Learning Enrvironment Services, Information Technology Services, The University of Hong Kong

# LEARNING TECHNOLOGY ADOPTION TOOLKIT

[Version 1.0]

Contents

1.) Executive Summary

The use of technology in teaching can deepen student learning by supporting instructional and interactive objectives. In tertiary education area, this can be always challenging to select the "best" technology tools while not losing sign of goals for student learning. Leading to the charge in selecting the right-fit would help avoid a common setback in successful implementation. It is also one of the core roles of Learning Environment Services (LES) of Information Technology Services (ITS) to engage stakeholders in the process and encourage them to take part into its practical usage, as well as to paint the picture of how technology can support the teaching and learning in the University of Hong Kong.

The aim of this **Learning Technology Adoption Toolkit** is to serve as a general resource for ITS and other HKU departments as reference for the consideration of learning technology products in the market. The Toolkit provides information, suggestions and tips for making enhancement. It shall be useful in planning, developing, implementing, and evaluating the technologies with recommendations in a framework of four major phases including "Initiation", "Technical Assessment", "User Assessment" and "Evaluation".

2.) Framework Overview

Phase 1	Phase 2	Phase 3	Phase 4
• Initiation	• Technical Assessment	• User Assessment	• Evaluation
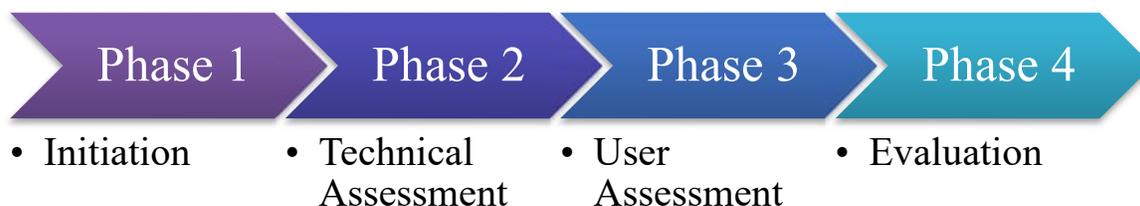
The framework includes four distinct phases, directly influenced by the adoption processes currently used in the University of Hong Kong. Predicted that the use of the Toolkit would not require any drastic deviation from the kind of assessment already undertaken, the key idea for the consideration of the assessment criteria under the same structure is to apply consistently on all future assessments; in particular, those criteria identified in Phase 3 as basis factors.

Phase	Processes	Tools	Outputs
Phase 1: Initiation	• Literature review	• Literature review guidelines	• Objective summary of available literature
Phase 2: Technical Assessment	• Itemisation of functionality • Equipment testing • Pilot scheme resource assessment	• Example documents	• Proof of technical reliability • Detailed break-down of resources required for pilot scheme implementation
Phase 3: User Assessment	• Technical staff assessment • Academic staff assessment • Student assessment	• Standardised assessment criteria • Assessment questionnaires	• Qualitative and quantitative data from three main user groups
Phase 4: Evaluation	• Review of prior outputs		• Short- and/or long-term adoption strategy

2.1) Phase 1: Initiation

Sources of Initiation

During the phase of initiation, a recommendation for the use of a particular technology would come from one or more of four main sources: **Technical Staff, Academic Staff, Students or External Suppliers**.

While the Toolkit aims to keep the adoption process as objective, a certain amount of subjective judgement would be required at this phase in deciding whether to proceed with the subsequent phases, and the criteria by which this decision made be kept flexible. For example, if a significant number of academic staff or students have requested the use of the same piece of technology, there is a strong case for proceeding with a full formal assessment. However, if the recommendation comes from a supplier, the same supplier be responsible for the distribution of the product in question, a little more caution should be employed when deciding upon a course of action.

Literature Review

To aid in the decision-making process, an external literature review should be conducted. This may include analysis of related articles from relevant publications, case studies conducted by other institutions, and where informal engagement with existing users, either internal or external. The extent of the review should be determined to some degree by the potential cost of progressing with the Toolkit.

When conducting the review, the following questions should be taken into account:-

• Has the product ever been used previously in a comparable tertiary education learning environment and/or other commercial sector?
• If so, was it successful?
• Does the product represent a direct replacement for an existing piece of equipment, e.g. a new model of data projector?
• If so, is there a specific and previously identified problem with the old technology that the new technology claims to solve?

Included in the Toolkit is a set of guidelines on creating an effective literature review (See Appendix A). The output from the review is likely to vary in form depending on the technology being assessed – in some situations, a brief tabulated summary of pertinent findings may be sufficient, in others a more formal document may be required. In either case, the process of researching prior experiences of the technology would prove invaluable and any resultant documentation should be retained in order to inform the evaluation process described in the Evaluation phase (Phase 4).

Once the decision has been made to proceed the three phases outlined in the Toolkit, there is an implicit acceptance that the technology has the potential to improve the learning experience for some or all of the user groups outlined in the User Assessment phase (Phase 3). However, a final decision on widespread adoption should not be made until the Evaluation phase (Phase 4).

2.2) Phase 2: Technical Assessment

The aim of the Technical Assessment is to broadly establish whether the technology is fit for purpose, ascertaining whether it performs the functions that are claimed with sufficient reliability to make Phase 3 viable. No assumptions should be made during Phase 2 about the benefits to students and staff, and similarly no judgement should be made at this phase about the cost/benefit relationship.

Ideally, Phase 2 should consist of the following distinct activities:

• An itemisation of technical functionality as specified by the manufacturer

• A thorough test of the equipment to ensure it performs these functions as described and with a reasonable level of reliability

• An initial assessment of the resources required to implement the pilot scheme in Phase 3, giving a detailed breakdown of all associated costs (e.g. unit cost, consumables, installation, maintenance, license fees,…… etc.), and resourcing needs, as well as any potential extra costs, such as relocation, repair, upgrade of components, etc.

Progression to Phase 3 should be automatic unless the technology fails to perform as described, or if the performance is so inconsistent that it is essentially rendered unusable. For all other outcomes, regardless of the subjective opinion of those carrying out the technical assessment, the user assessment process outlined in Phase 3 should be implemented.

At this phase in the assessment, a decision would also need to be made regarding the scale of the pilot scheme detailed in Phase 3, and this should be based upon the results of the resource assessment, the timescale involved and the available budget.

The results of the processes above would vary considerably depending on the nature of the technology in question, but included in the Toolkit is an assessment form template (See Appendix B) featuring some examples of the kind of results which should be expected during this phase.

Recommendations

The adoption of certain technologies would necessitate the replacement/removal of existing equipment. In these instances, it is strongly suggested that existing users are consulted to ensure that there would be no adverse effects on their teaching.

Again, the methods employed for this process would vary depending on the technology. In some cases a planning notice displayed in affected rooms would be sufficient, in others a one-to-one consultation with all affected users would be necessary.

It is also strongly suggested that the technical team/ personnel is actively involved in this process, as they would have experience of similar products and would be aware of potential areas of weakness/ unreliability which may otherwise be overlooked.

2.3) Phase 3: User Assessment

Phase 3 consists of a controlled, small-scale pilot study and associated data collecting process which aims to assess the experiences of various technology user groups. At the end of this phase all the necessary data should be available in order to undertake a well-informed and objective evaluation process.

For the purposes of this assessment, technology users have been split into THREE groups:

- Technical staff
- Academic staff
- Students

In reality, there may be some crossover among these groups, for example a student giving a presentation may interact with lecture theatre/ classroom equipment in the same way as a lecturer. For the sake of simplicity, it is advisable in most circumstances to assume that teachers and students would adopt the traditional roles of presenter and audience, although the Toolkit does allow for modifications to the assessment structure to allow for non-standard teaching technologies (an example of this would be lecture capture, where a student must actively interact with certain features of the technology in order to access recorded materials online).

The specific arrangements for the pilot study would differ considerably depending on the nature of the technology being tested, the size of the institution and the resources available. For relatively cheap, easy to install products it may be possible to conduct a fairly wide-spread evaluation, collecting data from a large number of users over a short period of time. For more expensive or complex products, it may be necessary to limit the pilot to a smaller number of locations and users, and in this scenario it may be beneficial to make the assessment process more detailed in order to compensate for the narrow cross-section of results.

Data Collection and Assessment Guidelines

Each institution would have its own preferences for data collection methods, and different types of technology may require slightly different approaches. As a minimum, it is advisable to assess each user group with some form of questionnaire combined with structured interviews and/or focus groups with key users, ensuring that the data collected is both detailed and wide-ranging.

It is during the data collection phase that the idea of a standardised process really becomes crucial, to ensure consistency and parity between technology evaluations. The standardised criteria (See Appendix C) should be taken into account when conducting the assessment. The headings on the left are fixed assessment categories, and alongside are examples of specific areas that should be assessed for each of the THREE user groups - Technical Staff, Academic Staff & Students.

User Assessment

Technical Staff

It is important to remember that technical staff should not be required to make a judgement on the effectiveness of the technology in a teaching and learning environment. Technical assessment should be limited to aspects of technology adoption specific to those supporting and maintaining the technology and the implications of a wider rollout for the technical team.

Academic Staff

To assist in the assessment, it is recommended that various 'early adopters' were identified within academic staff who agreed to act as a consultation group. It is suggested that a similar group is formed prior to the implementation of Phase 3 to work in conjunction with the space-planning department, giving feedback and advice on the potential benefits and barriers of new technology, while providing a ready-made sample group with which to conduct the pilot scheme.

It is also recommended that any academic staff involved in the pilot are made aware of it from the outset. Not only would this ensure that they are making full use of the technology being assessed, but that during its use they would be aware of the assessment criteria on which they would later be asked to judge the equipment, and therefore be in a position to provide information that is more accurate. In some circumstances, this would also be true with students, and so it may be useful for academic staff to inform their students of the pilot scheme and ask them to consider the benefits or barriers introduced by the new technology.

It would also be necessary in some cases to provide users with sufficient resources to be able to effectively use the technology. This may include briefing sessions, web resources and/or the distribution of user guides.

Students

Due to the potential volume of responses, it is advisable to keep student assessment forms as brief as possible, focusing on key points which can be easily tabulated and compared during the evaluation process. It may also be beneficial to employ technological solutions such as public response systems or online questionnaires to maximise engagement with the student community.

Recommendations

Included in the Toolkit is a set of generic template documents based on the above criteria. These documents can act as a baseline from which modified versions are developed, ensuring the standardised assessment criteria (Appendix C) retained while accommodating different types of technology. See appendix D, E & F for questionnaire templates of user groups.

The nature of the information collected from user interviews and focus groups would necessarily be less prescriptive and predefined than that provided by questionnaires, and it is important to be open to the opinions and experiences of users regardless of how well they fit into the original assessment categories.

It may be useful to create a set of questions which broadly correspond to five categories, but the questions should be as open ended as possible, and digression from the original topic should be encouraged and carefully recorded. It is this type of qualitative data which makes face-to-face assessment so valuable, and by giving serious consideration to the concerns and suggestions of key user groups a firm basis would be obtained for any future decision to either adopt or reject the technology in question.

This data would also highlight any difficulties various user groups may have with using the technology, allowing necessary measures to be taken to encourage effective use should a full adoption being implemented.

2.4) Phase 4: Evaluation

The data collection process can be made relatively objective and the evaluation process, including the final decision regarding the adoption or rejection of a given technology, would in reality always be undertaken by one or more people. The aim of the Toolkit is to provide necessary data for the relevant groups to make recommendations, and for that data to be standardised for all future decision making processes.

The data provided by the Toolkit and its suggested application to the decision making process can be summarised as follows:
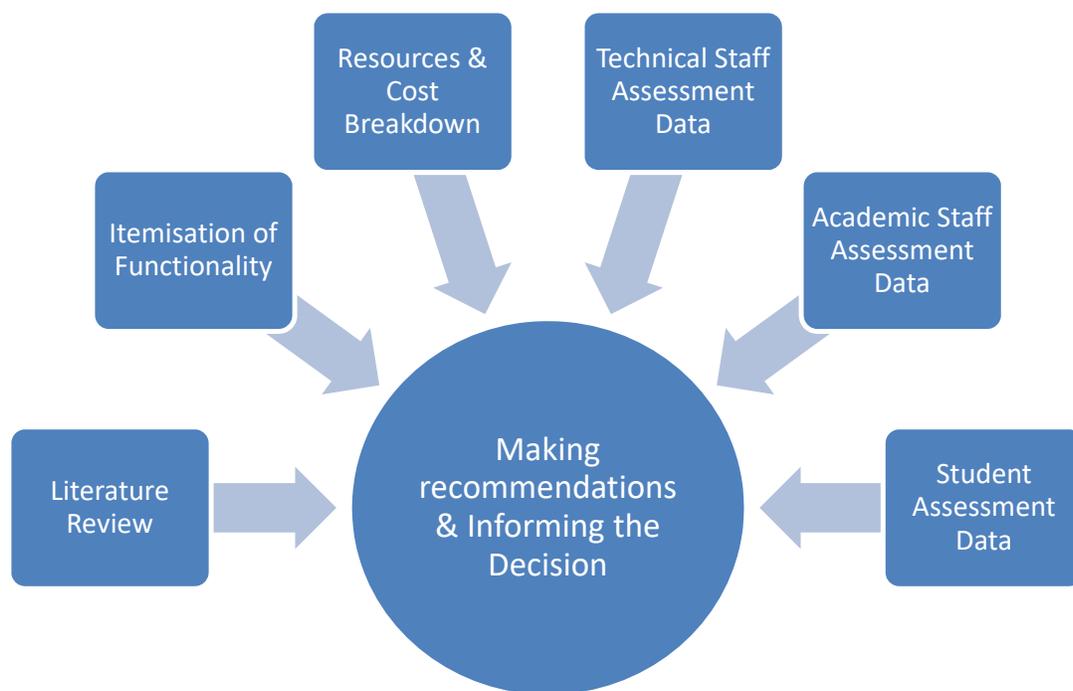
Literature Review

Literature Review (Phase 1) would provide a summary of the available literature on the technology in question. The needs, structure and resources of every institution are different, and so it would be unwise to base a decision on adoption solely on external information. However, there could be valuable lessons that were learned elsewhere which help develop a wider adoption strategy.

Technical Assessment

Itemisation of Functionality

By this phase, the technical functionality would have been tested by a variety of different users, and so it may be beneficial to revisit the itemised list created in Phase 2 to ensure that all functions have performed reliably and as specified throughout the assessment period.

Resources & Cost Breakdown

The initial cost breakdown was intended to inform only the implementation of Phase 3, and while many of the associated costs may be the same for a wider rollout it would be necessary to create a number of costing options scaling up the technology deployment to usable numbers, which can be referred to during the evaluation process.

Technical Staff Assessment Data

The information provided by the technical staff that support and maintain the technology would be essential in formulating an adoption strategy. As this role often brings technical staff into contact with front-line users there is also the opportunity to collect supplementary anecdotal evidence of the experiences of academic staff.

Academic Staff Assessment Data

This is arguably the most important information collected and should therefore be weighted appropriately. Although students would be the ultimate beneficiaries of any improvement in the learning experience, it is primarily teachers who would be using the technology and having to incorporate it into the delivery of their existing material. Not only would the data from the academic staff assessment give a good indication of whether or not a technology should be adopted, it would also highlight issues which may need to be addressed in the event of that adoption, such as user training, specialist maintenance etc.

Student Assessment Data

While student assessment can provide valuable information on the use of teaching technology, it is also worth bearing in mind that students may not be the most reliable sources. For example, if you asked students if they would like the answers to the end of year exams in advance, the majority would probably say yes. For this reason, it is important to identify in advance the role that student assessment should play, the specific type of results that is expected from it and the best way in which to obtain those results.

Considerations and Barriers

An added benefit of the Toolkit is that, it would highlight any potential barriers to the future uptake of the technology by each of the various user groups. For example, it may be that not all user groups are in agreement about the benefits offered by the technology, and in this situation, it would be necessary to carefully assess any concerns and ensure that they are addressed should a full adoption be implemented. The free text areas in the assessment documents and the information collected during interviews and focus group sessions would be particularly useful in identifying these potential problems.

Future Development

The evaluation phase is necessarily the least prescriptive part of the adoption process, and would therefore benefit the most from real-life case studies being created and shared.

3.) Adoption Strategies

To add some structure to the decision making process, it may be beneficial to identify in advance some potential courses of action, broad examples of which are shown below, along with the likely implications/requirements for each strategy.

Full Adoption

- All teaching rooms are equipped with the technology
- Extensive training/support resources are made available to ensure effective and widespread use
- Long term evaluation strategy is put in place to assess continued relevance and to collect examples of best practice

Partial Adoption

- Selected rooms are equipped with the technology. These may be rooms of a certain size, within certain departments or which perform a specialist function (e.g. science lab, computer room etc.)
- If the results of the initial assessment process prove inconclusive it may be necessary to expand and/or extend the trial period
- If it is decided that the service performed by the technology is beneficial, but that there are problems with the specific technology being trialled, it may be necessary to delay full adoption until an alternative solution becomes available

Rejection

- Technology is deemed unsuitable and is removed from venues
- Consultation with existing users is required, and alternative arrangements such as a phased decommissioning process may need to be implemented to accommodate continued use

4.) Conclusion

As indicated in the title, this is Version 1.0 of the Toolkit, and it is hoped that rather than being a definitive methodology the ideas and structure described would provide a basis from which more accurate and ultimately more beneficial versions may be developed. Although its individual components have each been tested in isolation during the creation of this initial version, the Toolkit has not, at the time of writing, been tested systematically from initiation through to conclusion, and so it is inevitable that some elements may need to be added, removed or altered.

Appendix A: Literature Review Guidelines

A literature review consists of a concise and focused summary of published material which relates directly to a particular topic or theme.   The review should be an entirely objective document, and should not seek to introduce new ideas or new interpretations of existing material. Below are some guidelines which can be used as a point of reference when constructing a literature review:

- Organisation:

  - **Introduction:** state intent, give any necessary background info

  - **Body:** It is often useful to provide an initial 'thesis statement' (e.g.'the use of lecture capture in higher education has a negative impact on student attendance') which is then used as a focus around which your sources are organised. It is generally better to arrange the text by theme rather than by publication, so rather than a list of sources with a summary next to each, you would create a list of sub-themes with references to the most relevant sources contained within the text

  - **Conclusion:** discuss what overall conclusions can be drawn and what further questions may have been raised by the sources you have discussed.   Relate this to the initial thesis statement

- Depending on the situation, a literature review may also evaluate the individual sources and advise the reader on the most pertinent or relevant. This is particularly true of research into technology, as companies would often publish large amounts of positive evidence to support their particular field with very little negative evidence to balance it

- Consider time-frame – literature reviews on technology would need to focus on relatively recent sources to ensure they are still relevant. Use of older sources may require a qualifying statement to justify their inclusion

- It is often useful to find examples of previous reviews, either on the same subject or one that is closely related, to act as a reference point for layout, organisation etc.

- When searching for sources it is advisable to narrow the topic as far as possible, e.g. rather than searching for 'lecture capture' search for 'lecture capture benefits and barriers'.   This would make the process of collecting information far more manageable and ensure that the results are applicable to your enquiry

- All points made in the text should be backed up by evidence from the sources and

- Direct quotes should be used sparingly and all points should be referenced

- Keep the document concise – it is a summary, not an in-depth study, so select only the most important points

Appendix B: Technical Assessment Form

Technology support area: _____

Equipment make/model: _____

Equipment Photo

Description of the device

B1.) How much time is required for installation (per unit)?

B2.) How much training is required to allow AV technicians to provide front-line support to users (e.g. basic functionality, fault-finding, integration issues, etc.)?

B3.) Please provide details, if available, of call-out statistics for the trial period:

- Equipment failure:
- User error:
- Integration issues:
- Time per callout:

B4.)   i.) Did installation require any modifications to existing technology and/or room configuration?

Yes / No

ii.) If yes, please provide details of the major issues:

B5.) Other comments:

- General impressions

- Unforeseen issues

- Recommendations for future roll-out

Appendix C: Standardised Assessment Criteria

	Technical Staff	**Academic Staff**	**Students**
Complexity	• Time/effort required to install/maintain • Training required to effectively support	• Time/effort required to become familiar • Assessment of training/support (where relevant)	• Ease of use (where relevant, e.g. lecture capture interface) • Negative impact on teaching
Reliability	• Impact of regular support call-outs/repairs on staff resourcing	• Any negative impact on teaching due to unreliable performance	• Disruption to classes due to unreliable performance
Integration	• With existing technology • With existing room configuration	• With existing teaching material • With existing technology	• With existing technology, where relevant (e.g. with Virtual Learning Environment)
Impact	• Effects on support requirements	• Effects on delivery – encourage or prevent certain teaching methods	• Effects on student experience, i.e. enhance understanding/enjoyment
Future Use	• General recommendations for future rollout	• Would it be used in future? • Would user recommend to colleagues? • Would user support wider investment?	• Would the technology be missed if unavailable? • Would the technology be desirable in other classes?

Appendix D: Technical Staff Assessment Questionnaire

D1.) Rating and Comment

Function	Rating (1 - 5)	Additional Comments	Flag

D2.) Estimated Cost

Item	Details	Cost
	Total:	

Appendix E: Academic Staff Assessment Questionnaire

Equipment make/model: _____

Department/ Course: _____

Name (Optional): _____

Venue technology primarily used: _____

E1.) Use of Technology

i.) Please indicate to what extent you agree or disagree with the following statements:

Description	Put ✓ to indicate				
	Strongly agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
I find the technology easy to access					
I find the technology easy to use					
I find the technology performs reliably					
The time and effort required to become familiar with the technology is reasonable					
I have received sufficient support and guidance in using the technology					
The technology met my expectations					
I feel confident in using the technology in my classes					

ii.) Comment (i.e. any experience sharing about your usage of teaching technology, any unexpected benefits or barriers, etc.)

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E2. Learning and Teaching

i.) To what extent do you feel the technology has enhanced the delivery of your teaching materials? (Please circle one answer only):

A great deal	A little	Not sure	Not very much	Not at all

ii.) Please briefly outline how the technology has enhanced your teaching in this context, for example is there a specific issue that the technology has resolved?

iii.) To what extent do you feel that the technology integrates well with other teaching materials used in this context?

A great deal	A little	Not sure	Not very much	Not at all

E3. Future Use

i.) Please indicate to what extent you agree or disagree with the following statements:

Description	Put ✓ to indicate				
	Strongly agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
I have a generally favourable attitude towards using new technologies					
If the technology was available to me in the future I would use it					
I would recommend the technology to my peers					
I would support the University investing more widely in the technology					

Appendix F: Student Assessment Questionnaire

Equipment make/model: _____

Department/ Course: _____

Name (Optional): _____

Venue technology primarily used: _____

F1.) Use of Technology

i.) Please indicate to what extent you agree or disagree with the following statements:

Description	Put ✓ to indicate				
	Strongly agree	**Agree**	**Neither agree nor disagree**	**Disagree**	**Strongly disagree**
I feel the use of the technology is appropriate in this particular learning/teaching context					
I feel the use of the technology enhances my understanding of the subject					
I feel the technology makes the subject more enjoyable					
I would like the technology to be available for other subjects in the future					
I would miss the technology if it were unavailable					

ii.) Comment (i.e. were there any uses of the technology which you found particularly helpful, or any problems which may have disrupted your classes… etc.)

_____