization materials, the focus of trainings should be tailored to

“Well, for me the point is, obviously, that there should be good training, good essays, and that the teachers have the capacity, or the ability, to evaluate the test itself. . . . Just like we have the guides, we have the guides and everyone looks at them, right? . . . And IB expects one to do those evaluations. Just like that with the exams. So, it’s really important that we have that ability.” – Cluster 7 New Programme, Primarily Spanish site visit

sufficiently address the unique information needs relevant to each role. Development of trainings provides another opportunity for IB to include schools in the process, and further ensure the quality of materials and ability to support school implementation.

Sufficient training is also essential for IB staff who will support schools during on-screen implementation. Training should be

specific to the various communication channels, as suggested by one IB staff member who expressed a need for more in-depth training for the IB Answers Team. Ensuring IB staff stay informed of conversations regarding on-screen examinations will facilitate their ability to provide clear and consistent information, answer schools' questions, or direct schools to pertinent information.

## Implications for Implementation

Respondents were very clear that a full-scale move directly to entirely on-screen examinations would not be welcomed. Both survey responses and site visits provided clear evidence of preferences for a phased transition, perhaps starting with single subjects or groups. Site visit respondents wanted a chance to test the new system, preferably in the subject areas they view as more amenable to on-screen examinations (e.g., Language A: literature, history). Those with experience with MYP eAssessments also suggested working out the imperfections with that before moving to on-screen examinations for the DP, which have higher stakes attached for students.

“I think probably something that is phased in in a gradual, gentle, supportive way would, rather than trying to do everything at once, and really reflect on how things work. I guess that’s what they would do anyway would be one or two subjects, I would hope. I would be terrified if I had to suddenly run a whole exam session in this way from one year to the next. I think it’s a big challenge so that’s what I would ask for.” – *Cluster 2 Remarkably Average site visit*

Overall, respondents reported high levels of importance for IB support related to guidance, training and demonstrations, and access to the assessment environment. Similarly, respondents reported high levels of usefulness for all the proposed professional development formats. This suggests that all proposed supports would be necessary and that professional development on both the exam platform and process along with how to prepare students for on-

“So, for things that require a lot more writing as opposed to more calculations, online was easier for most people. I think that percentage, generally, was easier to type. But for things like [mathematics], it was really a waste of time. You have to use a lot of specific math terminology. You can’t just type it. You have to look at it. For a while, it was a lot more difficult. . . . Then, by the time you find out how to put a square root in your equation, you’ve wasted time. You’ve forgotten your train of thought . . . and have to start all over. It’s inefficient.” – *Cluster 4 MYP eAssessment Implementers site visit*

screen examinations over time will be necessary to provide in a variety of formats. Providing training to teachers on preparing students for on-screen examinations, and ensuring teachers have opportunities to understand the assessment platform and create similar mock exams to prepare their students will be essential. Tailoring those trainings and resources to the differing needs of the subject areas would be preferable to a one-size-fits-all approach. Essay-based subject area teachers had few reservations about a move to on-screen examinations (except, perhaps, for the loss of handwriting skills). Not surprisingly, mathematics and science teachers had serious concerns, as did some teachers of social science subjects such as economics. Interestingly, fine arts

such as music envisioned some real possibilities for more authentic assessment in an on-screen format if musical passages, for instance, could be used. Regardless of the particular perceived benefits or challenges associated with on-screen examinations, it was clear from both the survey and site visits that schools would appreciate customized messaging and training.

Generally, respondents were concerned about challenges related to the logistics of on-screen examinations, such as problems loading files onto student devices just before exams, technological failures resulting in loss of student work, length of time/challenges to set up the on-screen examinations on each computer needed (especially with large student cohorts), insufficient or untimely support from IB, and length of time of uploading student exam files to IB. There was a general anxiety that came through many responses in both the survey and the site

visits that *IB needs to get this right* because the DP exams are high stakes for many students. Many of the concerns expressed relate to ensuring this transition does no harm, and history with other initiatives with the IB have not always proven to be smooth. Implementation should include many points at which to test *and refine* the platform, communications, trainings, and other components necessary to the successful global transition to on-screen examinations.

Overall, the IB schools that participated in the survey and site visits had mixed responses to the idea that the IB will be transitioning its DP/CP examinations to an on-screen format. Some were quite enthusiastic about the transition (“It’s about time,” stated one of the site visit IB

coordinators). Many more were willing to make the transition, identified some positives and negatives about on-screen examinations, and would do their best to prepare their students for success if the IB provides teachers and coordinators with timely, freely available training. A few just may not be able to make the transition due to prohibitive costs and other constraints. This span of responses is completely aligned with all research on adoptions of innovations. Using the lessons learned from other innovation adoptions, including IB’s own prior efforts, will help to make the transition successful for the largest number of schools.

“If the rolling out of MyIB is anything to go by, the guidance that we received has not been very helpful. And I have to say, I’ve been doing this 10 years and when they first started using electronic uploads to the visual arts and things like that, it really was an absolute disaster. So, [in] my experience with the IB introducing technological innovation, they certainly get there eventually but it has taken years for the uploading process to be smooth, to be really smooth.” – *Cluster 2 Remarkably Average site visit*

## Recommendations

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IB should consider the following recommendations when deciding next steps in its process toward a possible transition to on-screen examinations.

**Recommendation 1: Roll out examinations in stages.** School personnel have stated clearly their preference for on-screen examinations to be rolled out on a subject-by-subject or group-by-group basis, starting with hypothetically easier-to-adapt examinations for subjects in Groups 1–3 and perhaps 6 before subjects in Groups 4–5 (Experimental Sciences and Mathematics) to alleviate concerns among teachers, students, and school leaders.

**Recommendation 2: Anticipate and alleviate schools' anxieties through early communication and contingency planning.** Schools expect a user-friendly on-screen examination system, accessibility for students with diverse needs, and quick fixes or contingency plans for inevitable technological failures that could result in data loss. IB should ensure that schools are aware of the new system's user-friendliness and accessibility, plus make contingency plans available to mitigate potential issues ranging from hardware failures to power outages.

**Recommendation 3: Roll out implementation communications in stages.** Building on recommendation 2, use Rogers' concepts of "awareness knowledge," "how-to knowledge," and "principles knowledge" to create stages in the communications and guidance roll-out to alleviate evolving questions and concerns as schools absorb each phase of information and consider new issues based on what they now know. For example, start with simply ensuring all schools are aware this transition will be happening. Anticipate the "why" questions and answer them consistently, repeatedly, and before the global IB community has a chance to solidify uninformed opinions. Provide sample protocol language for (a) loading files onto students' own devices before exams, (b) managing technological failures resulting in loss of student work, and (c) logistics for setting up on-screen examinations and uploading student exam files as necessary. Providing such guidelines should help mitigate concerns that schools seem to have about the sufficiency or timeliness of support from IB.

**Recommendation 4: Offer early access to the examination environment.** Schools want clear guidance and ample, timely opportunities to "test drive" an on-screen examination system. It is important to consider that being surveyed and/or site-visited on the topic of on-screen examination transition has undoubtedly created expectations among many leaders of IB schools. There seems to be a groundswell for receiving opportunities as early as possible to explore the on-screen examination environment and to integrate that environment into teaching and learning at IB schools. Teachers want the opportunity to develop their own assessments in the examination environment to familiarise both themselves and their students.

**Recommendation 5: Provide sample on-screen examination paper in all subjects.** Hands-on opportunities with the examination environment should be supplemented with samples of examination papers completed in the on-screen format. Teachers and students will develop comfort and confidence with the new system if they can see what, for example, a mathematics or physics paper looks like when completed in an on-screen system. These examples may best

be shared in a multimedia format through videos to demonstrate the affordances the on-screen environment provides for authentic assessment.

**Recommendation 6: Offer free video-based training.** Schools want clear guidance on the new processes. IB would serve most schools' stated needs by developing a free webinar that includes video demonstrations of every aspect of administering on-screen examinations from the points of view of both teachers/coordinators and students.

**Recommendation 7: Identify specific schools' needs to mitigate schools leaving IB.**

Conduct further pattern analysis among the 10% of schools that indicated a possibility of abandoning the DP/CP if an on-screen system becomes the only assessment option. For example, public school respondents outside the US (13.5%, many of which are in Ecuador, the UK, and Canada) and inside the US (11.5%) seem more likely to consider abandoning the DP/CP if on-screen examinations become the lone option; schools that are "in trouble" also show elevated likelihood of abandoning DP/CP. IB should consider how to communicate uniquely with public and/or "in trouble" schools about the benefits of on-screen examinations and determine ways to mitigate possible barriers. Providing additional supports that are specific to the needs of public and/or "in trouble" schools might also mitigate some potential losses.

**Recommendation 8: Tap expertise of schools that have solved common problems.** IB

could leverage the work of schools that are already implementing digital assessments well (e.g., MYP eAssessment) by establishing a digital resource to which such schools or practitioners can contribute the promising practices they have developed or adopted. This resource might be a learning community, or FAQ centre, or exist in any number of other formats. The resource would benefit schools and practitioners who have not yet found success with on-screen examinations or who have high levels of perceived barriers to implementation. Such a resource would allow successful coordinators to inform their fellow coordinators about alternative approaches to seemingly common problems, such as that of finding suitable examination spaces. Practice-based recommendations would be useful, well-received, and consistent with promising practices for implementation in scholarly literature.

**Recommendation 9: Tailor communications to various stakeholder groups.** Given that survey results suggest parents or other guardians may be more skeptical of on-screen examinations, and the perceptions of other tertiary stakeholders (e.g., universities) are unknown, IB should consider how it uniquely messages the move to on-screen examinations to these and other groups. Communications with parents might emphasize the reasons students prefer on-screen examinations. Communications with teachers and universities could emphasize the greater authenticity afforded through an on-screen platform.

**Recommendation 10: Learn more about extreme responders.** More information is needed about the 10% of schools that say they would need *more than 3 years* (beyond 2021). Perhaps schools are being overly conservative in their perceived readiness and/or ability to adapt. Further data should be gathered to detect potentially malleable factors that might lead a school to make such strong determinations. For example, it could be explored if these schools are being overly conservative in their perceived readiness and/or ability to adapt. A close examination could also be undertaken of those schools that reported an extremely high number of barriers, as this makes them more likely to consider abandoning the DP. These extreme

responders could be at risk of ceasing their IB programme(s) as it is, and may need additional supports even now, prior to the start of the transition to on-screen exams.

**Recommendation 11: Understand policy across levels of schools and systems.** IB should make a concerted effort to understand regional and national policy contexts in order to best support its schools in the transition to on-screen examinations. Demonstrating an understanding of local constraints as well as anticipating possible solutions to barriers created by national or regional policies would help schools that may be particularly challenged by this transition.

## References

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- Futuresource Consulting. (2017). *Sales of mobile PCs into the US K–12 education market continue to grow, as OS battle heats up*. Retrieved from <https://www.futuresource-consulting.com/Press-K-12-Education-Market-Qtr4-0317.html>
- Hall, G. E., & Hord, S. M. (2011). *Implementing change: Patterns, principles, and potholes*. Boston, MA: Pearson.
- International Baccalaureate (IB). (2017a). *About the IB*. Retrieved from <http://www.ibo.org/about-the-ib/>
- International Baccalaureate (IB). (2017b). *Mission*. Retrieved from <http://www.ibo.org/about-the-ib/mission/>
- International Baccalaureate (IB). (2017c). *Facts and figures*. Retrieved from <http://www.ibo.org/about-the-ib/facts-and-figures/>
- International Baccalaureate (IB) Community Blog. (2015, April 14). *An exciting new step for the MYP*. Retrieved from <http://blogs.ibo.org/blog/2015/04/14/an-exciting-new-step-for-the-myp/>
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed). New York, NY: Free Press.